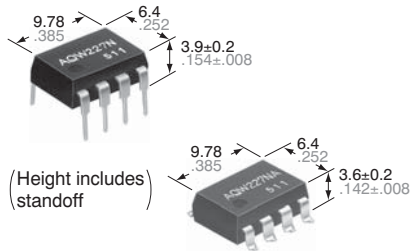


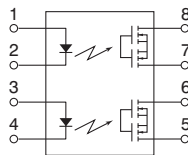
**DIP8-pin type featuring  
low on-resistance with  
200V/400V load voltage**

**PhotoMOS®  
RF 2 Form A**  
Low on-resistance (AQW22○N)



**CAD Data**

mm inch



## FEATURES

**1. 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. Low capacitance between output terminals ensures high response speed:**

The capacitance between output terminals is small; typ. 10 pF.

This enables for a fast operation speed of typ. 0.2 ms.

**4. High sensitivity and low on-resistance:**

Max. 0.07 A of load current can be controlled with input current of 5 mA.

The on-resistance is less than our conventional models.

**5. Low-level off state leakage current**

**6. Controls low-level analog signals:**

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

## TYPICAL APPLICATIONS

### • Measuring instruments

Scanner, IC checker, Board tester, etc.

## TYPES

|                | Output rating* |                                | Package                        | 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 dual use | 200 V          | 50 mA                          | DIP8-pin                       | AQW227N               | AQW227NA               | AQW227NAX                   | AQW227NAZ | 1 tube contains: 50 pcs.   | 1,000 pcs.    |
|                | 400 V          | 40 mA                          |                                | AQW224N               | AQW224NA               | AQW224NAX                   | AQW224NAZ | 1 batch contains: 500 pcs. |               |

\*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            | AQW227N(A)                      | AQW224N(A)         | Remarks                                               |
|-------------------------|-------------------------|-------------------|---------------------------------|--------------------|-------------------------------------------------------|
| Input                   | LED forward current     | I <sub>F</sub>    | 50 mA                           |                    |                                                       |
|                         | LED reverse voltage     | V <sub>R</sub>    | 5 V                             |                    |                                                       |
|                         | Peak forward current    | I <sub>FP</sub>   | 1 A                             |                    | f = 100 Hz, Duty factor = 0.1%                        |
|                         | Power dissipation       | P <sub>in</sub>   | 75 mW                           |                    |                                                       |
| Output                  | Load voltage (peak AC)  | V <sub>L</sub>    | 200 V                           | 400 V              |                                                       |
|                         | Continuous load current | I <sub>L</sub>    | 0.05 A<br>(0.07 A)              | 0.04 A<br>(0.05 A) | Peak AC, DC<br>( ): in case of using only 1 channel   |
|                         | Peak load current       | I <sub>peak</sub> | 0.15 A                          | 0.12 A             | A connection: 100 ms (1 shot),<br>V <sub>L</sub> = DC |
|                         | Power dissipation       | P <sub>out</sub>  | 800 mW                          |                    |                                                       |
| Total power dissipation |                         | P <sub>T</sub>    | 850 mW                          |                    |                                                       |
| I/O isolation voltage   |                         | V <sub>iso</sub>  | 1,500 V AC                      |                    |                                                       |
| Temperature limits      | Operating               | T <sub>opr</sub>  | −40°C to +85°C −40°F to +185°F  |                    | Non-condensing at low temperatures                    |
|                         | Storage                 | T <sub>stg</sub>  | −40°C to +100°C −40°F to +212°F |                    |                                                       |

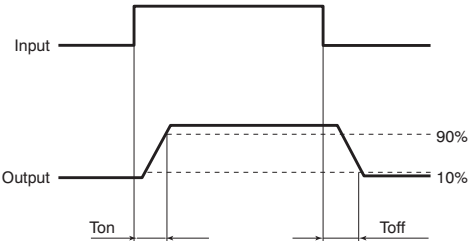
# RF 2 Form A Low on-resistance (AQW220N)

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

| Item                             |                           |                  | Symbol            | AQW227N(A)                               | AQW224N(A) | Remarks                                                              |
|----------------------------------|---------------------------|------------------|-------------------|------------------------------------------|------------|----------------------------------------------------------------------|
| Input                            | LED operate current       | Typical          | I <sub>Fon</sub>  | 0.9 mA                                   |            | I <sub>L</sub> = Max.                                                |
|                                  |                           | Maximum          |                   | 3.0 mA                                   |            |                                                                      |
|                                  | LED turn off current      | Minimum          | I <sub>Foff</sub> | 0.4 mA                                   |            | I <sub>L</sub> = Max.                                                |
|                                  |                           | Typical          |                   | 0.8 mA                                   |            |                                                                      |
|                                  | LED dropout voltage       | Typical          | V <sub>F</sub>    | 1.25 V (1.14 V at I <sub>F</sub> = 5 mA) |            | I <sub>F</sub> = 50 mA                                               |
|                                  |                           | Maximum          |                   | 1.5 V                                    |            |                                                                      |
| Output                           | On resistance             | Typical          | R <sub>on</sub>   | 30 Ω                                     | 70 Ω       | I <sub>F</sub> = 5 mA<br>I <sub>L</sub> = Max.<br>Within 1 s on time |
|                                  |                           | Maximum          |                   | 50 Ω                                     | 100 Ω      |                                                                      |
|                                  | Output capacitance        | Typical          | C <sub>out</sub>  | 10 pF                                    |            | I <sub>F</sub> = 0<br>V <sub>B</sub> = 0<br>f = 1 MHz                |
|                                  |                           | Maximum          |                   | 15 pF                                    |            |                                                                      |
|                                  | Off state leakage current | Maximum          | I <sub>Leak</sub> | 10 nA (1 nA or less)*                    |            | I <sub>F</sub> = 0<br>V <sub>L</sub> = Max.                          |
|                                  | Transfer characteristics  | Turn on time*    | Typical           | T <sub>on</sub>                          | 0.2 ms     |                                                                      |
| Maximum                          |                           |                  | 0.5 ms            |                                          |            |                                                                      |
| Turn off time*                   |                           | Typical          | T <sub>off</sub>  | 0.08 ms                                  |            | I <sub>F</sub> = 5 mA<br>I <sub>L</sub> = Max.                       |
|                                  |                           | Maximum          |                   | 0.2 ms                                   |            |                                                                      |
| I/O capacitance                  |                           | Typical          | C <sub>iso</sub>  | 0.8 pF                                   |            | f = 1 MHz<br>V <sub>B</sub> = 0                                      |
|                                  |                           | Maximum          |                   | 1.5 pF                                   |            |                                                                      |
| Initial I/O isolation resistance | Minimum                   | R <sub>iso</sub> | 1,000 MΩ          |                                          | 500 V DC   |                                                                      |

\* Available as custom orders (1 nA or less)

\*\*Turn on/Turn off 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 <sub>F</sub> | 5                 | mA   |

- Dimensions
- Schematic and Wiring Diagrams
- Cautions for Use

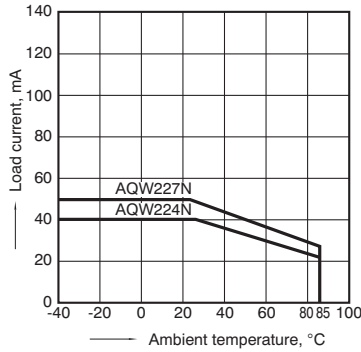
■ These products are not designed for automotive use.  
If you are considering to use these products for automotive applications, please contact your local Panasonic technical representative.  
Please refer to our information on [PhotoMOS Relays for Automotive Applications](#).

## REFERENCE DATA

### 1. Load current vs. ambient temperature characteristics

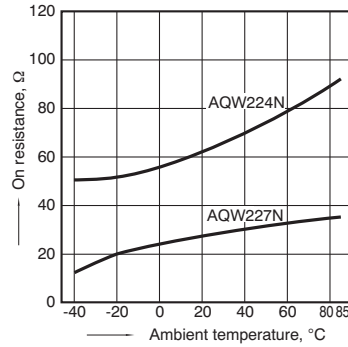
Allowable ambient temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 $-40^{\circ}\text{F}$  to  $+185^{\circ}\text{F}$

When using 2 channels



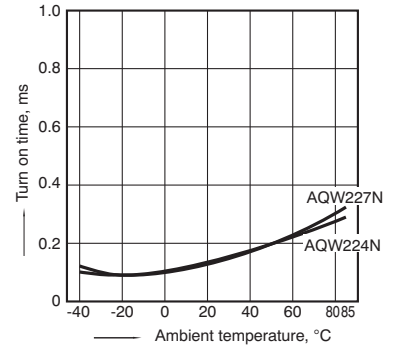
### 2. On resistance vs. ambient temperature characteristics

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



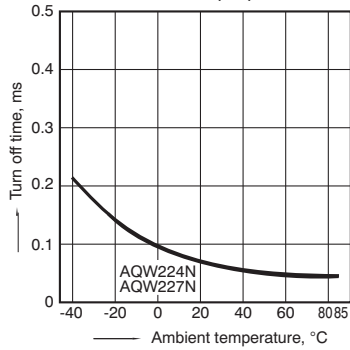
### 3. Turn on time vs. ambient temperature characteristics

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



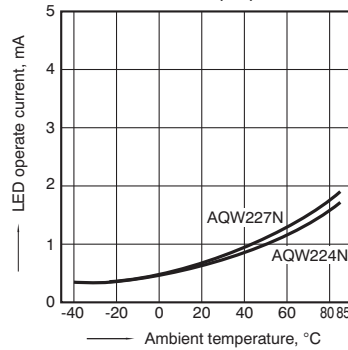
### 4. Turn off time vs. ambient temperature characteristics

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



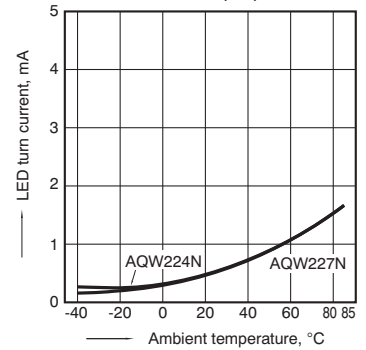
### 5. LED operate current vs. ambient temperature characteristics

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



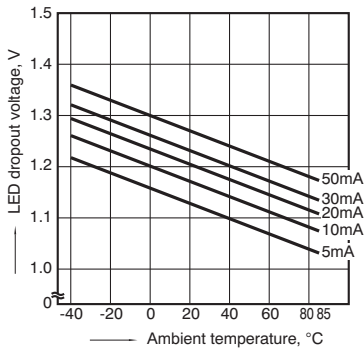
### 6. LED turn off current vs. ambient temperature characteristics

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



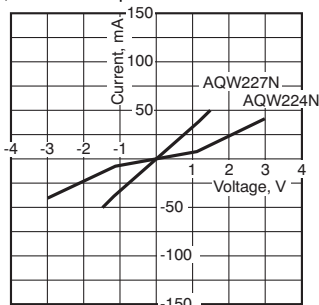
### 7. LED dropout voltage vs. ambient temperature characteristics

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



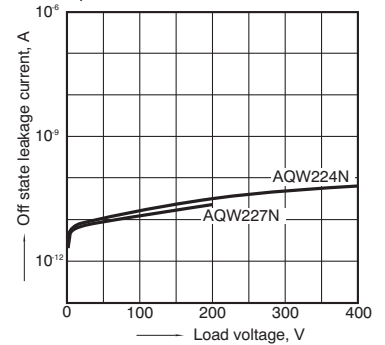
### 8. Voltage vs. current characteristics of output at MOS portion

Measured portion: between terminals 5 and 6,  
 7 and 8; Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



### 9. Off state leakage current

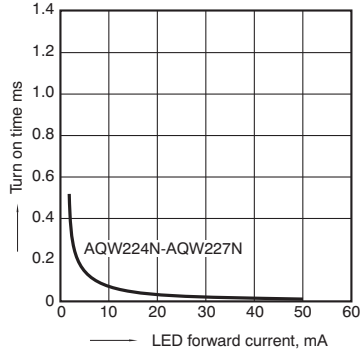
Measured portion: between terminals 5 and 6,  
 7 and 8;  
 Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



# RF 2 Form A Low on-resistance (AQW220N)

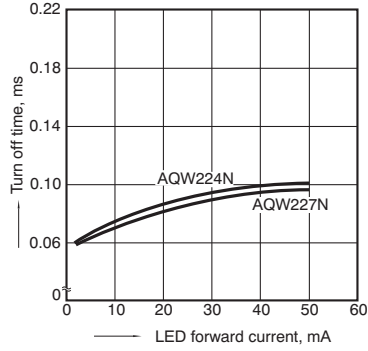
## 10.LED forward current vs. turn on time characteristics

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



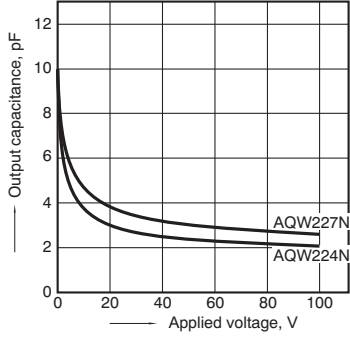
## 11.LED forward current vs. turn off time characteristics

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



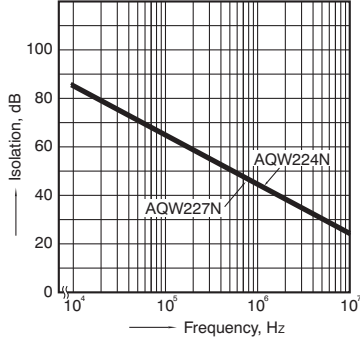
## 12.Applied voltage vs. output capacitance characteristics

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

