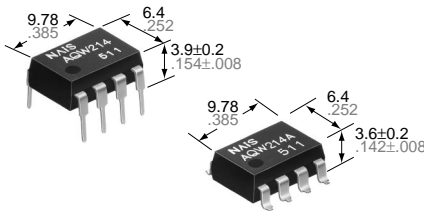


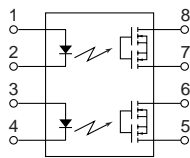
# NAIS

## GU (General Use) Type [2-Channel (Form A) Type]

# PhotoMOS RELAYS



mm inch



### FEATURES

#### 1. 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).

#### 2. Applicable for 2 Form A use as well as two independent 1 Form A use

#### 3. Controls low-level analog signals

PhotoMOS relays feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.

#### 4. High sensitivity, high speed response

Can control a maximum 0.13 A load current with a 5 mA input current. Fast operation speed of 310 μs (typical). (AQW214)

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

The SSR has an off state leakage current of several milliamperes whereas the PhotoMOS relays has only 100 pA even with the rated load voltage of 400 V (AQW214).

#### 6. Low-level thermal electromotive force (Approx. 1 μV)

#### 7. Eliminates the need for a counter electromotive force protection diode in the drive circuits on the input side

#### 8. Stable ON resistance.

#### 9. Eliminates the need for a power supply to drive the power MOSFET

### TYPICAL APPLICATIONS

- High-speed inspection machines
- Telephones equipment
- Computer

### TYPES

#### 1. AC/DC type

Output rating*		Part No.				Packing quantity	
		Through hole terminal	Surface-mount terminal		Tube		
Load voltage	Load current	Tube packing style		Tape and reel packing style		1 tube contains 40 pcs. 1 batch contains 400 pcs.	1,000 pcs.
60V	350 mA	AQW212	AQW212A	AQW212AX	AQW212AZ		
100 V	300 mA	AQW215	AQW215A	AQW215AX	AQW215AZ		
200 V	160 mA	AQW217	AQW217A	AQW217AX	AQW217AZ		
350 V	120 mA	AQW210	AQW210A	AQW210AX	AQW210AZ		
400 V	100 mA	AQW214	AQW214A	AQW214AX	AQW214AZ		
600 V	40 mA	AQW216	AQW216A	AQW216AX	AQW216AZ		

\*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. AC/DC type

##### 1. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

Item		Symbol	AQW212(A)	AQW215(A)	AQW217(A)	AQW210(A)	AQW214(A)	AQW216(A)	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	350 V	400 V	600 V	
	Continuous load current	I <sub>L</sub>	0.35 A (0.40A)	0.30 A (0.35 A)	0.16 A (0.2 A)	0.12 A (0.14 A)	0.10 A (0.13 A)	0.04 A (0.05 A)	( ) : in case of using only 1 channel A connection: Peak AC, DC
	Peak load current	I <sub>peak</sub>	1.0 A	0.9 A	0.48 A	0.36 A	0.3 A	0.12 A	A connection: 100 ms (1 shot), 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						Between input and output/ between contact sets
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						

# AQW21○

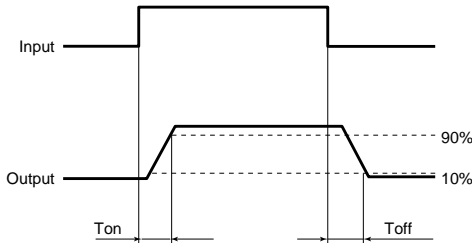
## 2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item		Symbol	AQW212(A)	AQW215(A)	AQW217(A)	AQW210(A)	AQW214(A)	AQW216(A)	Condition
Input	LED operate current	Typical	0.9 mA						$I_L = \text{Max.}$
		Maximum	3 mA						
	LED turn off current	Minimum	0.4 mA						$I_L = \text{Max.}$
		Typical	0.8 mA						
LED dropout voltage	Typical	1.14 V (1.25 V at $I_F = 50 \text{ mA}$ )						$I_F = 5 \text{ mA}$	
	Maximum	1.5 V							
Output	On resistance	Typical	0.83 $\Omega$	2.3 $\Omega$	11 $\Omega$	23 $\Omega$	30 $\Omega$	70 $\Omega$	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ Within 1 $\mu\text{s}$ on time
		Maximum	2.5 $\Omega$	4.0 $\Omega$	15 $\Omega$	35 $\Omega$	50 $\Omega$	120 $\Omega$	
	Off state leakage current	Maximum	1 $\mu\text{A}$						
Transfer characteristics	Turn on time*	Typical	0.65 ms	0.60 ms	0.25 ms	0.25 ms	0.31 ms	0.28 ms	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$
		Maximum	2 ms	2 ms	1.0 ms	0.5 ms	0.5 ms	0.5 ms	
	Turn off time*	Typical	0.08 ms	0.06 ms	0.05 ms	0.05 ms	0.05 ms	0.04 ms	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$
		Maximum	0.2 ms						
	I/O capacitance	Typical	0.8 pF						$f = 1 \text{ MHz}$ $V_B = 0$
		Maximum	1.5 pF						
Initial I/C isolation resistance	Minimum	1,000 M $\Omega$						500 V DC	

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

For type of connection, see page 32.

\*Turn on/Turn off time

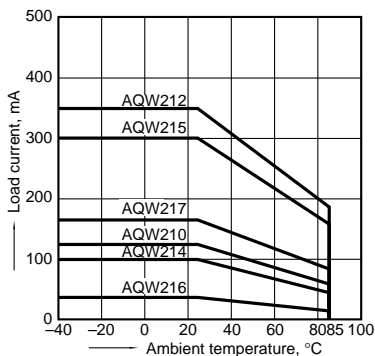


- For Dimensions, see Page 27.
- For Schematic and Wiring Diagrams, see Page 32.
- For Cautions for Use, see Page 36.

## REFERENCE DATA

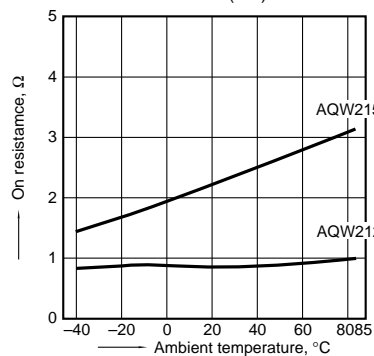
### 1. Load current vs. ambient temperature characteristics

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



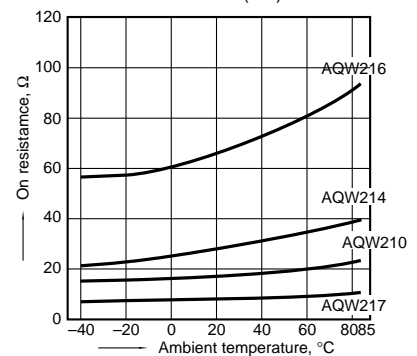
### 2.-(1) On resistance vs. ambient temperature characteristics

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



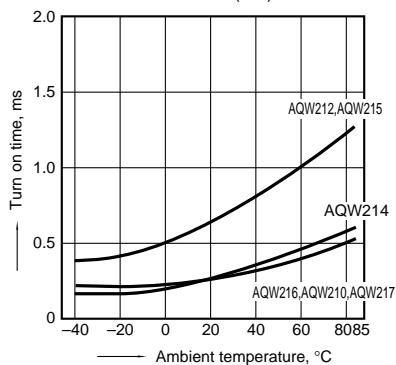
### 2.-(2) On resistance vs. ambient temperature characteristics

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



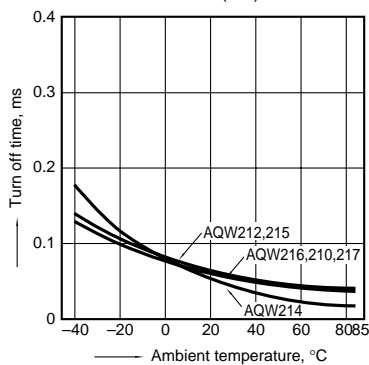
### 3. Turn on time vs. ambient temperature characteristics

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



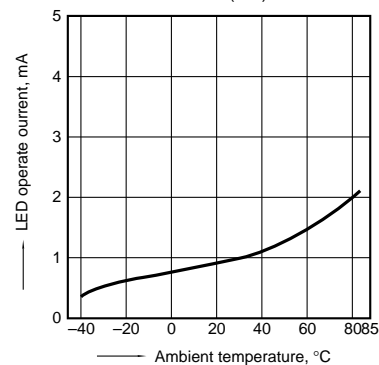
### 4. Turn off time vs. ambient temperature characteristics

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



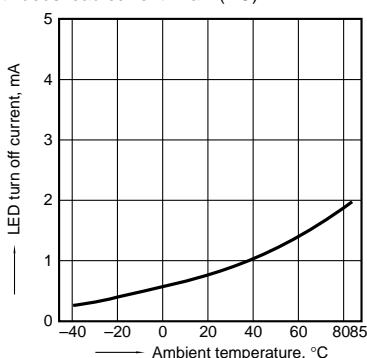
### 5. LED operate current vs. ambient temperature characteristics

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



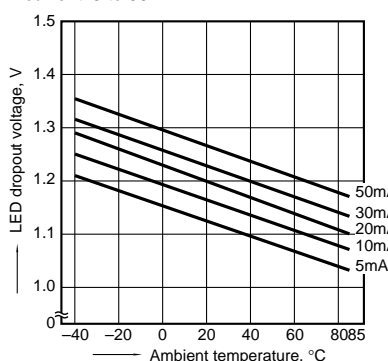
### 6. LED turn off current vs. ambient temperature characteristics

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



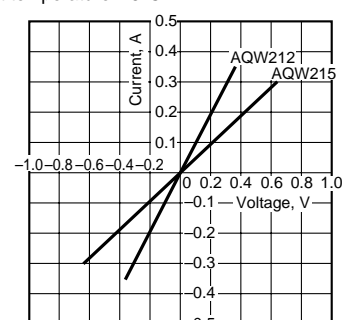
### 7. LED dropout voltage vs. ambient temperature characteristics

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



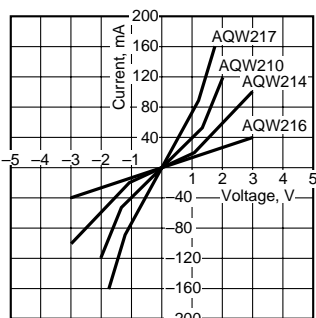
### 8.-(1) Voltage vs. current characteristics of output at MOS portion

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



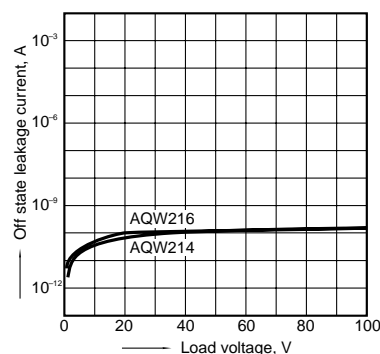
### 8.-(2) Voltage vs. current characteristics of output at MOS portion

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



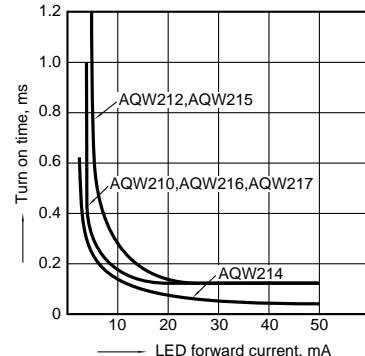
### 9. Off state leakage current

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



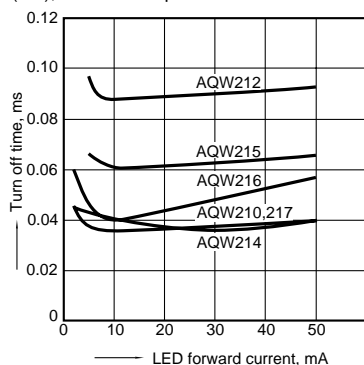
### 10. LED forward current vs. turn on time characteristics

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;  
Ambient temperature: 25°C 77°F

