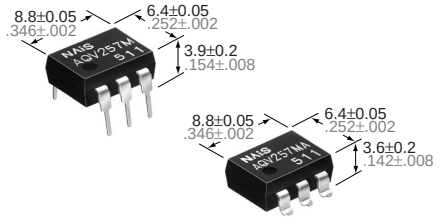
NAiS

**HE (High-function Economy) Type**
**[1-Channel (Form A) Type]**
**—Soft-ON/OFF Operation—**

# PhotoMOS RELAYS




mm inch

## FEATURES

**1. Reducing switching-noise**
Smooth switching realized by Soft-ON/OFF operation.

**2. Reducing inrush current generated in the circuit by Soft-ON operating function**

**3. Reducing counter electromotive force by Soft-OFF operating function**

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

## TYPICAL APPLICATIONS

- OCU (Official Channel Unit) line switching
- Need to eliminate inrush and counter electromotive force

## TYPES

| | Output rating* | | Part No. | | | | Packing quantity | |
|---|---|---|---|---|---|---|---|---|
| | | | Through hole terminal | Surface-mount terminal | | | | |
| | Load voltage | Load current | Tube packing style | | Tape and reel packing style | | Tube | Tape and reel |
| | | | | | Picked from the 1/2/3-pin side | Picked from the 4/5/6-pin side | | |
| AC/DC type | 200 V | 250 mA | AQV257M | AQV257MA | AQV257MAX | AQV257MAZ | 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 | AQV257M(A) | Remarks |
|---|---|---|---|---|---|
| Input | LED forward current | $I_F$ | | 50 mA | |
| | LED reverse voltage | $V_R$ | | 3 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) | $V_L$ | | 200 V | |
| | Continuous load current | $I_L$ | A | 0.25 A | A connection: Peak AC, DC<br>B, C connection: DC |
| | | | B | 0.35 A | |
| | | | C | 0.5 A | |
| | Peak load current | $I_{peak}$ | | 0.75 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 | |
| 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 )

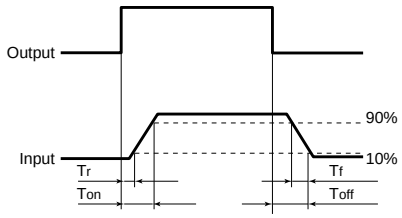
| Item | | | | Symbol | Type of connection | AQV257M(A) | Condition |
|---|---|---|---|---|---|---|---|
| Input | LED operate current | | Typical | $I_{Fon}$ | — | 0.6 mA | $I_L$ = Max. |
| | | | Maximum | | | 2.0 mA | |
| | LED turn off current | | Minimum | $I_{Foff}$ | — | 0.2 mA | $I_L$ = Max. |
| | | | Typical | | | 0.5 mA | |
| | LED dropout voltage | | Typical | $V_F$ | — | 1.14 V** | $I_F$ = 50 mA |
| | | | Maximum | | | 1.5 V | |
| Output | On resistance | | Typical | $R_{on}$ | A | 2.6 Ω | $I_F$ = 5 mA<br>$I_L$ = Max.<br>Within 1 s on time |
| | | | Maximum | | | 4 Ω | |
| | | | Typical | $R_{on}$ | B | 1.4 Ω | $I_F$ = 5 mA<br>$I_L$ = Max.<br>Within 1 s on time |
| | | | Maximum | | | 2 Ω | |
| | | | Typical | $R_{on}$ | C | 0.7 Ω | $I_F$ = 5 mA<br>$I_L$ = Max.<br>Within 1 s on time |
| | | | Maximum | | | 1 Ω | |
| | Off state leakage current | | Maximum | $I_{Leak}$ | — | 1 μA | $I_F$ = 0<br>$V_L$= Max. |
| Transfer characteristics | Switching speed | Turn on time* | Typical | $T_{on}$ | — | 5.1 ms | $I_F$ = 5 mA<br>$I_L$ = Max.<br>$V_L$ = Max. |
| | | | Maximum | | | 15.0 ms | |
| | | Rise time* | Minimum | $T_r$ | — | 1.0 ms | $I_F$ = 5 mA<br>$I_L$ = Max.<br>$V_L$ = Max. |
| | | | Typical | | | 2.2 ms | |
| | | Turn off time* | Typical | $T_{off}$ | — | 3.2 ms | $I_F$ = 5 mA<br>$I_L$ = Max.<br>$V_L$ = Max. |
| | | | Maximum | | | 10.0 ms | |
| | | Fall time* | Minimum | $T_f$ | — | 0.6 ms | $I_F$ = 5 mA<br>$I_L$ = Max.<br>$V_L$ = Max. |
| | | | Typical | | | 1.3 ms | |
| | I/O capacitance | | Typical | $C_{iso}$ | — | 0.8 pF | f = 1 MHz<br>$V_B$ = 0 |
| | | | Maximum | | | 1.5 pF | |
| | Initial I/O isolation resistance | | Minimum | $R_{iso}$ | — | 1,000 MΩ | 500 V DC |

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

**1.25 V at $I_F$ = 50 mA

For type of connection, see Page 444.

* Turn on ($T_{on}$)/Turn off ($T_{off}$) time
Rise ($T_r$)/Fall ($T_f$) time

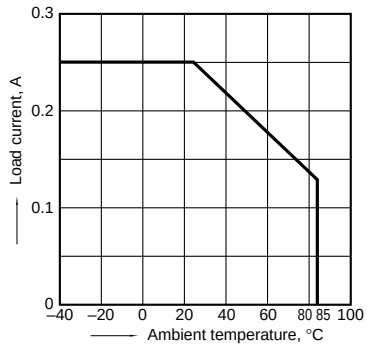



■ **For Dimensions, see Page 440.**
■ **For Schematic and Wiring Diagrams, see Page 444.**
■ **For Cautions for Use, see Page 449.**

# REFERENCE DATA

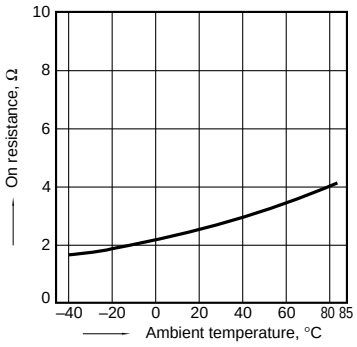
1. Load current vs. ambient temperature characteristics

Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F;
Type of connection: A



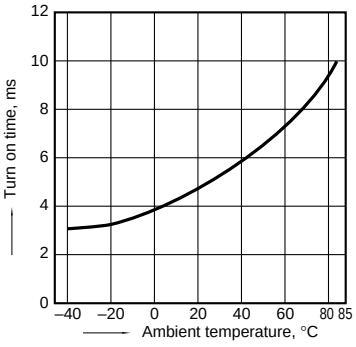

2. On resistance vs. ambient temperature characteristics

Sample: AQV257M; Measured portion: between terminals 4 and 6; LED current: 5 mA;
Continuous load current: 250 mA (DC)



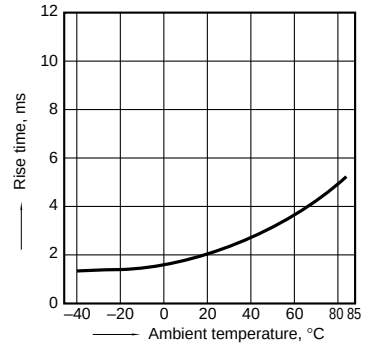

3. Turn on time vs. ambient temperature characteristics

Sample: AQV257M;
LED current: 5 mA; Load voltage: 200 V (DC);
Continuous load current: 250 mA (DC)



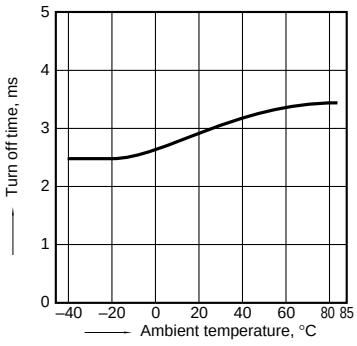

4. Rise time vs. ambient temperature characteristics

Sample: AQV257M;
LED current: 5 mA; Load voltage: 200 V (DC);
Continuous load current: 250 mA (DC)



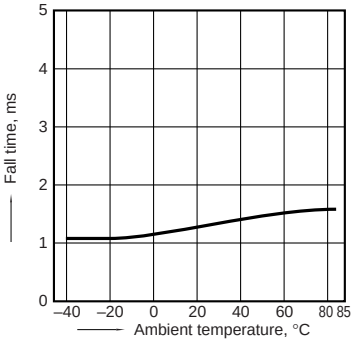

5. Turn off time vs. ambient temperature characteristics

Sample: AQV257M;
LED current: 5 mA; Load voltage: 200 V (DC);
Continuous load current: 250 mA (DC)



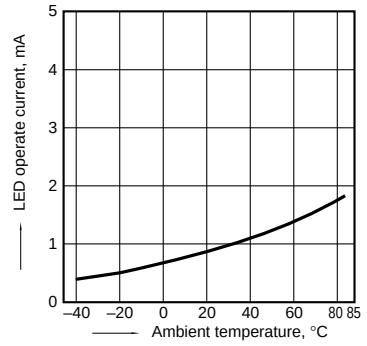

6. Fall time vs. ambient temperature characteristics

Sample: AQV257M;
LED current: 5 mA; Load voltage: 200 V (DC);
Continuous load current: 250 mA (DC)



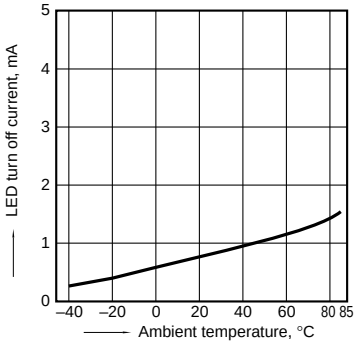

7. LED operate current vs. ambient temperature characteristics

Sample: AQV257M; Load voltage: 200 V (DC);
Continuous load current: 250 mA (DC)



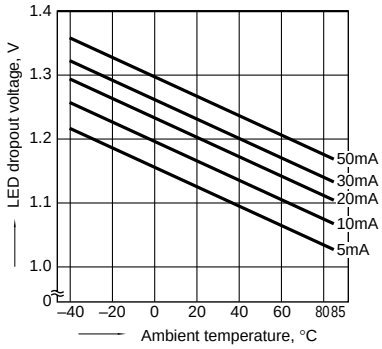

8. LED turn off current vs. ambient temperature characteristics

Sample: AQV257M; Load voltage: 200 V (DC);
Continuous load current: 250 mA (DC)



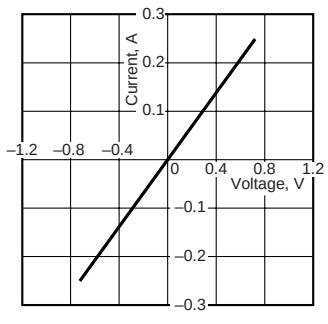

9. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



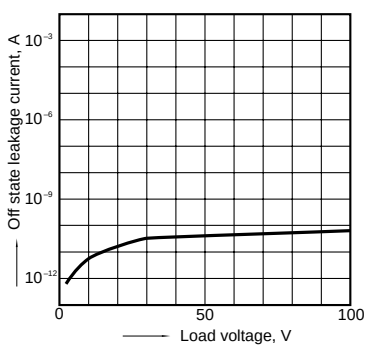

10. Voltage vs. current characteristics of output at MOS portion

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



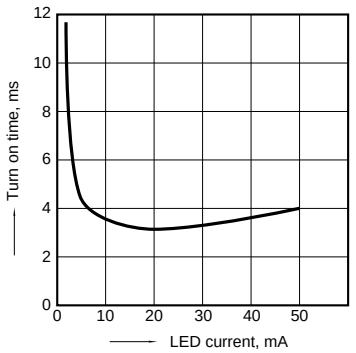

11. Off state leakage current

Sample: AQV257M;
Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



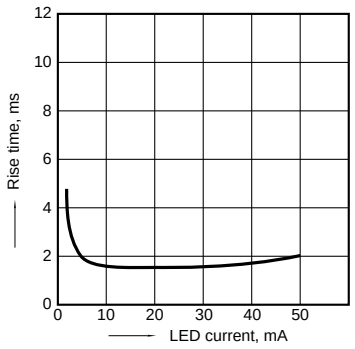

12. LED forward current vs. turn off time characteristics

Sample: AQV257M; Measured portion: between terminals 4 and 6; Load voltage: 200 V (DC); Continuous load current: 250 mA (DC); Ambient temperature: 25°C 77°F



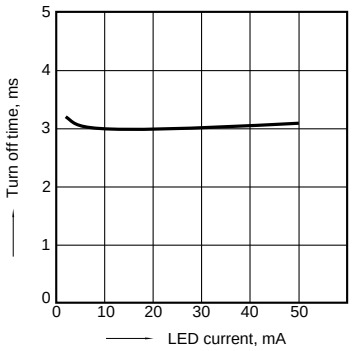
13. LED current vs. rise time characteristics

Sample: AQV257M;
Measured portion: between terminals 4 and 6;
Load voltage: 200 V (DC);
Continuous load current: 250 mA (DC);
Ambient temperature: 25°C 77°F



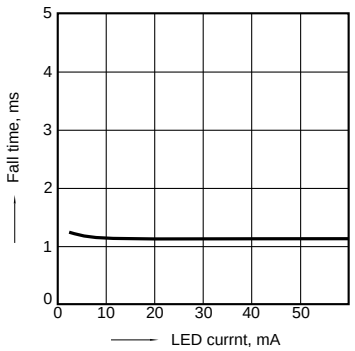

14. LED forward current vs. turn off time characteristics

Sample: AQV257M;
Measured portion: between terminals 4 and 6;
Load voltage: 200 V (DC);
Continuous load current: 250 mA (DC);
Ambient temperature: 25°C 77°F



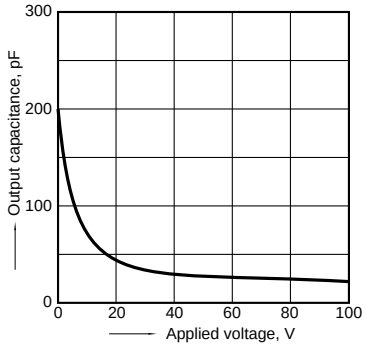

15. LED current vs. fall time characteristics

Sample: AQV257M;
Measured portion: between terminals 4 and 6;
Load voltage: 200 V (DC);
Continuous load current: 250 mA (DC);
Ambient temperature: 25°C 77°F




16. Applied voltage vs. output capacitance characteristics

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



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