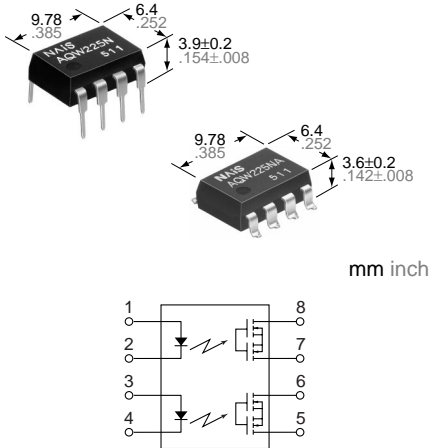


# NAiS

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

# PhotoMOS RELAYS



mm inch

## 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			Tube	Tape and reel
	Load voltage	Load current	Tube packing style		Tape and reel packing style			
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 <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>	80 V	200 V	400 V	
	Continuous load current	I <sub>L</sub>	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 <sub>peak</sub>	0.36 A	0.15 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			
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			

# AQW220N

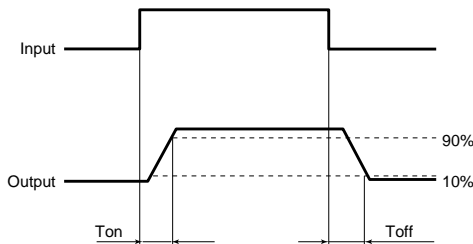
## 2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item			Symbol	AQW225N(A)	AQW227N(A)	AQW224N(A)	Remarks
Input	LED operate current	Typical	$I_{Fon}$	0.9 mA			$I_L = \text{Max.}$
		Maximum		3.0 mA			
	LED turn off current	Minimum	$I_{Foff}$	0.4 mA			$I_L = \text{Max.}$
		Typical		0.8 mA			
	LED dropout voltage	Typical	$V_F$	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	$R_{on}$	7 $\Omega$	30 $\Omega$	70 $\Omega$	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time
		Maximum		10 $\Omega$	50 $\Omega$	100 $\Omega$	
	Output capacitance	Typical	$C_{out}$	10 pF			$I_F = 0$ $V_B = 0$ $f = 1 \text{ MHz}$
		Maximum		15 pF			
	Off state leakage current	Maximum	$I_{leak}$	10 nA			$I_F = 0$ $V_L = \text{Max.}$
	Transfer characteristics	Switching speed	Turn on time*	Typical	0.20 ms		
Maximum				0.5 ms			$I_L = \text{Max.}$
Turn off time*			Typical	0.08 ms			$I_F = 5 \text{ mA}$
			Maximum	0.2 ms			$I_L = \text{Max.}$
I/O capacitance		Typical	$C_{iso}$	0.8 pF			$f = 1 \text{ MHz}$
		Maximum		1.5 pF			$V_B = 0$
Initial I/O isolation resistance	Minimum	$R_{iso}$	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

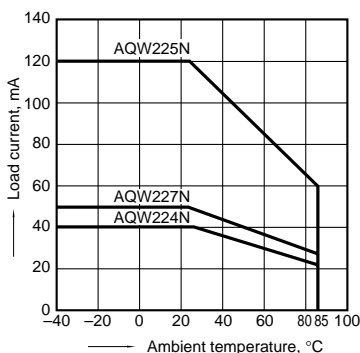


- For Dimensions, see Page 27.
- For Schematic and Wiring Diagrams, see Page 32.
- For Cautions for Use, see Page 36.

## REFERENCE DATA

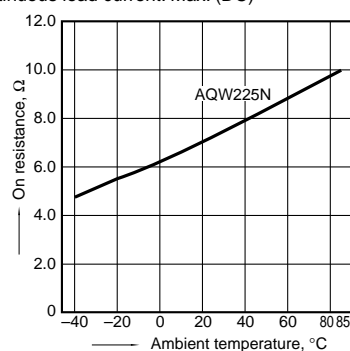
### 1. Load current vs. ambient temperature characteristics

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



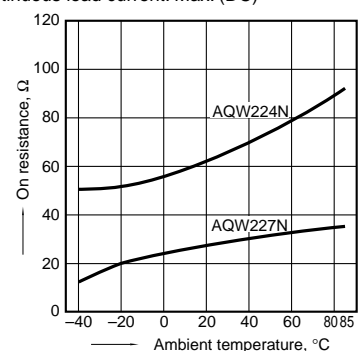
### 2.-(1) On resistance vs. ambient temperature characteristics

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



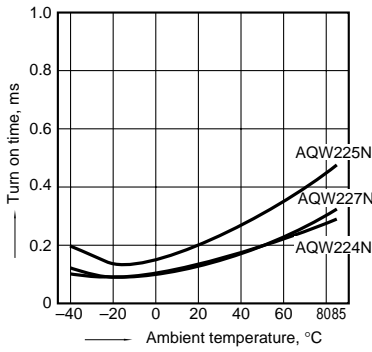
### 2.-(2) On resistance vs. ambient temperature characteristics

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



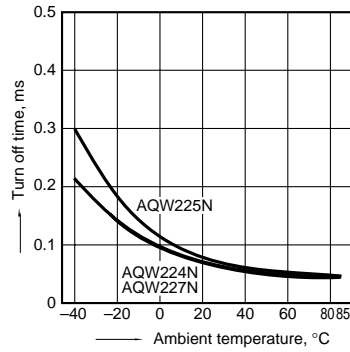
### 3. Turn on time vs. ambient temperature characteristics

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



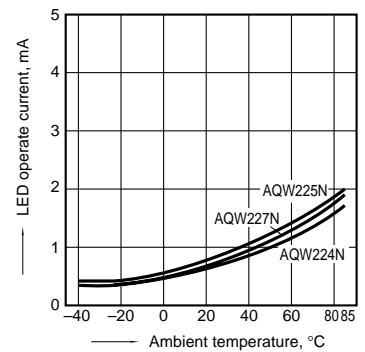
### 4. Turn off time vs. ambient temperature characteristics

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



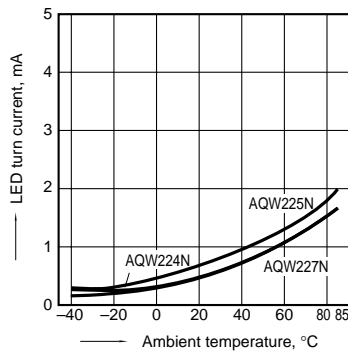
### 5. LED operate current vs. ambient temperature characteristics

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



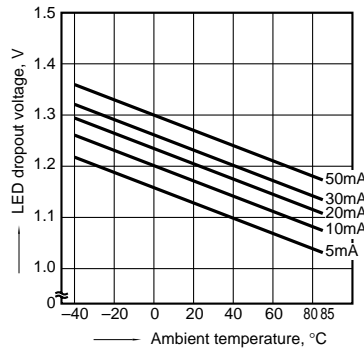
### 6. LED turn off current vs. ambient temperature characteristics

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



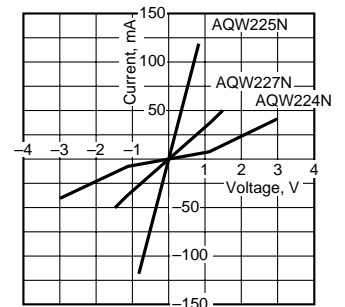
### 7. LED dropout voltage vs. ambient temperature characteristics

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



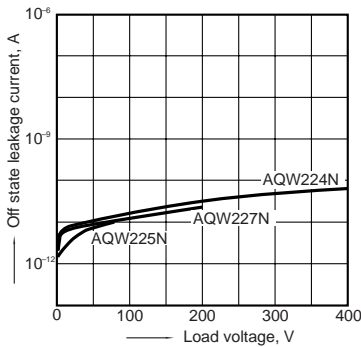
### 8. Voltage vs. current characteristics of output at MOS portion

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



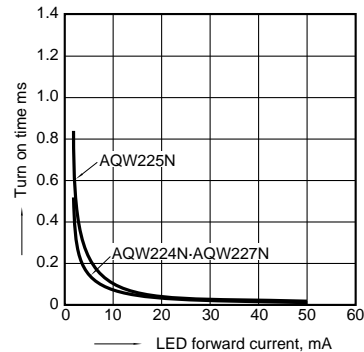
### 9. Off state leakage current

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



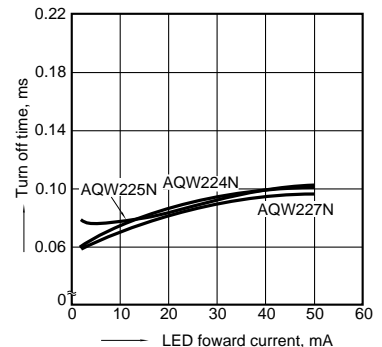
### 10. LED forward current vs. turn on time characteristics

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



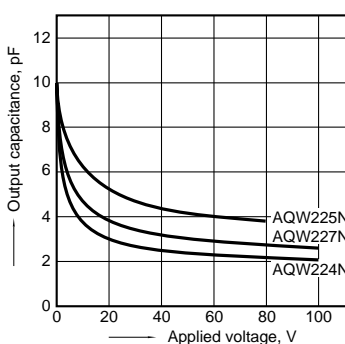
### 11. LED forward current vs. turn off time characteristics

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



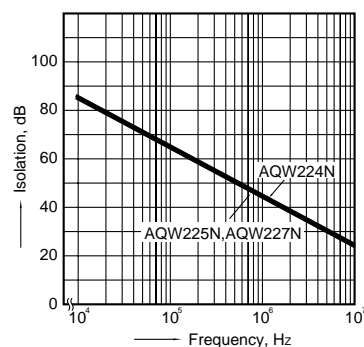
### 12. Applied voltage vs. output capacitance characteristics

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

