

Normally closed DIP4-pin
economic type with
reinforced insulation

PhotoMOS[®]
GU-E 1 Form B
(AQY410EH)



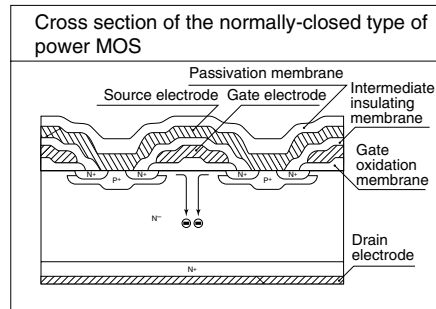
RoHS compliant

FEATURES

1. High cost-performance type of PhotoMOS 1 Form B output

2. Low on-resistance

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



3. Reinforced insulation of 5,000 V

More than 0.4 mm internal insulation distance between inputs and outputs. Conforms to EN41003, EN60950 (reinforced insulation).

4. Controls low-level analog signals

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

5. High sensitivity and low on-resistance

Can control max. 0.55 A load current with 5 mA input current.

Low on-resistance of typ. 1Ω (AQY412EH).

6. Low-level off-state leakage current

TYPICAL APPLICATIONS

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

TYPES

| Type | I/O isolation voltage | Output rating* | | Package | Part No. | | | | Packing quantity | |
|----------------|-----------------------|------------------------------|------------------------------|----------|-----------------------|------------------------|------------|-----------------------------|-----------------------------------------------------------|------------|
| | | | | | Through hole terminal | Surface-mount terminal | | | | |
| | | | | | | Tube packing style | | Tape and reel packing style | | Tube |
| 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 | 60 V | 550 mA | DIP4-pin | AQY412EH | AQY412EHA | AQY412EHAX | AQY412EHAZ | 1 tube contains: 100 pcs. 1 batch contains: 1,000 pcs. | 1,000 pcs. |
| | | 350 V | 130 mA | | AQY410EH | AQY410EHA | AQY410EHAX | AQY410EHAZ | | |
| | | 400 V | 120 mA | | AQY414EH | AQY414EHA | AQY414EHAX | AQY414EHAZ | | |

*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 device. (Ex. the label for product number AQY412EHAX is 412EH.)

RATING

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

| Item | | Symbol | AQY412EH(A) | AQY410EH(A) | AQY414EH(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 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 | 0.55 A | 0.13 A | 0.12 A | Peak AC, DC |
| | Peak load current | I _{peak} | 1.5 A | 0.4 A | 0.3 A | 100 ms (1 shot), V _L = DC |
| | Power dissipation | P _{out} | 500 mW | | | |
| Total power dissipation | | P _T | 550 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 | | | |

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

| Item | | Symbol | AQY412EH(A) | AQY410EH(A) | AQY414EH(A) | Condition |
|----------------------------------|---------------------------|------------------|----------------------------------------|-------------|-------------|----------------------------------------------------------------------|
| Input | LED operate (OFF) current | Typical | 1.4 mA | | | I _L =Max. |
| | | Maximum | 3.0 mA | | | |
| | LED reverse (ON) current | Minimum | 0.4 mA | | | I _L =Max. |
| Typical | | 1.3 mA | | | | |
| | LED dropout voltage | Typical | 1.25 (1.14 V at I _F = 5 mA) | | | I _F = 50 mA |
| | | Maximum | 1.5 V | | | |
| Output | On resistance | Typical | 1Ω | 18Ω | 26Ω | I _F = 0 mA I _L = Max. Within 1 s on time |
| | | Maximum | 2.5Ω | 25Ω | 35Ω | |
| | Off state leakage current | Maximum | I _{Leak} | 10μA | | I _F = 5 mA V _L = Max. |
| Transfer characteristics | Operate (OFF) time* | Typical | 3.0 ms | 1.0 ms | 0.8 ms | I _F = 0 mA → 5 mA I _L = Max. |
| | | Maximum | 10.0 ms | 3.0 ms | | |
| | Reverse (ON) time* | Typical | 0.2 ms | 0.3 ms | 0.2 ms | I _F = 5 mA → 0 mA I _L = Max. |
| | | Maximum | 1.0 ms | | | |
| | I/O capacitance | Typical | C _{iso} | 0.8 pF | | f = 1MHz V _B = 0 V |
| Maximum | | 1.5 pF | | | | |
| Initial I/O isolation resistance | Minimum | R _{iso} | 1,000MΩ | | 500 V DC | |

*Operate/Reverse 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 _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 Corporation technical representative.
For more information.

REFERENCE DATA

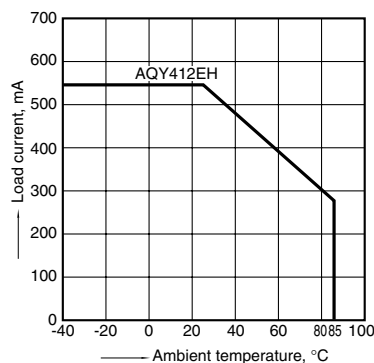
1-(1). Load current vs. ambient temperature characteristics

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. 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)



GU-E 1 Form B (AQY410EH)

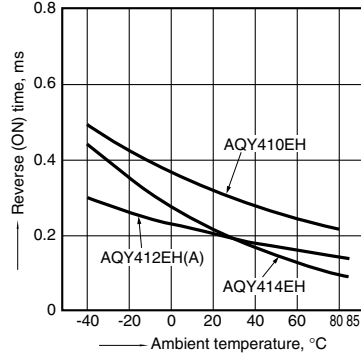
3. Operate (OFF) time vs. ambient temperature characteristics

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



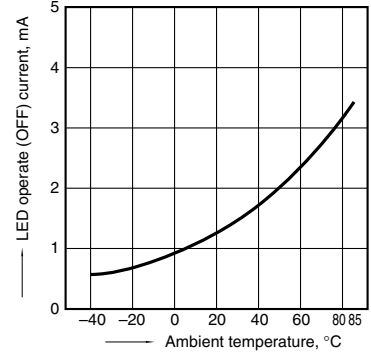
4. Reverse (ON) time vs. ambient temperature characteristics

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



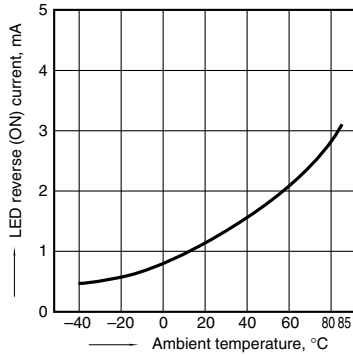
5. LED operate (OFF) current vs. ambient temperature characteristics

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



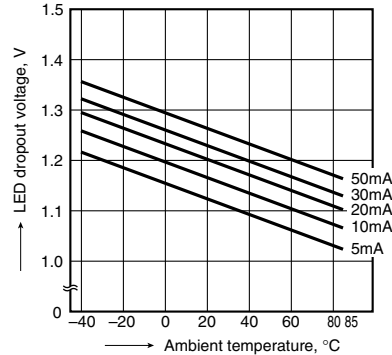
6. LED reverse (ON) current vs. ambient temperature characteristics

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



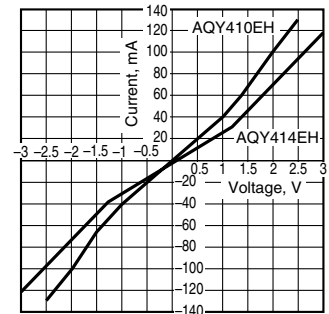
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



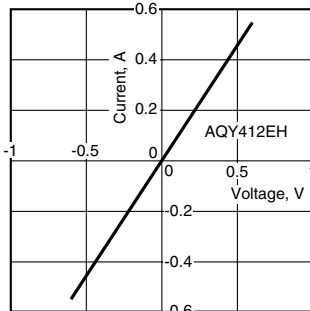
8-(1). Current vs. voltage characteristics of output at MOS portion

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



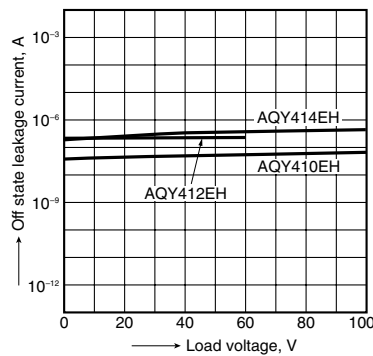
8-(2). Current vs. voltage characteristics of output at MOS portion

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



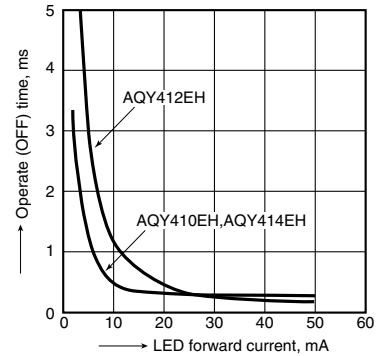
9. Off state leakage current vs. load voltage characteristics

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



10. Operate (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. Reverse (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



12. Output capacitance vs. applied voltage characteristics

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

