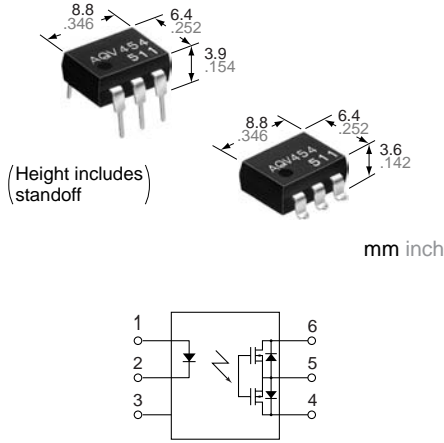


**Normally closed
DIP6-pin type
Low on-resistance with
250V/400V load voltage**

PhotoMOS Relays
HE 1 Form B
 (AQV450, AQV454H)

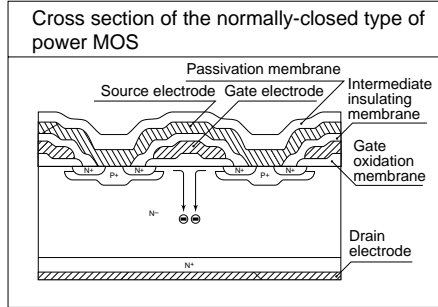


Compliance with RoHS Directive

FEATURES

1. 1 Form B (Normally-closed) type with low on-resistance

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



2. Controls low-level analog signals

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

3. High sensitivity and low on-resistance

Can control max. 0.2 A load current with 5 mA input current. Low on-resistance of typ. 5.5 Ω (AQV453).

4. Reinforced insulation 5,000 V type also available.

More than 0.4 mm .016 inch internal insulation distance between inputs and outputs. Conforms to IEC950 (reinforced insulation).

TYPICAL APPLICATIONS

- Security equipment
- High-speed inspection machines
- Measuring instruments
- Telephone equipment
- Sensing equipment

TYPES

| | I/O isolation | Output rating* | | Package | Part No. | | | | Packing quantity | |
|----------------|-----------------------|----------------|--------------|--------------------|--------------------------------|--------------------------------|-----------|-----------|--|------------|
| | | Load voltage | Load current | | Through hole terminal | Surface-mount terminal | | Tube | Tape and reel | |
| | | | | | | Tape and reel packing style | | | | |
| | | | | Tube 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 | 250 V | 200 mA | DIP6-pin | AQV453 | AQV453A | AQV453AX | AQV453AZ | 1 tube contains: 50 pcs. 1 batch contains: 500 pcs. | 1,000 pcs. |
| | | 400 V | 150 mA | | AQV454 | AQV454A | AQV454AX | AQV454AZ | | |
| | Reinforced 5,000 V AC | | | | AQV454H | AQV454HA | AQV454HAX | AQV454HAZ | | |

* Indicate the peak AC and DC values.
Note: The surface mount terminal indicator "A" and the packing style indicator "X" or "Z" are not marked on the relay.

RATING

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

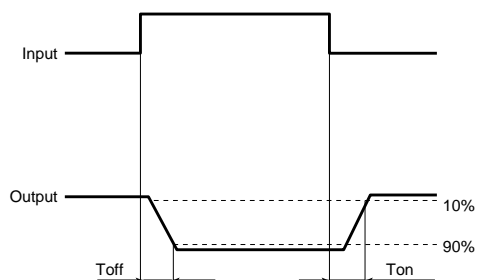
| Item | Symbol | Type of connection | AQV453(A) | AQV454(A) | AQV454H(A) | Remarks |
|-------------------------|-------------------------|--------------------|---------------------------------|------------|------------|--|
| Input | LED forward current | I _F | 50 mA | | | |
| | LED reverse voltage | 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 | 250 V | 400 V | | |
| | Continuous load current | I _L | A | 0.2 A | 0.15 A | A connection: Peak AC, DC B, C connection: DC |
| | | | B | 0.3 A | 0.18 A | |
| | | | C | 0.4 A | 0.25 A | |
| | Peak load current | I _{PEAK} | 0.6 A | 0.5 A | | A connection: 100 ms (1 shot), V _L = DC |
| Power dissipation | P _{OUT} | 360 mW | | | | |
| Total power dissipation | P _T | 410 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 | | | |

HE 1 Form B (AQV45○, AQV454H)

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

| Item | | Symbol | Type of connection | AQV453(A) | AQV454(A) | AQV454H(A) | Remarks | |
|----------------------------------|---------------------------|-------------------|--------------------|---|-----------|------------|--|---|
| Input | LED operate (OFF) current | Typical | I _{off} | 1 mA | 0.9 mA | 1.4 mA | I _L = Max. | |
| | | Maximum | | | | | | 3 mA |
| | LED reverse (ON) current | Minimum | I _{fon} | 0.4 mA | | | I _L = Max. | |
| Typical | | 0.9 mA | | 0.8 mA | 1.3 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 | 5.5 Ω | 11 Ω | I _F = 0 mA I _L = Max. Within 1 s on time | |
| | | Maximum | | | 8 Ω | 16 Ω | | |
| | On resistance | Typical | R _{on} | B | 2.7 Ω | 6.3 Ω | I _F = 0 mA I _L = Max. Within 1 s on time | |
| | | Maximum | | | 4 Ω | 8 Ω | | |
| | On resistance | Typical | R _{on} | C | 1.4 Ω | 3.1 Ω | I _F = 0 mA I _L = Max. Within 1 s on time | |
| | | Maximum | | | 2 Ω | 4 Ω | | |
| Off state leakage current | Maximum | I _{Leak} | — | 1 μA | 1 μA | 10 μA | I _F = 5 mA V _L = Max. | |
| Transfer characteristics | Operate (OFF) time* | Typical | T _{off} | — | 1.52 ms | 1.2 ms | 1.8 ms | I _F = 0 mA → 5 mA I _L = Max. |
| | | Maximum | | | 3 ms | 2.0 ms | 3.0 ms | |
| | Reverse (ON) time* | Typical | T _{on} | — | 0.4 ms | 0.36 ms | 0.4 ms | I _F = 5 mA → 0 mA I _L = Max. |
| | | Maximum | | | 1 ms | | | |
| I/O capacitance | Typical | C _{iso} | — | 1.3 pF | | | f = 1 MHz V _B = 0 V | |
| | Maximum | | | 3 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 relay operation and resetting.

| Item | Symbol | Recommended value | Unit |
|-------------------|----------------|---|------|
| Input LED current | I _F | Standard type: 5 Reinforced insulation type: 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 Electric Works technical representative.

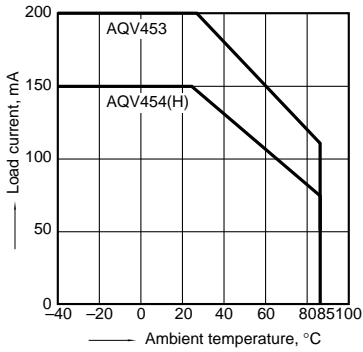
For more information

REFERENCE DATA

1. Load current vs. ambient temperature characteristics

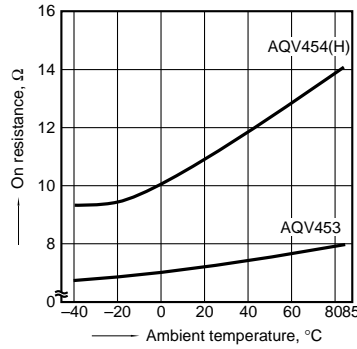
Allowable ambient temperature: -40°C to $+85^{\circ}\text{C}$
 -40°F to $+185^{\circ}\text{F}$

Type of connection: A



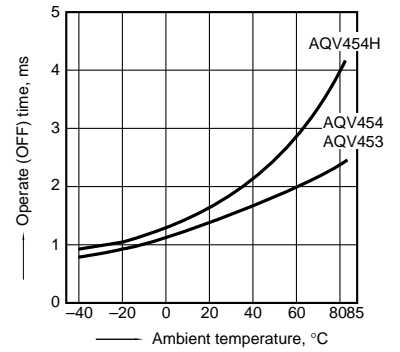
2. On resistance vs. ambient temperature characteristics

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



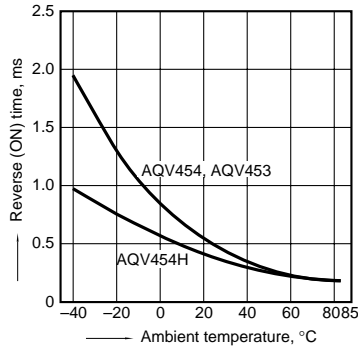
3. Operate (OFF) time vs. ambient temperature characteristics

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



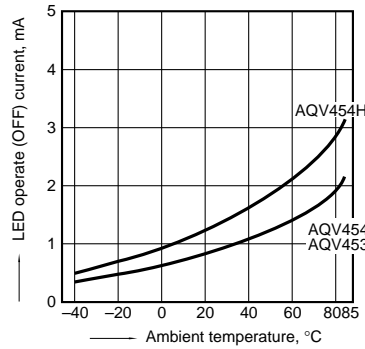
4. Reverse (ON) time vs. ambient temperature characteristics

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



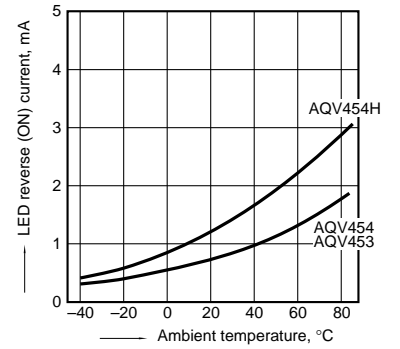
5. LED operate (OFF) current vs. ambient temperature characteristics

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



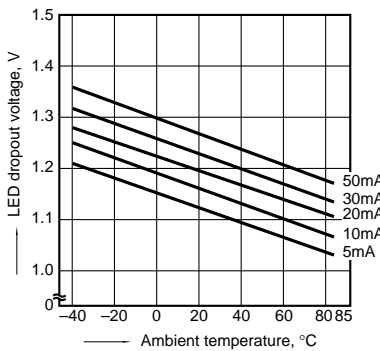
6. LED reverse (ON) current vs. ambient temperature characteristics

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



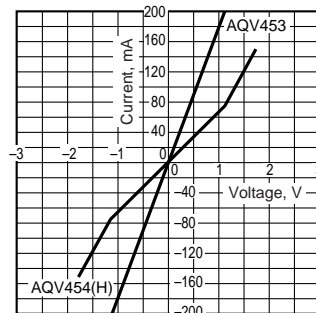
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



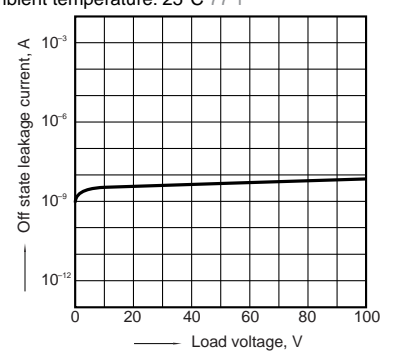
8. Current vs. voltage characteristics of output at MOS portion

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



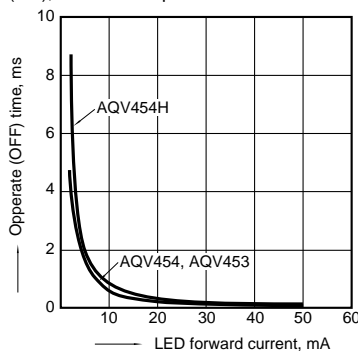
9. Off state leakage current vs. load voltage characteristics

Sample: AQV454;
 Measured portion: between terminals 4 and 6;
 Ambient temperature: 25°C 77°F



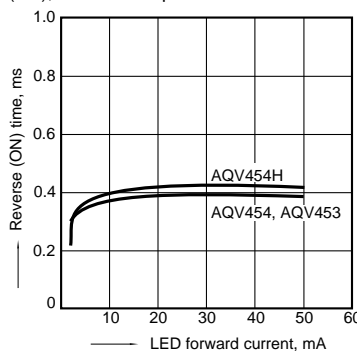
10. Operate (OFF) time vs. LED forward current characteristics

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

