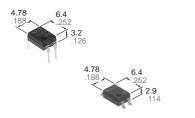


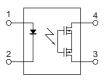


#### GU (General Use)-E Type 1-Channel (Form B) 4-pin Type

# PhotoMOS RELAYS



mm inch

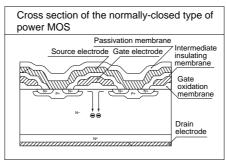


#### **FEATURES**

# 1. Low on resistance for normally-closed type

This has been realized thanks to the builtin MOSFET processed by our proprietary method, DSD (Double-diffused and Selective Doping) method.

Cross section of the normally-closed type of power MOS



# 2. Reinforced insulation 5,000 V type More than 0.4 mm internal insulation distance between inputs and outputs. Conforms to EN41003, EN60950 (reinforced insulation).

#### 3. Compact 4-pin DIP size

The device comes in a compact (W)6.4×(L)4.78×(H)3.2mm (W).252×(L).188×(H).126inch, 4-pin DIP size

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

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

5. High sensitivity, low ON resistance Can control a maximum 0.13 A load current with a 5 mA input current. Low ON resistance of 18 $\Omega$  (AQY410EH). Stable operation because there are no metallic contact parts.

6. Low-level off state leakage current

#### TYPICAL APPLICATIONS

- Modem
- Telephone equipment
- Security equipment
- Sensors

#### **TYPES**

|       | I/O isolation<br>voltage | Output rating* |                   |                       | Pa                     | Packing quantity             |                              |                             |            |
|-------|--------------------------|----------------|-------------------|-----------------------|------------------------|------------------------------|------------------------------|-----------------------------|------------|
| Туре  |                          |                |                   | Through hole terminal | Surface-mount terminal |                              |                              |                             |            |
|       |                          | Lood           | Load Load current |                       |                        | Tape and reel packing style  |                              |                             | Tape and   |
|       |                          | voltage        |                   | Tube pac              | king style             | Picked from the 1/2-pin side | Picked from the 3/4-pin side | Tube                        | reel       |
| AC/DC | Reinforced               | 350 V          | 130 mA            | AQY410EH              | AQY410EHA              | AQY410EHAX                   | AQY410EHAZ                   | 1 tube contains 100 pcs.    | 1,000 pcs. |
| type  | 5,000 V                  | 400 V          | 120 mA            | AQY414EH              | AQY414EHA              | AQY414EHAX                   | AQY414EHAZ                   | 1 batch contains 1,000 pcs. | 1,000 μcs. |

<sup>\*</sup>Indicate the peak AC and DC values.

Note: For space reasons, the initial letters of the product number "AQY", the SMD terminal shape indicator "A" and the package type indicator "X" and "Z" are omitted from the seal.

#### **RATING**

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

| Item                    |                         | Symbol           | AQY410EH (A)     | AQY414EH (A)                       | Remarks                              |
|-------------------------|-------------------------|------------------|------------------|------------------------------------|--------------------------------------|
| Input                   | LED forward current     | lF               | 50 r             |                                    |                                      |
|                         | LED reverse voltage     | VR               | 3,               |                                    |                                      |
|                         | Peak forward current    | IFP              | 1.               | f = 100 Hz, Duty factor = 0.1%     |                                      |
|                         | Power dissipation       | Pin              | 75 n             |                                    |                                      |
| Output                  | Load voltage (peak AC)  | VL               | 350 V            | 400 V                              |                                      |
|                         | Continuous load current | IL               | 0.13 A           | 0.12 A                             |                                      |
|                         | Peak load current       | Ipeak            | 0.4 A            | 0.3 A                              | 100 ms (1 shot), V <sub>L</sub> = DC |
|                         | Power dissipation       | Pout             | 500 mW           |                                    |                                      |
| Total power dissipation |                         | Рт               | 550              |                                    |                                      |
| I/O isolation voltage   |                         | Viso             | 5,000            |                                    |                                      |
| Tempe                   | erature Operating       | Topr             | –40°C to +85°C - | Non-condensing at low temperatures |                                      |
| lim                     | nits Storage            | T <sub>stg</sub> | -40°C to +100°C  |                                    |                                      |

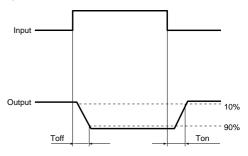
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

| Item          |                                  |         | Symbol           | AQY410EH (A)   | AQY414EH (A)                 | Condition  |  |
|---------------|----------------------------------|---------|------------------|----------------|------------------------------|--|--|
|               | LED operate                      | Typical |                  | 1.4 mA         | 1.3 mA                       | l. May   |  |
|               | (OFF) current                    | Maximum | Foff             | 3.0            | ─ I∟=Max.                    |  |  |
| lanut         | LED reverse<br>(ON) current      | Minimum | l Fon            | 0.4            | l∟=Max.                      |  |  |
| Input         |                                  | Typical | IFon             | 1.3 mA         | 1.2 mA                       | IL=IVIAX.  |  |
|               | LED dropout                      | Typical | VF               | 1.14 (1.25 V a | I <sub>F</sub> = 5 mA        |  |  |
|               | voltage                          | Maximum | VF               | 1.5 V          |                              |  |  |
|               | 0                                | Typical | Ron              | 18Ω            | 26Ω                          | I <sub>F</sub> = 0 mA<br>I <sub>L</sub> = Max.<br>Within 1 s on time |  |
| Output        | On resistance                    | Maximum |                  | 25Ω            | 35Ω                          |  |  |
| ·             | Off state leak-<br>age current   | Maximum | Leak             | 10μΑ           |                              | I <sub>F</sub> = 5 mA<br>V <sub>L</sub> = Max.                       |  |
|               | Operate (OFF) time*              | Typical | _                | 1.0 ms         | 0.8 ms                       | I <sub>F</sub> = 0 mA>5 mA   |  |
|               |                                  | Maximum | T <sub>off</sub> | 3.0 ms         |                              | I∟= Max.   |  |
|               | Reverse (ON)<br>time*            | Typical | _                | 0.3 ms         | 0.2 ms                       | I <sub>F</sub> = 5 mA>0 mA   |  |
| ransfer char- |                                  | Maximum | Ton              | 1.0 ms         |                              | I∟= Max.   |  |
| acteristics   | I/O conscitones                  | Typical |                  | 0.8            | f =1MHz<br>V <sub>B</sub> =0 |  |  |
|               | I/O capacitance                  | Maximum | Ciso             | 1.5            |                              |  |  |
|               | Initial I/O isolation resistance | Minimum | Riso             | 1,000ΜΩ        |                              | 500 V DC   |  |

Note: Recommendable LED forward current  $I_F = 5$  to 10mA.

For type of connection, see page 32.

#### \*Operate/Reverse time

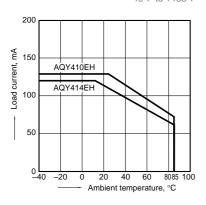


- **■** For Dimensions, see Page 27.
- For Schematic and Wiring Diagrams, see Page 32.
- For Cautions for Use, see Page 36.

#### REFERENCE DATA

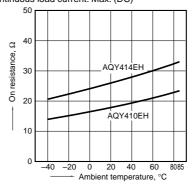
1. Load current vs. ambient temperature characteristics

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



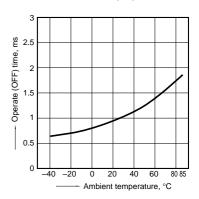
2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4; LED current: 0 mA; Load voltage: Max.(DC); Continuous load current: Max. (DC)



3. Operate (OFF) time vs. ambient temperature characteristics

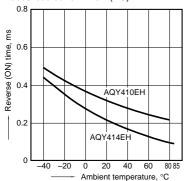
LED current: 5 mA; Load voltage: Max. (DC); Continuous load current: Max. (DC)



#### AQY41OEH

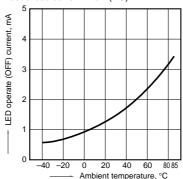
# 4. Reverse (ON) time vs. ambient temperature characteristics

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



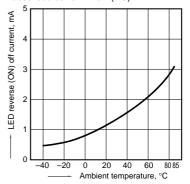
# 5. LED operate (OFF) current vs. ambient temperature characteristics

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



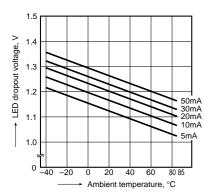
# 6. LED reverse (ON) current vs. ambient temperature characteristics

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



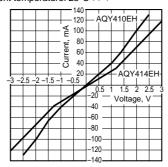
# 7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



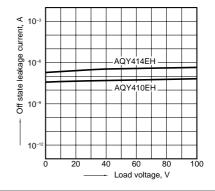
# 8. Voltage vs. current characteristics of out-put at MOS portion

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



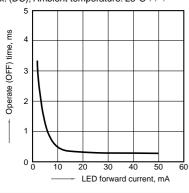
#### 9. Off state leakage current

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



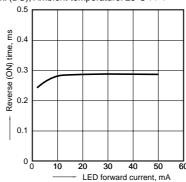
# 10. LED forward current vs. Operate (OFF) time characteristics

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



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

Measured portion: between terminals 3 and 4; Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature:  $25^{\circ}C$   $77^{\circ}F$ 



# 12. Applied voltage vs. output capacitance characteristics

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

