

NAIS

HS (High Sensitivity) Type [1-Channel (Form A) Type]

PhotoMOS RELAYS

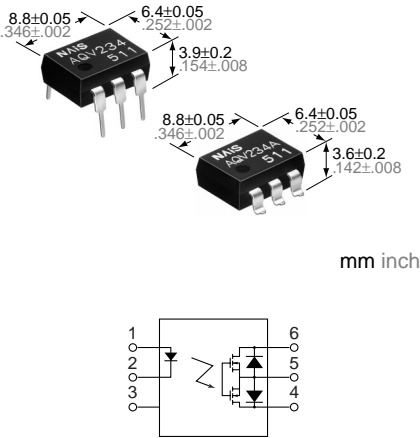
FEATURES

- High sensitivity type**
LED operate current: typical 0.31 mA
- Low-level off state leakage current (Typical 1 μ A at 400 V load voltage)**
- Eliminates the need for a power supply to drive the power MOSFET**
- Low thermal electromotive force (Approx. 1 μ V)**
- Extremely low closed-circuit offset voltages to enable control of small analog signals without distortion**
- Eliminates the need for a counter electromotive force protection diode in the drive circuits on the input side**

- Stable on resistance to help simplify circuit design**
- Surface-mount model available**

TYPICAL APPLICATIONS

- High-speed inspection machines**
 - Scanner
 - IC checker
 - Board tester
- Telephone and data communication equipment**



TYPES

| Type | Output rating* | | Part No. | | | | Packing quantity | |
|------------|----------------|--------------|-----------------------|------------------------|--|--|--|---------------|
| | | | Through hole terminal | Surface-mount terminal | | | Tube | Tape and reel |
| | Load voltage | Load current | Tube packing style | | Tape and reel packing style | | | |
| AC/DC type | 400 V | 120 mA | AQV234 | AQV234A | Picked from the 1/2/3-pin side AQV234AX | Picked from the 4/5/6-pin side AQV234AZ | 1 tube contains 50 pcs. 1 batch contains 500 pcs. | 1,000 pcs. |

*Indicate the peak AC and DC values.

Note: For space reasons, 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 | Type of connection | AQV234(A) | Remarks | |
|-------------------------|-------------------------|------------|--------------------|---------------------------------|--|--|
| Input | LED forward current | I_F | | 50 mA | f = 100 Hz, Duty factor = 0.1% | |
| | LED reverse voltage | V_R | | 3 V | | |
| | Peak forward current | I_{FP} | | 1 A | | |
| | Power dissipation | P_{in} | | 75 mW | | |
| Output | Load voltage (Peak AC) | V_L | | 400 V | A connection: Peak AC, DC B, C connection: DC | |
| | Continuous load current | I_L | | A | | 0.12 A |
| | | | | B | | 0.13 A |
| | | | | C | | 0.15 A |
| | Peak load current | I_{peak} | | 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 | | |
| Temperature limits | Operating | T_{opr} | | -40°C to +85°C -40°F to +185°F | Non-condensing at low temperature | |
| | Storage | T_{stg} | | -40°C to +100°C -40°F to +212°F | | |

AQV234

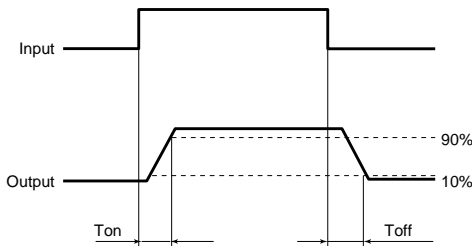
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

| Item | | | Symbol | Type of connection | AQV234(A) | Remarks |
|----------------------------------|----------------------------|-----------------|---------------|--------------------|--|---|
| Input | LED operate current | Typical | I_{Fon} | — | 0.31 mA | $\Delta I_F/\Delta t \geq \text{Min. } 100 \mu\text{A/s}$ $I_L = 120 \text{ mA}$ |
| | | Maximum | | | 0.5 mA | |
| | LED turn off current | Minimum | I_{Foff} | — | 0.1 mA | $\Delta I_F/\Delta t \geq \text{Min. } 100 \mu\text{A/s}$ $I_L = 120 \text{ mA}$ |
| | | Typical | | | 0.29 mA | |
| | LED dropout voltage | Typical | V_F | — | 1.1 V (1.25 V at $I_F = 50 \text{ mA}$) | $I_F = 2 \text{ mA}$ |
| | | Maximum | | | 1.5 V | |
| Output | On resistance | Typical | R_{on} | A | 30 Ω | $I_F = 2 \text{ mA}$ $I_L = 120 \text{ mA}$ Within 1 s on time |
| | | Maximum | | | 50 Ω | |
| | | Typical | R_{on} | B | 22.5 Ω | $I_F = 2 \text{ mA}$ $I_L = 120 \text{ mA}$ Within 1 s on time |
| | | Maximum | | | 25 Ω | |
| | | Typical | R_{on} | C | 11.3 Ω | $I_F = 2 \text{ mA}$ $I_L = 120 \text{ mA}$ Within 1 s on time |
| | | Maximum | | | 12.5 Ω | |
| | Off state leakage current | Maximum | — | — | 1 μA | $I_F = 0$ $V_L = 400 \text{ V}$ |
| | Transistor characteristics | Switching speed | Turn on time* | T_{on} | — | 0.89 ms |
| Maximum | | | | | | 2 ms |
| Turn off time* | | | T_{off} | — | 0.22 ms | $I_F = 2 \text{ mA}$ $I_L = 120 \text{ mA}$ |
| | | | | | Maximum | |
| I/O capacitance | | Typical | C_{iso} | — | 0.8 pF | $f = 1 \text{ MHz}$ $V_B = 0$ |
| | | Maximum | | | 1.5 pF | |
| Initial I/O isolation resistance | Minimum | R_{iso} | — | 1,000 M Ω | 500 V DC | |

Note: Recommendable LED forward current $I_F = 2 \text{ mA}$.

For type of connection, see Page 31.

*Turn on/Turn off time



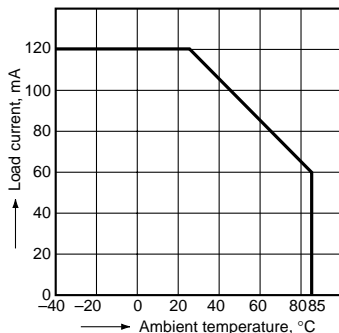
- For Dimensions, see Page 27.
- For Schematic and Wiring Diagrams, see Page 31.
- For Cautions for Use, see Page 36.

REFERENCE DATA

1. Load current vs. ambient temperature characteristics

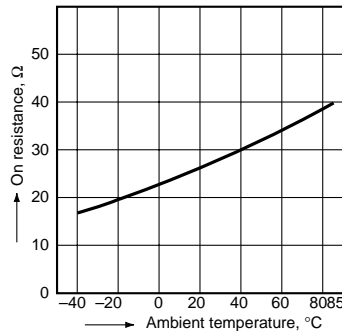
Allowable ambient temperature: -40°C to $+85^\circ\text{C}$
 -40°F to $+185^\circ\text{F}$

Type of connection: A



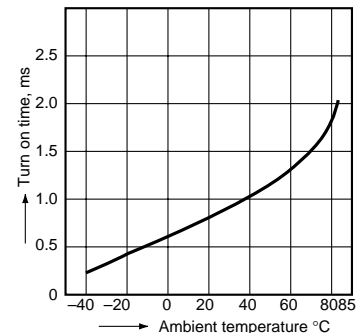
2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;
LED current: 2 mA; Load voltage: 400 V (DC);
Continuous load current: 120 mA (DC)



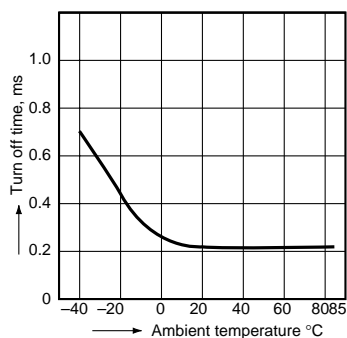
3. Turn on time vs. ambient temperature characteristics

LED current: 2 mA;
Load voltage: 400 V (DC);
Continuous load current: 120 mA (DC)



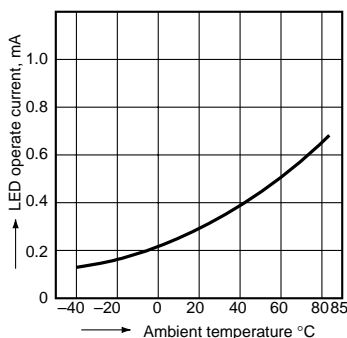
4. Turn off time vs. ambient temperature characteristics

LED current: 2 mA; Load voltage: 400 V (DC);
Continuous load current: 120 mA (DC)



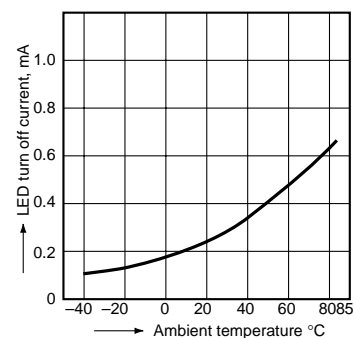
5. LED operate current vs. ambient temperature characteristics

Load voltage: 400 V (DC);
Continuous load current: 120 mA (DC)



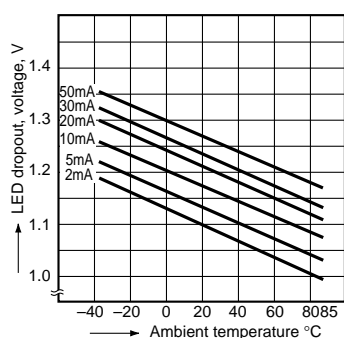
6. LED turn off current vs. ambient temperature characteristics

Load voltage: 400 V (DC);
Continuous load current: 120 mA (DC)



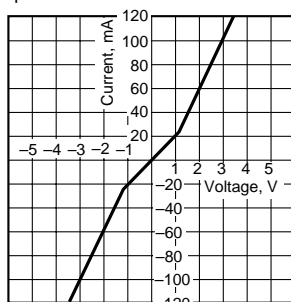
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 2 to 50 mA



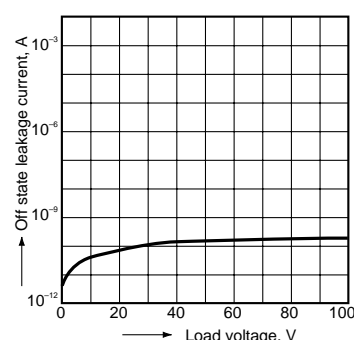
8. Voltage vs. current characteristics of output at MOS portion

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



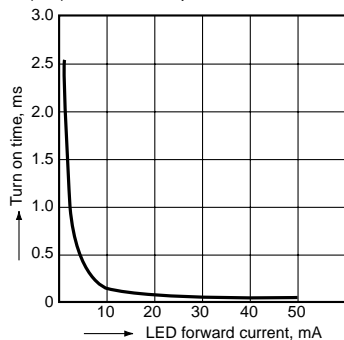
9. Off state leakage current

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



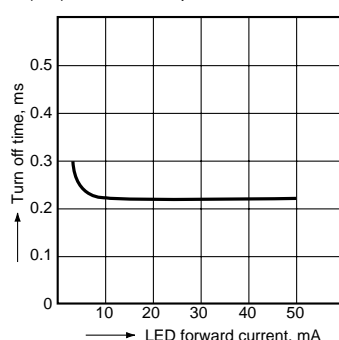
10. LED forward current vs. turn on time characteristics

Measured portion: between terminals 4 and 6;
Load voltage: 400 V (DC); Continuous load current:
120 mA (DC); Ambient temperature: 25°C 77°F



11. LED forward current vs. turn off time characteristics

Measured portion: between terminals 4 and 6;
Load voltage: 400 V (DC); Continuous load current:
120 mA (DC); Ambient temperature: 25°C 77°F



12. Applied voltage vs. output capacitance characteristics

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

