



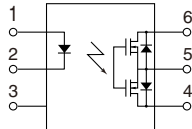
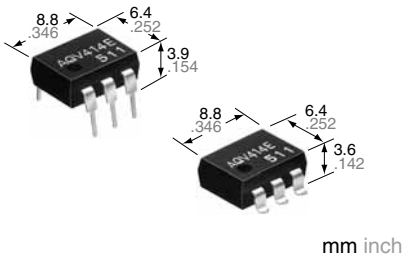


Standard type:  (AQV412EH) / Reinforced type:  (AQV410EH, 414EH)  

**Normally closed type
with reinforced insulation**

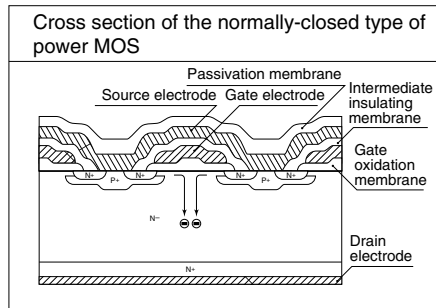
**PhotoMOS[®]
GE 1 Form B
(AQV414E, AQV410EH)**



RoHS compliant

FEATURES

- 1 Form B output type**
- 2 60V type couples high capacity (0.55A) with low on-resistance (typ. 1Ω).**
- 3 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.



- 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 (AQV412EH).

- 6 Low-level off-state leakage current of max. 1 μA (AQV414E)**

- 7 Reinforced insulation 5,000 V type also available**

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

TYPICAL APPLICATIONS

- Power supply
- Measuring equipment
- Security equipment
- Telephone equipment
- Sensing equipment

TYPES

| | I/O isolation voltage | Output rating* | | Package | Part No. | | | | Packing quantity | |
|----------------|-------------------------|----------------|--------------|----------|-----------------------|------------------------|--------------------------------|--------------------------------|--|---------------|
| | | Load voltage | Load current | | Through hole terminal | Surface-mount terminal | | | Tube | Tape and reel |
| | | | | | | Tube packing style | Tape and reel packing style | | | |
| | | | | | | | Picked from the 1/2/3-pin side | Picked from the 4/5/6-pin side | | |
| AC/DC dual use | 1,500 V AC (Standard) | 400 V | 120 mA | DIP6-pin | AQV414E | AQV414EA | AQV414EAX | AQV414EAZ | 1 tube contains: 50 pcs. 1 batch contains: 500 pcs. | 1,000 pcs. |
| | | 60 V | 550 mA | | AQV412EH | AQV412EHA | AQV412EHAX | AQV412EHAZ | | |
| | 5,000 V AC (Reinforced) | 350 V | 130 mA | | AQV410EH | AQV410EHA | AQV410EHAX | AQV410EHAZ | | |
| | | 400 V | 120 mA | | AQV414EH | AQV414EHA | AQV414EHAX | AQV414EHAZ | | |

*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

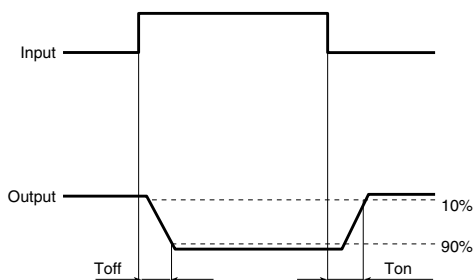
1. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

| Item | Symbol | Type of connection | AQV414E(A) | AQV412EH(A) | AQV410EH(A) | AQV414EH(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 | | | | | |
| Load voltage (peak AC) | V_L | | 400 V | 60 V | 350 V | 400 V | | |
| Output | Continuous load current | I_L | A | 0.12 A | 0.55 A | 0.13 A | 0.12 A | A connection: Peak AC, DC B,C connection: DC |
| | | | B | 0.13 A | 0.65 A | 0.15 A | 0.13 A | |
| | | | C | 0.15 A | 0.8 A | 0.17 A | 0.15 A | |
| | Peak load current | I_{peak} | | 0.3 A | 1.5 A | 0.4 A | 0.3 A | A connection: 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} | | 1,500 V AC | | 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 | Type of connection | AQV414E(A) | AQV412EH(A) | AQV410EH(A) | AQV414EH(A) | Condition | | |
|----------------------------------|---------------------------|--------------------|----------------------------------|-------------|-------------|-------------|------------------------------|--|--|
| Input | LED operate (OFF) current | Typical | 1.45 mA | 1.9 mA | | | $I_L = Max.$ | | |
| | | Maximum | 3.0 mA | | | | | | |
| | LED reverse (ON) current | Minimum | 0.3 mA | 0.4 mA | | | $I_L = Max.$ | | |
| | | Typical | 1.40 mA | 1.8 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 | 26 Ω | 1 Ω | 18 Ω | 25.2 Ω | $I_F = 0 mA$ $I_L = Max.$ Within 1 s on time |
| | | | | | Maximum | 50 Ω | 2.5 Ω | 35 Ω | |
| | | Typical | R_{on} | B | 20 Ω | 0.55 Ω | 13 Ω | 19 Ω | |
| | | | | | Maximum | 25 Ω | 1.3 Ω | 17.5 Ω | |
| | Typical | R_{on} | C | 10 Ω | 0.3 Ω | 6.5 Ω | 10 Ω | $I_F = 0 mA$ $I_L = Max.$ Within 1 s on time | |
| | | | | Maximum | 12.5 Ω | 0.7 Ω | 8.8 Ω | | 12.5 Ω |
| Off state leakage current | Maximum | I_{Leak} | 1 μA | 10 μA | | | $I_F = 5 mA$ $V_L = Max.$ | | |
| Transfer characteristics | Operate (OFF) time* | Typical | T_{off} | — | 0.7 ms | 3 ms | 1.5 ms | 1.3 ms | $I_F = 0 mA \rightarrow 5 mA$ $I_L = Max.$ |
| | | Maximum | | | 2.0 ms | 8 ms | 3.0 ms | | |
| | Reverse (ON) time* | Typical | T_{on} | — | 0.1 ms | 0.3 ms | | | $I_F = 5 mA \rightarrow 0 mA$ $I_L = Max.$ |
| | | Maximum | | | 1.0 ms | 1.5 ms | | | |
| | I/O capacitance | Typical | C_{iso} | — | 0.8 pF | | | | f = 1 MHz $V_B = 0 V$ |
| Maximum | | 1.5 pF | | | | | | | |
| Initial I/O isolation resistance | Minimum | R_{iso} | — | 1,000 MΩ | | | 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 | Standard type: 5 Reinforced type: 5 to 10 | mA |

■ These products are not designed for automotive use.

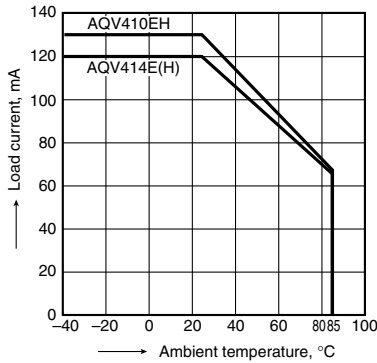
If you are considering to use these products for automotive applications, please contact your local Panasonic Corporation technical representative.

REFERENCE DATA

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

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

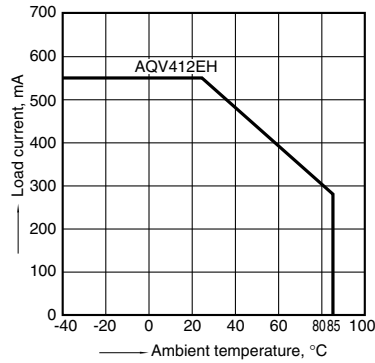
Type of connection: A



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

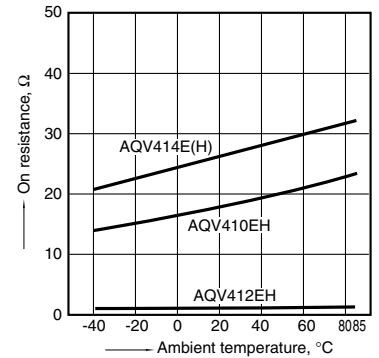
Allowable ambient temperature: -40°C to +85°C
-40°F to +185°F

Type of connection: A



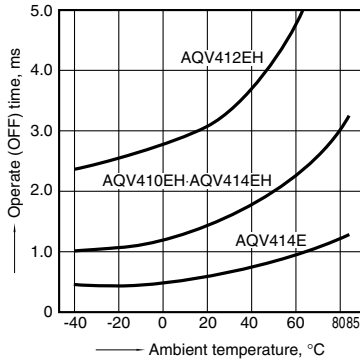
2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;
LED current: 0 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



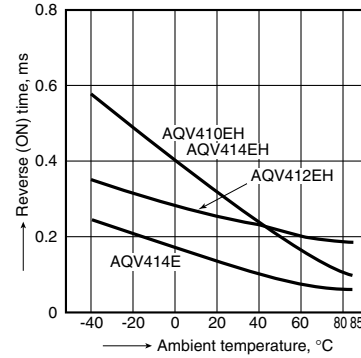
3. Operate (OFF) time vs. ambient temperature characteristics

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



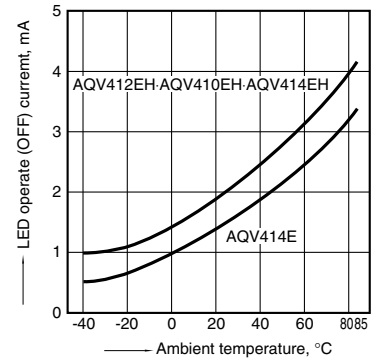
4. Reverse (ON) time vs. ambient temperature characteristics

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



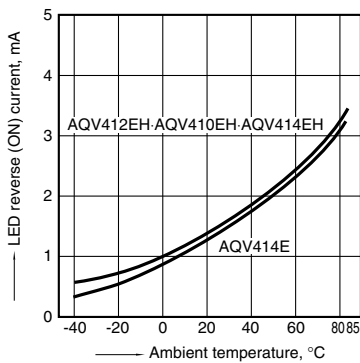
5. LED operate (OFF) current vs. ambient temperature characteristics

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



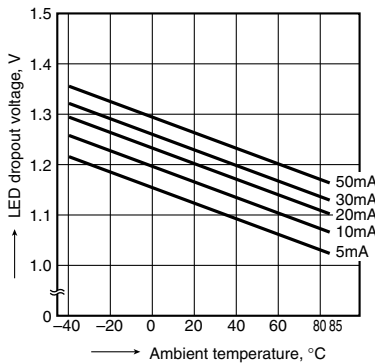
6. LED reverse (ON) current vs. ambient temperature characteristics

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



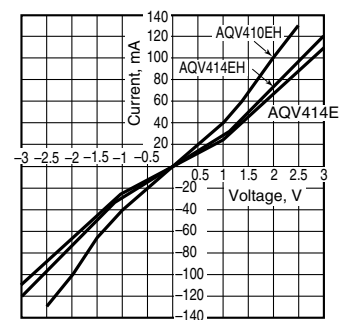
7. LED dropout voltage vs. ambient temperature characteristics

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



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

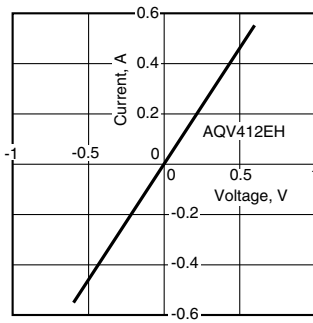
Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



GE 1 Form B (AQV414E, AQV410EH)

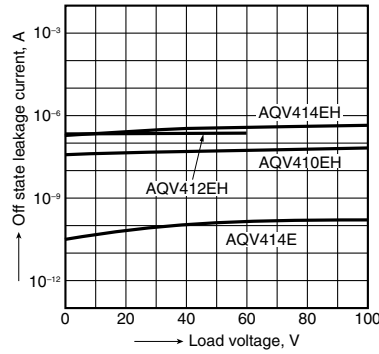
8-(2). Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



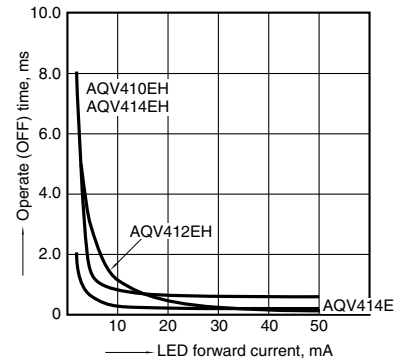
9. Off state leakage current vs. load voltage characteristics

Sample: All types;
Measured portion: between terminals 4 and 6;
LED current: 5 mA; Ambient temperature: 25°C 77°F



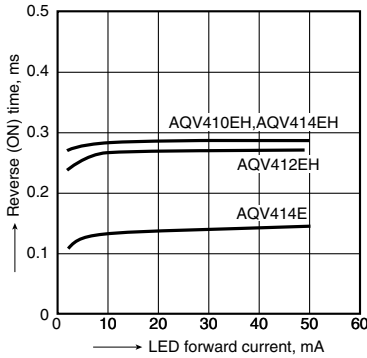
10. Operate (OFF) time vs. LED forward current characteristics

Measured portion: between terminals 4 and 6;
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



11. Reverse (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



12. Output capacitance vs. applied voltage characteristics

Measured portion: between terminals 4 and 6;
Frequency: 1 MHz;
Ambient temperature: 25°C 77°F

