

# NAIS

## PD Type 1- channel (Form A) Type

# PhotoMOS RELAYS

### FEATURES

**1. Flat-Packaged Type (W) 8.8× (D) 9.3× (H) 3.9mm (W) .346× (D) .366× (H) .154inch**

**2. High capacity**

Supports the various types of load control, from very small loads to a maximum 2A at the rated load voltage 60V (AQY272)

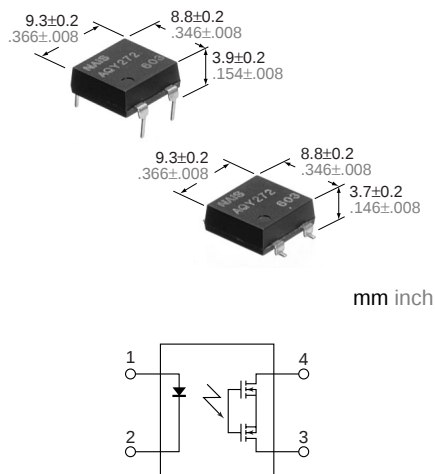
**3. High sensitivity**

- Low ON resistance

A maximum 2A load can be controlled with a 5mA input current. The ON resistance is low at 0.11Ω (AQY272)

### TYPICAL APPLICATIONS

- Measuring and Testing equipment
- IC Testers and Board Testers
- High speed inspection machines



### TYPES

| Type  | Output rating* |              | Part No.              |                        |                              |                              | Packing quantity |               |
|-------|----------------|--------------|-----------------------|------------------------|------------------------------|------------------------------|------------------|---------------|
|       | Load voltage   | Load current | Through hole terminal | Surface-mount terminal |                              |                              |                  |               |
|       |                |              | Tube packing style    |                        | Tape and reel packing style  |                              | Tube             | Tape and reel |
|       |                |              |                       |                        | Picked from the 1/2-pin side | Picked from the 3/4-pin side |                  |               |
| AC/DC | 60V            | 2.0A         | AQY272                | AQY272A                | AQY272AX                     | AQY272AZ                     |                  |               |
|       | 100V           | 1.3A         | AQY275                | AQY275A                | AQY275AX                     | AQY275AZ                     |                  |               |
|       | 200V           | 0.65A        | AQY277                | AQY277A                | AQY277AX                     | AQY277AZ                     |                  |               |
|       | 400V           | 0.35A        | AQY274                | AQY274A                | AQY274AX                     | AQY274AZ                     |                  |               |

\* Indicate the peak AC and DC values.

Note: For space reasons, the SMD terminal shape indicator "A" and 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            | AQY272                          | AQY275 | AQY277 | AQY274 | Remarks                             |
|-------------------------|-----------------------------------|-------------------|---------------------------------|--------|--------|--------|-------------------------------------|
| Input                   | LED forward current               | I <sub>F</sub>    | 50 mA                           |        |        |        |                                     |
|                         | LED reverse voltage               | V <sub>R</sub>    | 3 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>    | 60 V                            | 100 V  | 200 V  | 400 V  |                                     |
|                         | Continuous load current (Peak AC) | I <sub>L</sub>    | 2.0 A                           | 1.3 A  | 0.65 A | 0.35 A |                                     |
|                         | Peak load current                 | I <sub>peak</sub> | 6.0 A                           | 4.0 A  | 2.0 A  | 1.0 A  | 100ms (1 shot), V <sub>L</sub> = DC |
|                         | Power dissipation                 | P <sub>out</sub>  | 700 mW                          |        |        |        |                                     |
| Total power dissipation |                                   | P <sub>T</sub>    | 750 mW                          |        |        |        |                                     |
| I/O isolation voltage   |                                   | V <sub>iso</sub>  | 2,500 V AC                      |        |        |        |                                     |
| Temperture 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 |        |        |        |                                     |

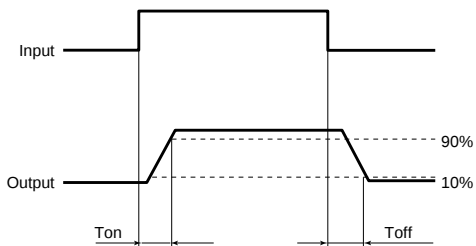
## 2. Electrical characteristics (Ambient temperature: 25°C 77°F)

| Item                     |                                  |         | Symbol            | AQY272                                    | AQY275  | AQY277  | AQY274  | Condition                                                                                    |
|--------------------------|----------------------------------|---------|-------------------|-------------------------------------------|---------|---------|---------|----------------------------------------------------------------------------------------------|
| Input                    | LED operate current              | Typical | I <sub>Fon</sub>  | 1.0 mA                                    |         |         |         | I <sub>L</sub> = 100 mA                                                                      |
|                          |                                  | Maximum |                   | 3.0 mA                                    |         |         |         | V <sub>L</sub> = 10 V                                                                        |
|                          | LED turn off current             | Minimum | I <sub>Foff</sub> | 0.4 mA                                    |         |         |         | I <sub>L</sub> = 100 mA                                                                      |
|                          |                                  | Typical |                   | 0.9 mA                                    |         |         |         | V <sub>L</sub> = 10 V                                                                        |
|                          | LED dropout voltage              | Typical | V <sub>F</sub>    | 1.16 V (1.25 V at I <sub>F</sub> = 50 mA) |         |         |         | I <sub>F</sub> = 10 mA                                                                       |
|                          |                                  | Maximum |                   | 1.5 V                                     |         |         |         |                                                                                              |
| Output                   | On resistance                    | Typical | R <sub>on</sub>   | 0.11 Ω                                    | 0.23 Ω  | 0.7 Ω   | 2.1 Ω   | I <sub>F</sub> = 10 mA                                                                       |
|                          |                                  | Maximum |                   | 0.18 Ω                                    | 0.34 Ω  | 1.1 Ω   | 3.2 Ω   | I <sub>L</sub> = Max.<br>Within 1 s on time                                                  |
|                          | Off state leakage current        | Maximum | I <sub>Leak</sub> | 10 μA                                     |         |         |         | I <sub>F</sub> = 0<br>V <sub>L</sub> = Max.                                                  |
| Transfer characteristics | Turn on time*                    | Typical | T <sub>on</sub>   | 2.46 ms                                   | 2.40 ms | 2.40 ms | 1.65 ms | I <sub>F</sub> = 10 mA                                                                       |
|                          |                                  | Maximum |                   | 5.0 ms                                    |         |         |         | I <sub>L</sub> = 100 mA<br>V <sub>L</sub> = 10 V                                             |
|                          |                                  | Typical |                   | 5.64 ms                                   | 5.65 ms | 2.57 ms | 3.88 ms | I <sub>F</sub> = 5 mA                                                                        |
|                          |                                  | Maximum |                   | 10.0 ms                                   |         |         |         | I <sub>L</sub> = 100 mA<br>V <sub>L</sub> = 10 V                                             |
|                          | Turn off time*                   | Typical | T <sub>off</sub>  | 0.22 ms                                   | 0.21 ms | 0.10 ms | 0.08 ms | I <sub>F</sub> = 5 mA or 10 mA                                                               |
|                          |                                  | Maximum |                   | 3.0 ms                                    |         |         |         | I <sub>L</sub> = 100 mA<br>V <sub>L</sub> = 10 V                                             |
|                          | I/O capacitance                  | Typical | C <sub>iso</sub>  | 0.8 pF                                    |         |         |         | f = 1 MHz                                                                                    |
|                          |                                  | Maximum |                   | 1.5 pF                                    |         |         |         | V <sub>B</sub> = 0                                                                           |
|                          | Initial I/O isolation resistance | Minimum | R <sub>iso</sub>  | 1,000 MΩ                                  |         |         |         | 500 V DC                                                                                     |
|                          | Maximum operating speed          | Maximum | —                 | 0.5 cps                                   | 0.5 cps | 0.5 cps | 0.5 cps | I <sub>F</sub> = 10 mA<br>Duty factor = 50%<br>I <sub>L</sub> = Max. , V <sub>L</sub> = Max. |

Note: Recommendable LED forward current  $I_F = 5$  to 10 mA.

For type of connection, see page 31.

\*Turn on/Turn off time



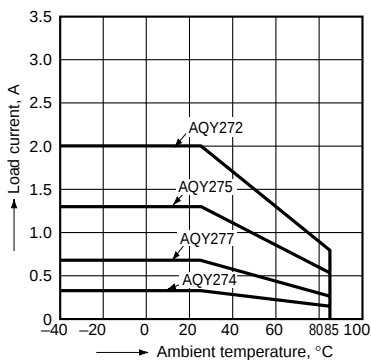
■ For Dimensions, see Page 29.

■ For Schematic and Wiring Diagrams, see Page 31.

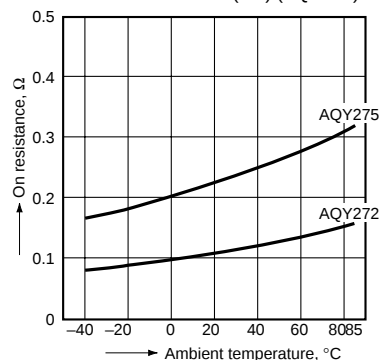
■ For Cautions for Use, see Page 36.

## REFERENCE DATA

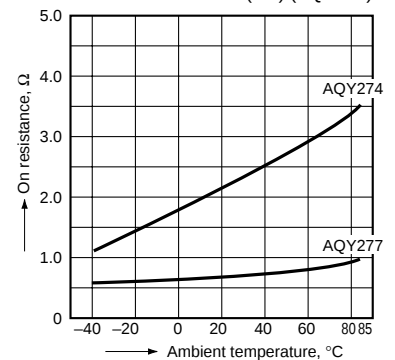
## 1. Load current vs. ambient temperature characteristics

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

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

LED current: 10 mA;  
Continuous load current: 2.0 A (DC) (AQY272),  
1.3 A (DC) (AQY275)

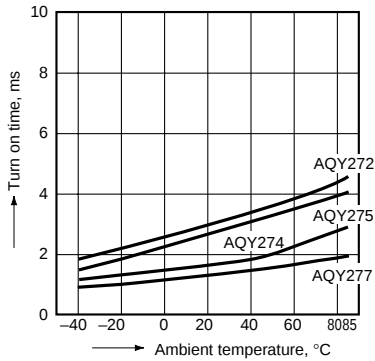
## 2.-(2) On resistance vs. ambient temperature characteristics

LED current: 10 mA;  
Continuous load current: 0.65 A (DC) (AQY277),  
0.35 A (DC) (AQY274)

# AQY27○

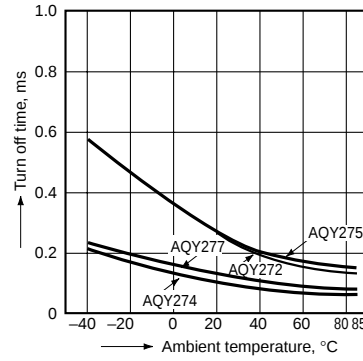
## 3. Turn on time vs. ambient temperature characteristics

LED current: 10 mA; Load voltage: 10 V (DC);  
Continuous load current: 100 mA (DC)



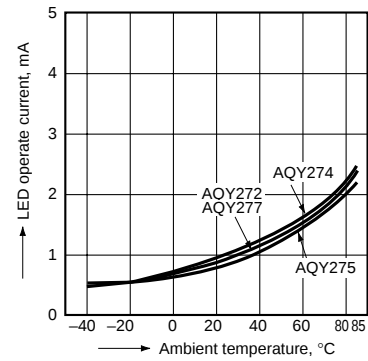
## 4. Turn off time vs. ambient temperature characteristics

LED current: 10 mA; Load voltage: 10 V (DC);  
Continuous load current: 100 mA (DC)



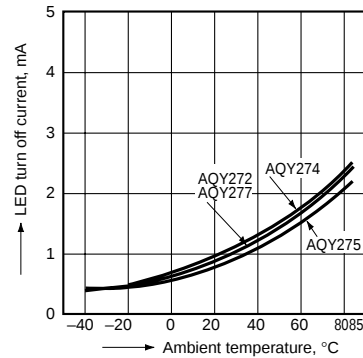
## 5. LED operate vs. ambient temperature characteristics

Load voltage: 10 V (DC);  
Continuous load current: 100 mA (DC)



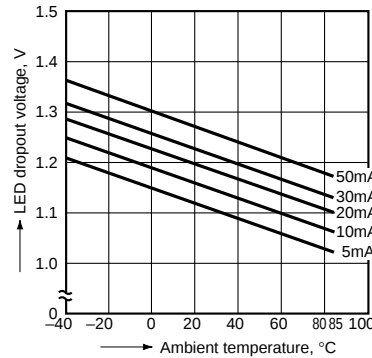
## 6. LED turn off current vs. ambient temperature characteristics

Load voltage: 10 V (DC);  
Continuous load current: 100 mA (DC)



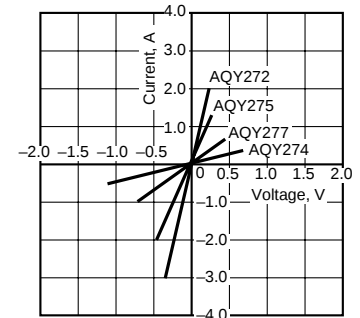
## 7. LED dropout voltage vs. ambient temperature characteristics

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



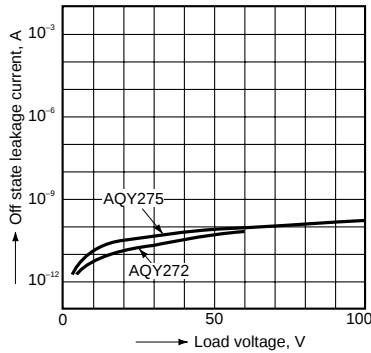
## 8. Voltage vs. current characteristics of output at MOS portion

Ambient temperature: 25°C 77°F



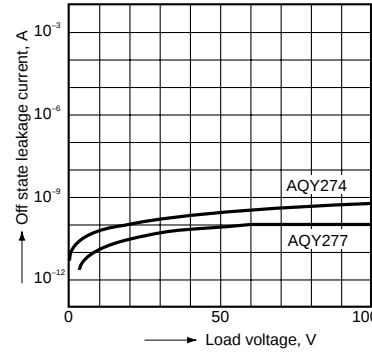
## 9.-(1) Off state leakage current

Ambient temperature: 25°C 77°F



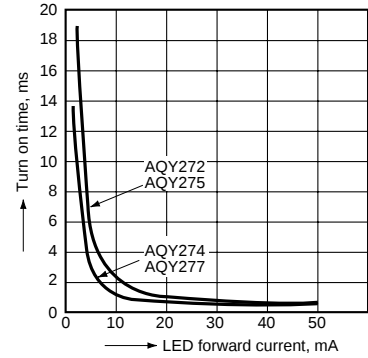
## 9.-(2) Off state leakage current

Ambient temperature: 25°C 77°F



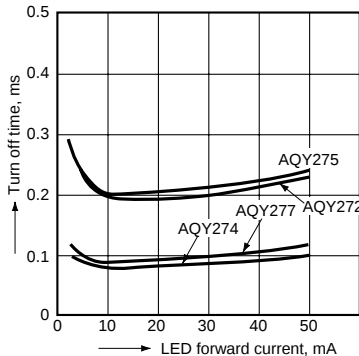
## 10. LED forward current vs. turn on time characteristics

Load voltage: 10 V (DC); Continuous load current: 100 mA (DC); Ambient temperature: 25°C 77°F



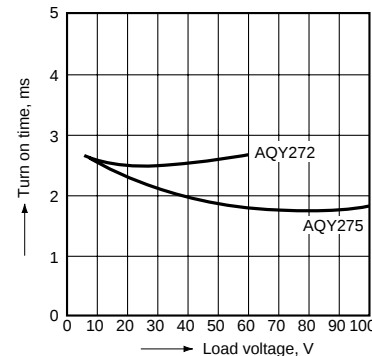
## 11. LED forward current vs. turn off time characteristics

Load voltage: 10 V (DC); Continuous load current: 100 mA (DC); Ambient temperature: 25°C 77°F



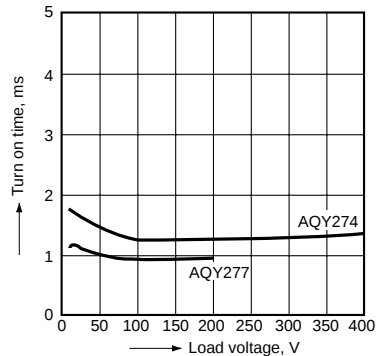
## 12.-(1) Load voltage vs. turn on time characteristics

LED current: 10 mA; Continuous load current: 100 mA; Ambient temperature: 25°C 77°F



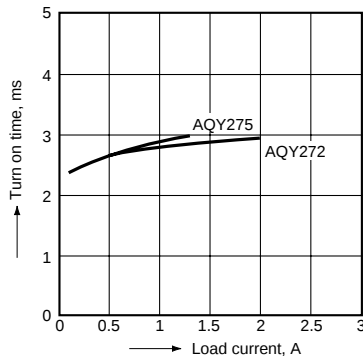
## 12.-(2) Load voltage vs. turn on time characteristics

LED current: 10 mA; Continuous load current: 100 mA; Ambient temperature: 25°C 77°F



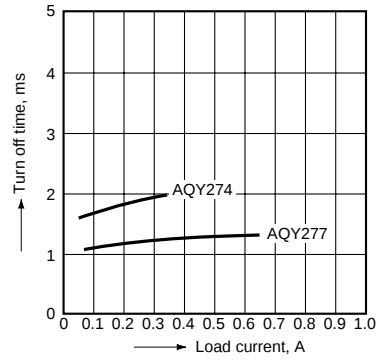
## 13.-(1) Load current vs. turn on time characteristics

LED current: 10 mA; Load voltage: 10 V (DC);  
Ambient temperature: 25°C 77°F



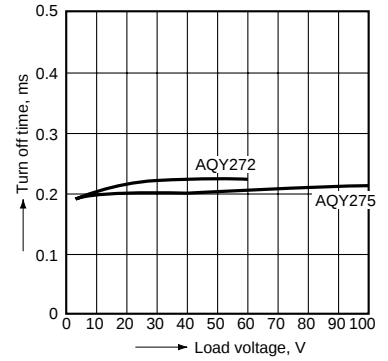
## 13.-(2) Load current vs. turn on time characteristics

LED current: 10 mA; Load voltage: 10 V (DC);  
Ambient temperature: 25°C 77°F



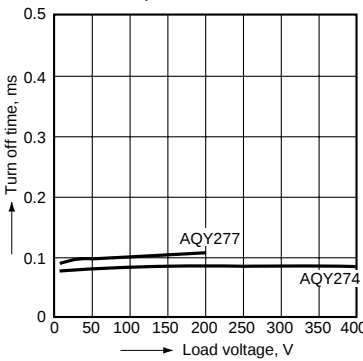
## 14.-(1) Load voltage vs. turn off time characteristics

LED current: 10 mA; Continuous load current: 100 mA; Ambient temperature: 25°C 77°F



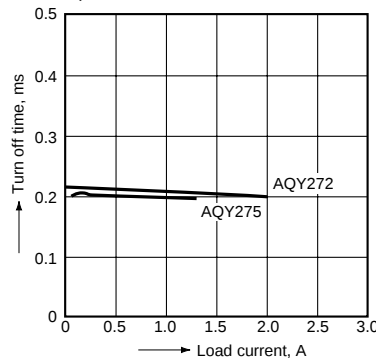
## 14.-(2) Load voltage vs. turn off time characteristics

LED current: 10 mA; Continuous load current: 100 mA; Ambient temperature: 25°C 77°F



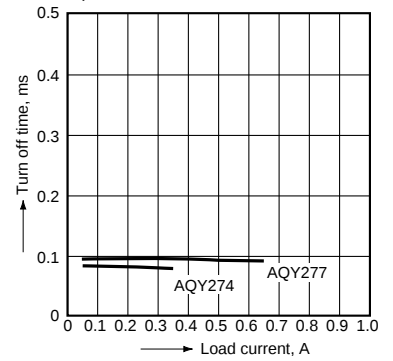
## 15.-(1) Load current vs. turn off time characteristics

LED current: 10 mA; Load voltage 10 V (DC);  
Ambient temperature: 25°C 77°F



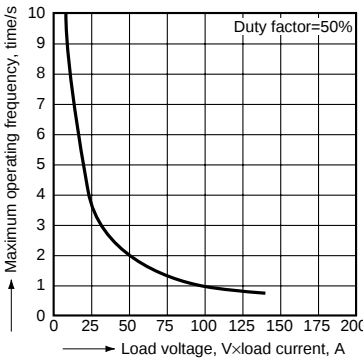
## 15.-(2) Load current vs. turn off time characteristics

LED current: 10 mA; Load voltage 10 V (DC);  
Ambient temperature: 25°C 77°F



## 16. Maximum operating frequency vs. load voltage/current characteristics

LED current: 10 mA;  
Ambient temperature: 25°C 77°F



## 17. Applied voltage vs. output capacitance characteristics

Frequency: 1 MHz;  
Ambient temperature: 25°C 77°F

