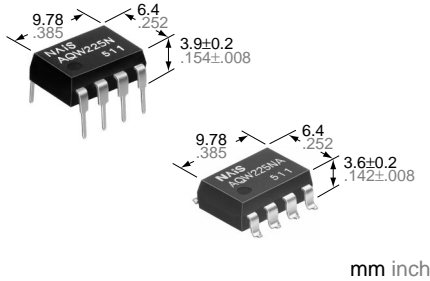


NAIS

RF (Radio Frequency) Type [2-Channel (Form A) Type] —Low On resistance—

PhotoMOS RELAYS



FEATURES

1. PhotoMOS relay 2-channels (Form A) type with high response speed, low leakage current and low On resistance.
2. Applicable for 2 Form A use as well as two independent 1 Form A use

3. Compact 8-pin DIP size

The device comes in a compact (W) 6.4×(L) 9.78×(H) 3.9 mm (W) .252×(L) .385×(H) .154 inch, 8-pin DIP size (through hole terminal type).

4. 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 μs.

5. High sensitivity and low On resistance:

Maximum 0.16 A of load current can be controlled with input current of 5 mA (AQW225N). The 10 Ω On resistance is less than our conventional models. With no metallic contacts, the PhotoMOS relay has stable switching characteristics.

6. 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 (AQW225N).

7. Controls low-level analog signals:

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

8. Low terminals electromotive force: (approx. 1 μV)

TYPICAL APPLICATIONS

- Measuring equipment
- 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 | 120 mA | AQW225N | AQW225NA | AQW225NAX | AQW225NAZ | 1 tube contains 40 pcs. 1 batch contains 400 pcs. | 1,000 pcs. |
| | 200 V | 50 mA | AQW227N | AQW227NA | AQW227NAX | AQW227NAZ | | |
| | 400 V | 40 mA | AQW224N | AQW224NA | AQW224NAX | AQW224NAZ | | |

*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)

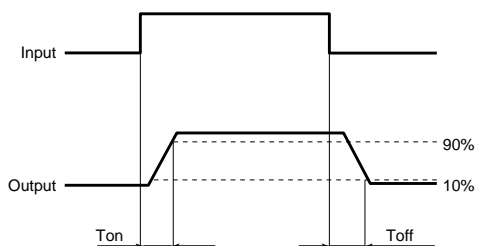
| Item | | Symbol | AQW225N(A) | AQW227N(A) | AQW224N(A) | Remarks |
|-------------------------|-------------------------|-------------------|---------------------------------|--------------------|--------------------|---|
| Input | LED forward current | I _F | 50 mA | | | |
| | LED reverse voltage | 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 | 80 V | 200 V | 400 V | |
| | Continuous load current | I _L | 0.12 A (0.16 A) | 0.05 A (0.07 A) | 0.04 A (0.05 A) | Peak AC, DC (): in case of using only 1 channel |
| | Peak load current | I _{peak} | 0.36 A | 0.15 A | 0.12 A | A connection: 100 ms (1 shot), V _L = DC |
| | Power dissipation | P _{out} | 800 mW | | | |
| Total power dissipation | | P _T | 850 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 | AQW225N(A) | AQW227N(A) | AQW224N(A) | Remarks |
|----------------------------------|---------------------------|-----------------|------------------|-------------------|---|------------|-----------------------|--|
| Input | LED operate current | | Typical | I _{Fon} | 0.9 mA | | | I _L = Max. |
| | | | Maximum | | 3.0 mA | | | |
| | LED turn off current | | Minimum | I _{Foff} | 0.4 mA | | | I _L = Max. |
| | | | Typical | | 0.8 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} | 7 Ω | 30 Ω | 70 Ω | I _F = 5 mA I _L = Max. Within 1 s on time |
| | | | Maximum | | 10 Ω | 50 Ω | 100 Ω | |
| | Output capacitance | | Typical | C _{out} | 10 pF | | | I _F = 0 V _B = 0 f = 1 MHz |
| | | | Maximum | | 15 pF | | | |
| | Off state leakage current | | Maximum | I _{leak} | 10 nA | | | I _F = 0 V _L = Max. |
| | Transfer characteristics | Switching speed | Turn on time* | Typical | T _{on} | 0.20 ms | | |
| Maximum | | | | 0.5 ms | | | I _L = Max. | |
| Turn off time* | | | Typical | T _{off} | 0.08 ms | | | I _F = 5 mA |
| | | | Maximum | | 0.2 ms | | | I _L = Max. |
| I/O capacitance | | Typical | C _{iso} | 0.8 pF | | | f = 1 MHz | |
| | | Maximum | | 1.5 pF | | | V _B = 0 | |
| Initial I/O isolation resistance | | Minimum | R _{iso} | 1.000 MΩ | | | 500 V DC | |

Note: Recommendable LED forward current $I_F = 5 \text{ mA}$.

*Turn on/Turn off time



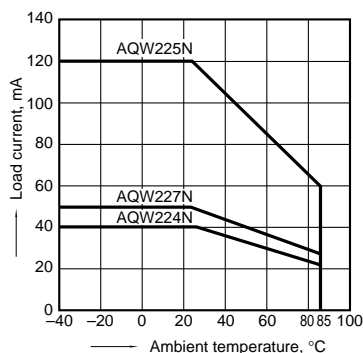
■ For Dimensions, see Page 440.

■ For Schematic and Wiring Diagrams, see Page 445.

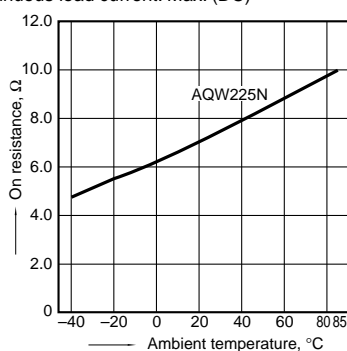
■ For Cautions for Use, see Page 449.

REFERENCE DATA

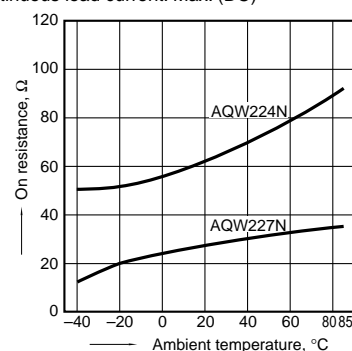
1. Load current vs. ambient temperature characteristics

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

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

Measured portion: between terminals 5 and 6,
7 and 8; LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)

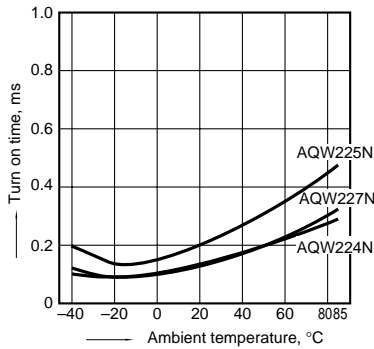
2.-(2) On resistance vs. ambient temperature characteristics

Measured portion: between terminals 5 and 6,
7 and 8; LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)

AQW220N

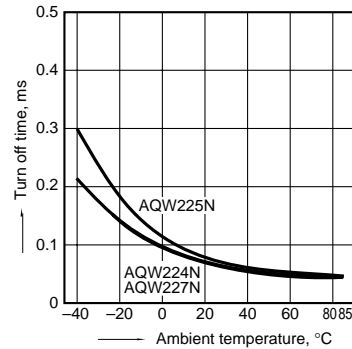
3. Turn on time vs. ambient temperature characteristics

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



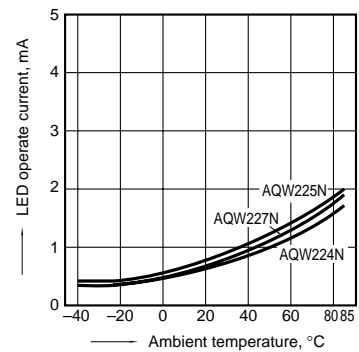
4. Turn off time vs. ambient temperature characteristics

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



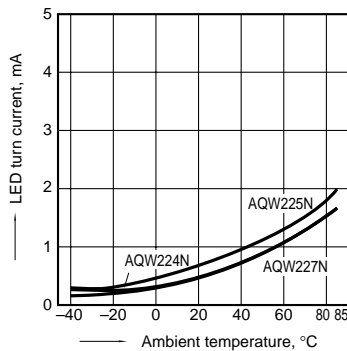
5. LED operate current vs. ambient temperature characteristics

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



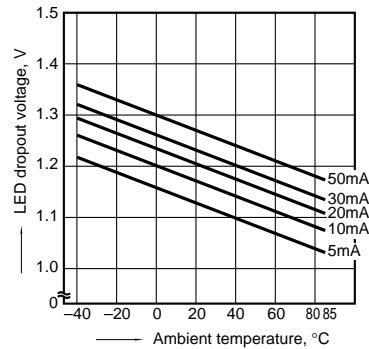
6. LED turn off current vs. ambient temperature characteristics

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



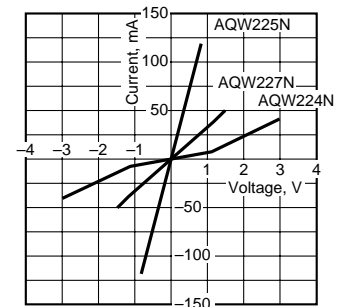
7. LED dropout voltage vs. ambient temperature characteristics

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



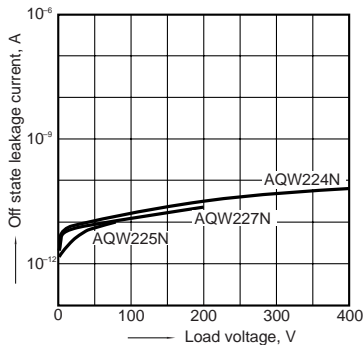
8. Voltage vs. current characteristics of output at MOS portion

Measured portion: between terminals 5 and 6,
7 and 8; Ambient temperature: 25°C 77°F



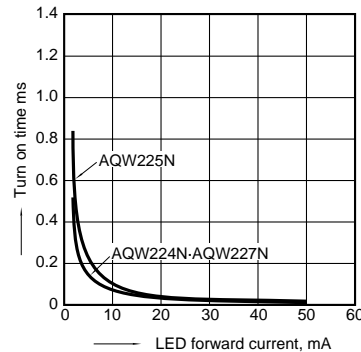
9. Off state leakage current

Measured portion: between terminals 5 and 6,
7 and 8; Ambient temperature: 25°C 77°F



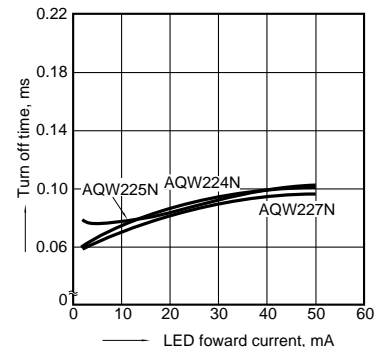
10. LED forward current vs. turn on time characteristics

Measured portion: between terminals 5 and 6,
7 and 8; Load voltage: Max. (DC);
Continuous load current: Max. (DC);
Ambient temperature: 25°C 77°F



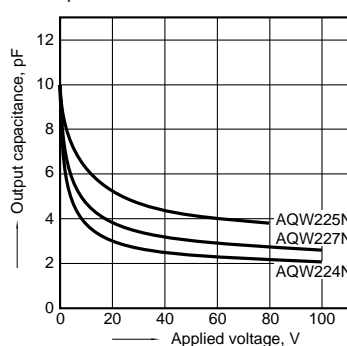
11. LED forward current vs. turn off time characteristics

Measured portion: between terminals 5 and 6,
7 and 8; Load voltage: Max. (DC);
Continuous load current: Max. (DC);
Ambient temperature: 25°C 77°F



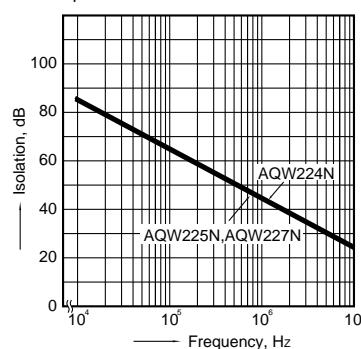
12. Applied voltage vs. output capacitance characteristics

Measured portion: between terminals 5 and 6,
7 and 8; Frequency: 1 MHz, 30 mVrms;
Ambient temperature: 25°C 77°F



13. Isolation characteristics (50 Ω impedance)

Measured portion: between terminals 5 and 6,
7 and 8; Ambient temperature: 25°C 77°F



14. Insertion loss characteristics (50 Ω impedance)

Measured portion: between terminals 5 and 6,
7 and 8; Ambient temperature: 25°C 77°F

