



THE DATASHEET OF AQV225N



FEATURES

1. PhotoMOS relay with high response speed, low leakage current and low On resistance

2. Low capacitance between output terminals ensures high response speed:

The capacitance between output terminals is small, typically 10 pF. This enables for a fast operation speed of 200 μ s.

3. High sensitivity and low On resistance

Maximum 0.3 A of load current can be controlled with input current of 5 mA. The 10 Ω (AQV225N) On resistance is less than our conventional models. With no metallic contacts, the PhotoMOS relay has stable switching characteristics.

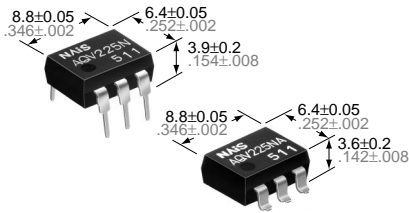
4. Low-level off state leakage current

The SSR has an off state leakage current of several milliamperes, whereas the PhotoMOS relay has only 30 pA even with the rated load voltage of 80 V (AQV225N).

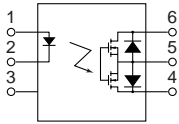
5. Controls low-level analog signals

PhotoMOS relay features extremely low closed-circuit offset voltages to enable control of small analog signals without distortion.

6. Low terminals electromotive force (approx. 1 μ V)



mm inch



TYPICAL APPLICATIONS

- Measuring devices
- Scanner, IC checker, Board tester

TYPES

| Type | 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 |
| AC/DC type | 80 V | 150 mA | AQV225N | AQV225NA | AQV225NAX | AQV225NAZ | 1 tube contains 50 pcs. 1 batch contains 500 pcs. | 1,000 pcs. |
| | 200 V | 70 mA | AQV227N | AQV227NA | AQV227NAX | AQV227NAZ | | |
| | 400 V | 50 mA | AQV224N | AQV224NA | AQV224NAX | AQV224NAZ | | |

*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)

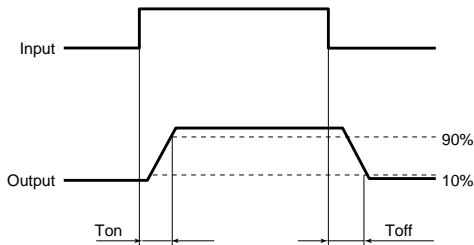
| Item | Symbol | Type of connection | AQV225N(A) | AQV227N(A) | AQV224N(A) | Remarks | |
|-------------------------|-------------------------|--------------------|---------------------------------|------------|------------|--|--------|
| Input | LED forward current | I_F | 50 mA | | | f = 100 Hz, Duty 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 | 80 V | 200 V | 400 V | A connection: Peak AC, DC B, C connection: DC | |
| | Continuous load current | I_L | A | 0.15 A | 0.07 A | | 0.05 A |
| | | | B | 0.20 A | 0.08 A | | 0.06 A |
| | | | C | 0.30 A | 0.10 A | 0.08 A | |
| | Peak load current | I_{peak} | 0.45 A | 0.21 A | 0.15 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 | AQV225N(A) | AQV227N(A) | AQV224N(A) | Remarks | |
|--------------------------|----------------------------------|----------------|-------------------|--------------------|---|------------|------------|--|--|
| Input | LED operate current | Typical | I _{Fon} | — | 0.90 mA | | | I _L = Max. | |
| | | Maximum | | | 3.0 mA | | | | |
| | LED turn off current | Minimum | I _{Foff} | — | 0.4 mA | | | I _L = Max. | |
| | | Typical | | | 0.85 mA | | | | |
| | LED dropout voltage | Typical | V _F | — | 1.14 V (1.25 V at I _F = 50 mA) | | | I _F = 5 mA | |
| | | Maximum | | | 1.5 V | | | | |
| Output | On resistance | Typical | R _{on} | A | 7.0 Ω | 30 Ω | 70 Ω | I _F = 5 mA I _L = Max. Within 1 s on time | |
| | | Maximum | | | 10 Ω | 50 Ω | 100 Ω | | |
| | | Typical | R _{on} | B | 3.5 Ω | 16 Ω | 55 Ω | I _F = 5 mA I _L = Max. Within 1 s on time | |
| | | Maximum | | | 5 Ω | 25 Ω | 70 Ω | | |
| | | Typical | R _{on} | C | 1.8 Ω | 8 Ω | 28 Ω | I _F = 5 mA I _L = Max. Within 1 s on time | |
| | | Maximum | | | 2.5 Ω | 12.5 Ω | 35 Ω | | |
| | Output capacitance | Typical | C _{out} | — | 10 pF | | | I _F = 0 V _B = 0 f = 1 MHz | |
| | | Maximum | | | 15 pF | | | | |
| | Off state leakage current | Typical | I _{Leak} | — | 30 pA | 30 pA | 90 pA | I _F = 0 V _L = Max. | |
| | | Maximum | | | 10 nA | | | | |
| Transfer characteristics | Switching speed | Turn on time* | Typical | T _{on} | — | 0.20 ms | | | I _F = 5 mA I _L = Max. |
| | | | Maximum | | | 0.5 ms | | | |
| | | Turn off time* | Typical | T _{off} | — | 0.08 ms | | | I _F = 5 mA I _L = Max. |
| | | | Maximum | | | 0.2 ms | | | |
| | I/O capacitance | Typical | C _{iso} | — | 0.8 pF | | | f = 1 MHz 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 = 5mA.
*Turn on/Turn off time

For type of connection, see page 31.

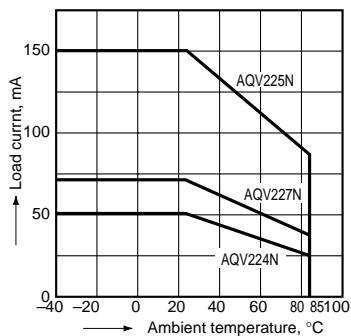


REFERENCE DATA

1. Load current vs. ambient temperature characteristics

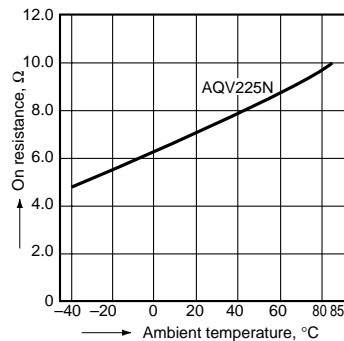
Allowable ambient temperature: -40°C to +85°C
-40°F to +185°F

Type of connection: A



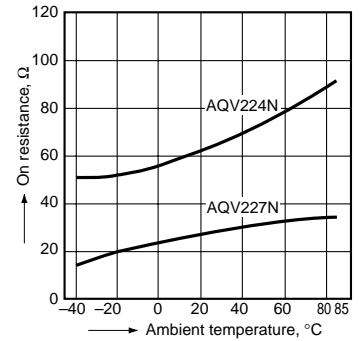
2.-(1) On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;
LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



2.-(2) On resistance vs. ambient temperature characteristics

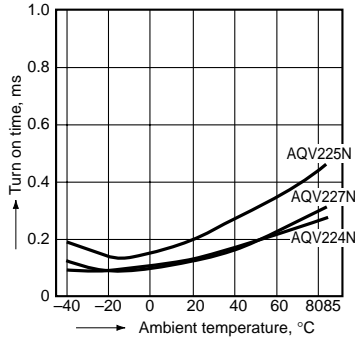
Measured portion: between terminals 4 and 6;
LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



AQV220N

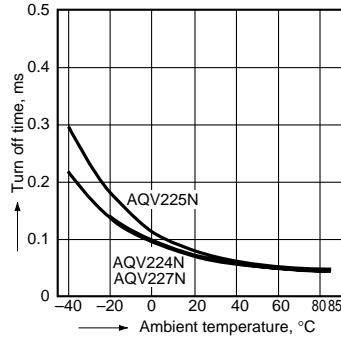
3. Turn on time vs. ambient temperature characteristics

Sample: AQV225N, AQV227N, AQV224N;
LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



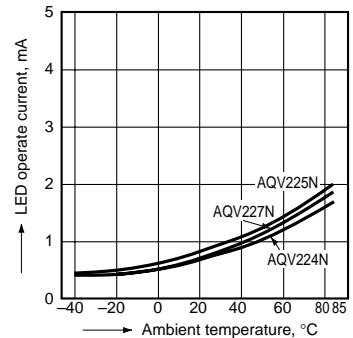
4. Turn off time vs. ambient temperature characteristics

Sample: AQV225N, AQV227N, AQV224N;
LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



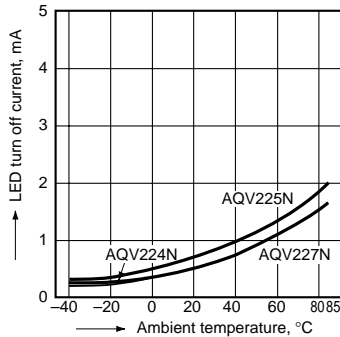
5. LED operate current vs. ambient temperature characteristics

Sample: AQV225N, AQV227N, AQV224N;
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



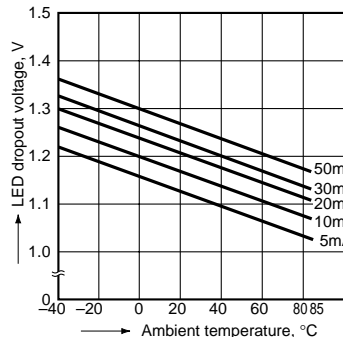
6. LED turn off current vs. ambient temperature characteristics

Sample: AQV225N, AQV227N, AQV224N;
Load voltage: Max. (DC);
Continuous load current: Max. (DC)



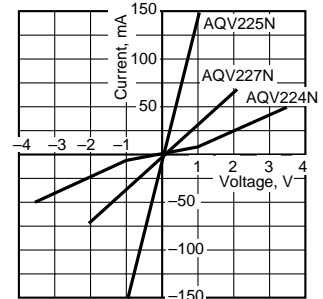
7. LED dropout voltage vs. ambient temperature characteristics

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



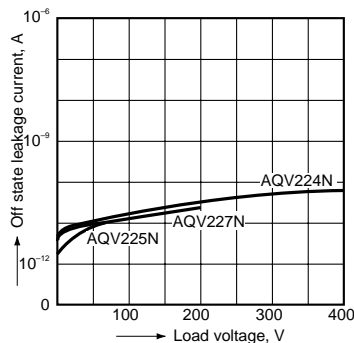
8. Voltage vs. current characteristics of output at MOS portion

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



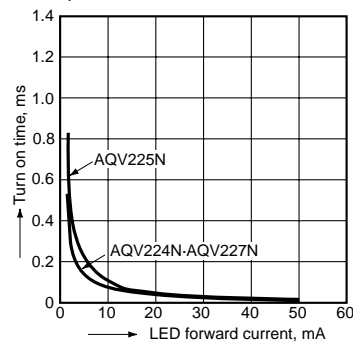
9. Off state leakage current

Sample: AQV225N, AQV227N, AQV224N;
Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



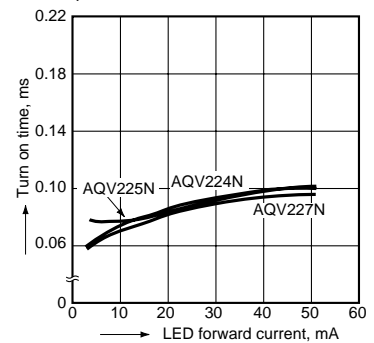
10. LED forward current vs. turn on time characteristics

Sample: AQV225N, AQV227N, AQV224N;
Measured portion: between terminals 4 and 6;
Load voltage: Max. (DC);
Continuous load current: Max. (DC);
Ambient temperature: 25°C 77°F



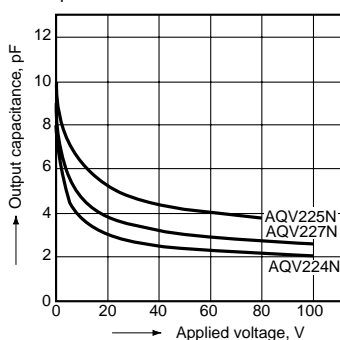
11. LED forward current vs. turn off time characteristics

Sample: AQV225N, AQV227N, AQV224N;
Measured portion: between terminals 4 and 6;
Load voltage: Max. (DC);
Continuous load current: Max. (DC);
Ambient temperature: 25°C 77°F



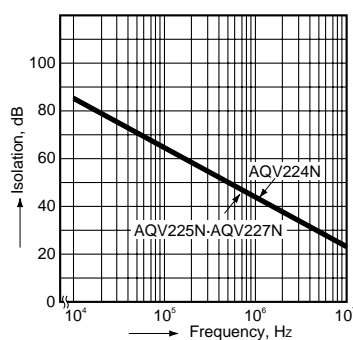
12. Applied voltage vs. output capacitance characteristics

Measured portion: between terminals 4 and 6;
Frequency: 1 MHz, 30 mVrms;
Ambient temperature: 25°C 77°F



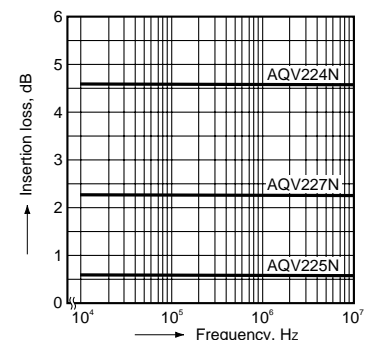
13. Isolation characteristics (50 Ω impedance)

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





14. Insertion loss characteristics (50 Ω impedance)

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



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