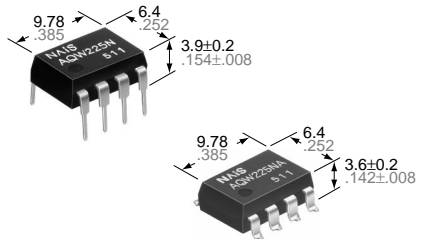


# NAIS

## 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)

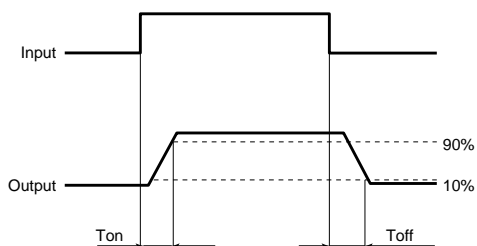
Item		Symbol	AQW225N(A)	AQW227N(A)	AQW224N(A)	Remarks
Input	LED forward current	I <sub>F</sub>	50 mA			
	LED reverse voltage	V <sub>R</sub>	3 V			
	Peak forward current	I <sub>FP</sub>	1 A			f = 100 Hz, Duty factor = 0.1%
	Power dissipation	P <sub>in</sub>	75 mW			
Output	Load voltage (peak AC)	V <sub>L</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			

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

Item			Symbol	AQW225N(A)	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>	1.14 V (1.25 V at I <sub>F</sub> = 50 mA)			I <sub>F</sub> = 5 mA	
	Maximum		1.5 V				
Output	On resistance	Typical	R <sub>on</sub>	7 Ω	30 Ω	70 Ω	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max. Within 1 s on time
		Maximum		10 Ω	50 Ω	100 Ω	
	Output capacitance	Typical	C <sub>out</sub>	10 pF			I <sub>F</sub> = 0 V <sub>B</sub> = 0 f = 1 MHz
		Maximum		15 pF			
	Off state leakage current	Maximum	I <sub>leak</sub>	10 nA			I <sub>F</sub> = 0 V <sub>L</sub> = Max.
Transfer characteristics	Switching speed	Turn on time*	Typical	T <sub>on</sub>	0.20 ms		I <sub>F</sub> = 5 mA
			Maximum		0.5 ms		I <sub>L</sub> = Max.
		Turn off time*	Typical	T <sub>off</sub>	0.08 ms		I <sub>F</sub> = 5 mA
			Maximum		0.2 ms		I <sub>L</sub> = Max.
	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		

Note: Recommendable LED forward current I<sub>F</sub> = 5mA.

\*Turn on/Turn off time

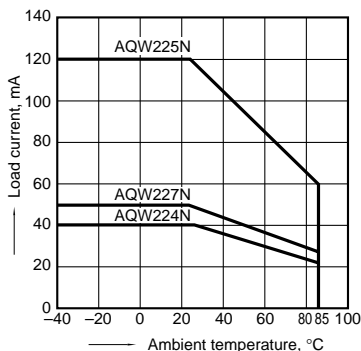


- For Dimensions, see Page 440.
- For Schematic and Wiring Diagrams, see Page 445.
- For Cautions for Use, see Page 449.

**REFERENCE DATA**

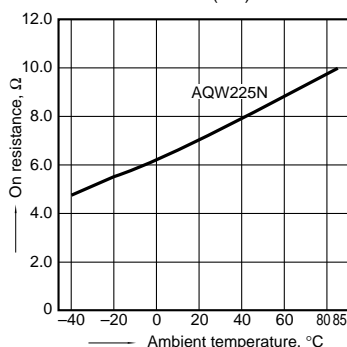
1. Load current vs. ambient temperature characteristics

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



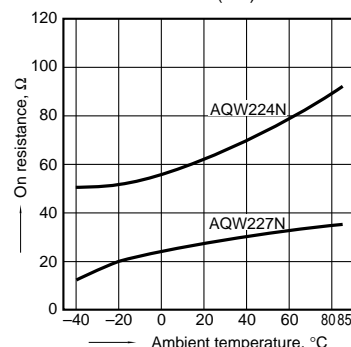
2.-(1) On resistance vs. ambient temperature characteristics

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



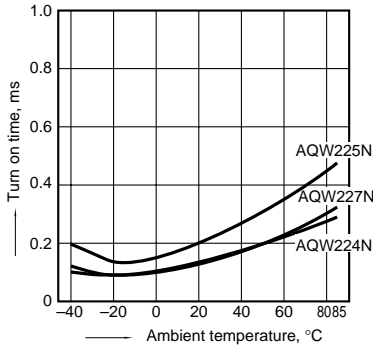
2.-(2) On resistance vs. ambient temperature characteristics

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



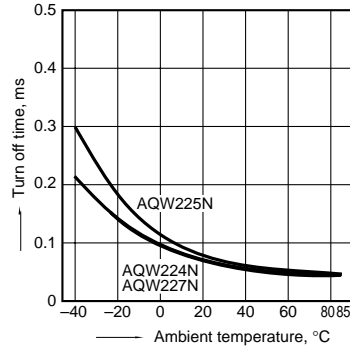
### 3. Turn on time vs. ambient temperature characteristics

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



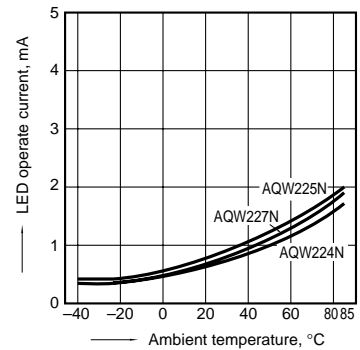
### 4. Turn off time vs. ambient temperature characteristics

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



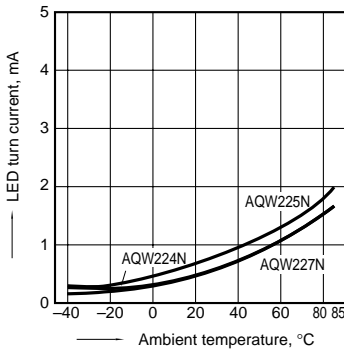
### 5. LED operate current vs. ambient temperature characteristics

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



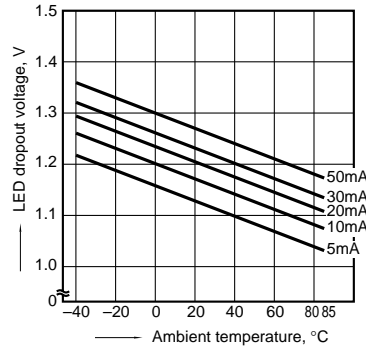
### 6. LED turn off current vs. ambient temperature characteristics

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



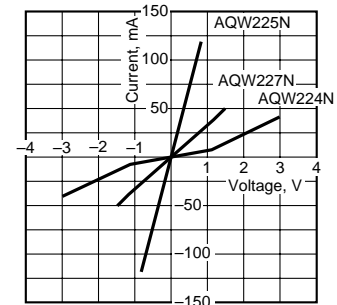
### 7. LED dropout voltage vs. ambient temperature characteristics

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



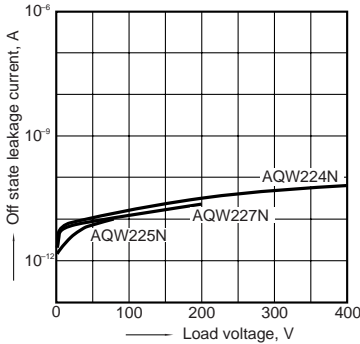
### 8. Voltage vs. current characteristics of output at MOS portion

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



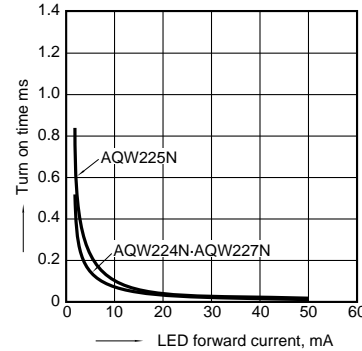
### 9. Off state leakage current

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



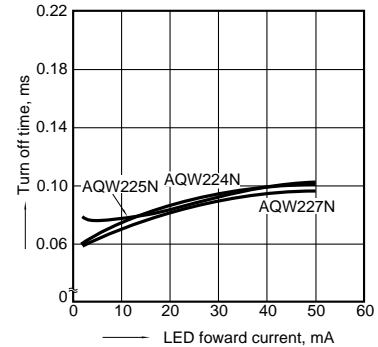
### 10. LED forward current vs. turn on time characteristics

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



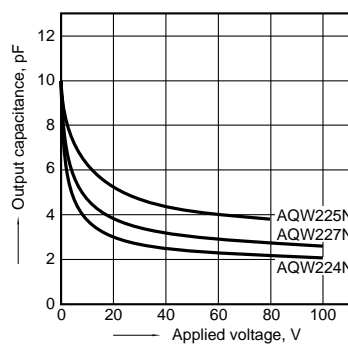
### 11. LED forward current vs. turn off time characteristics

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



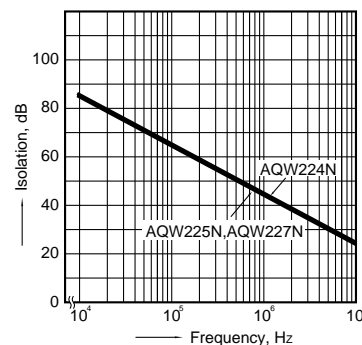
### 12. Applied voltage vs. output capacitance characteristics

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

