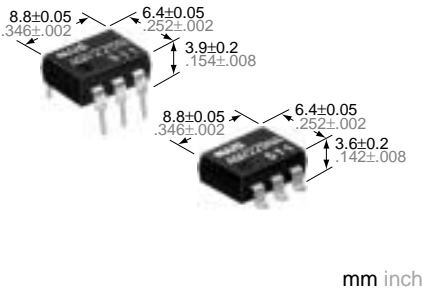


# NAIS

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

# PhotoMOS RELAYS



## FEATURES

**1. PhotoMOS relay with high response speed, low leakage current and low On resistance**

**2. 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 ms.

**3. High sensitivity and low On resistance**

Maximum 0.3 A of load current can be controlled with input current of 5 mA. The 10 W (AQV225N) On resistance is less than our conventional models. With no metallic contacts, the PhotoMOS relay has stable switching characteristics.

**4. 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 (AQV225N).

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

**6. Low terminals electromotive force (approx. 1 μV)**

## TYPICAL APPLICATIONS

- Measuring devices
- Scanner, IC checker, Board tester

## TYPES

Type	Output rating*		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
		⚠ AQV225N	⚠ AQV225NA	⚠ AQV225NAX	⚠ AQV225NAZ	Picked from the 1/2/3-pin side		
AC/DC type	80 V	150 mA	⚠ AQV225N	⚠ AQV225NA	⚠ AQV225NAX	⚠ AQV225NAZ	1 tube contains 50 pcs. 1 batch contains 500 pcs.	1,000 pcs.
	200 V	70 mA	AQV227N	AQV227NA	AQV227NAX	AQV227NAZ		
	400 V	50 mA	AQV224N	AQV224NA	AQV224NAX	AQV224NAZ		

\*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)

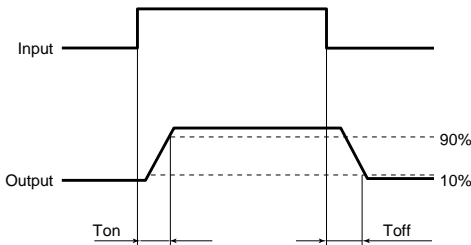
Item		Symbol	Type of connection	⚠ AQV225N(A)	AQV227N(A)	AQV224N(A)	Remarks
Input	LED forward current	I <sub>F</sub>	/	50 mA			f = 100 Hz, Duty factor = 0.1%
	LED reverse voltage	V <sub>R</sub>		3 V			
	Peak forward current	I <sub>FP</sub>		1 A			
	Power dissipation	P <sub>in</sub>		75 mW			
Output	Load voltage (peak AC)	V <sub>L</sub>	/	80 V	200 V	400 V	A connection: Peak AC, DC B, C connection: DC
	Continuous load current	I <sub>L</sub>	A	0.15 A	0.07 A	0.05 A	
			B	0.20 A	0.08 A	0.06 A	
			C	0.30 A	0.10 A	0.08 A	
	Peak load current	I <sub>peak</sub>	/	0.45 A	0.21 A	0.15 A	A connection: 100 ms (1 shot), V <sub>L</sub> = DC
Power dissipation	P <sub>out</sub>	/	360 mW				
Total power dissipation		P <sub>T</sub>	/	410 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			

# AQV220N

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

Item		Symbol	Type of connection	AQV225N(A)    AQV227N(A)    AQV224N(A)			Remarks		
Input	LED operate current	Typical	I <sub>Fon</sub>	—	0.90 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			0.85 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>	A	7.0	30	70	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max. Within 1 s on time	
		Maximum			10	50	100		
		Typical	R <sub>on</sub>	B	3.5	16	55		
		Maximum			5	25	70		
		Typical	R <sub>on</sub>	C	1.8	8	28		
		Maximum			2.5	12.5	35		
	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	Typical	I <sub>Leak</sub>	—	30 pA	30 pA	90 pA	I <sub>F</sub> = 0 V <sub>L</sub> = Max.	
		Maximum			10 nA				
Transfer characteristics	Switching speed	Turn on time*	Typical	T <sub>on</sub>	—	0.20 ms			I <sub>F</sub> = 5 mA I <sub>L</sub> = Max.
			Maximum			0.5 ms			
		Turn off time*	Typical	T <sub>off</sub>	—	0.08 ms			I <sub>F</sub> = 5 mA I <sub>L</sub> = Max.
			Maximum			0.2 ms			
	I/O capacitance	Typical	C <sub>iso</sub>	—	0.8 pF			f = 1 MHz V <sub>B</sub> = 0	
		Maximum			1.5 pF				
	Initial I/O isolation resistance	Minimum	R <sub>iso</sub>	—	1,000 MW			500 V DC	

Note: Recommendable LED forward current I<sub>F</sub> = 5 mA  
\*Turn on/Turn off time



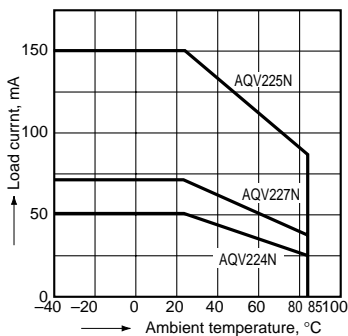
- For Dimensions, see Page 441.
- For Schematic and Wiring Diagrams, see Page 444.
- For Cautions for Use, see Page 449.

## REFERENCE DATA

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

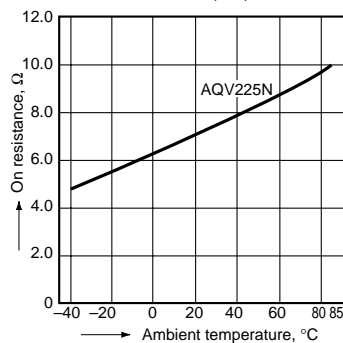
Allowable ambient temperature: -40°C to +85°C  
-40°F to +185°F

Type of connection: A



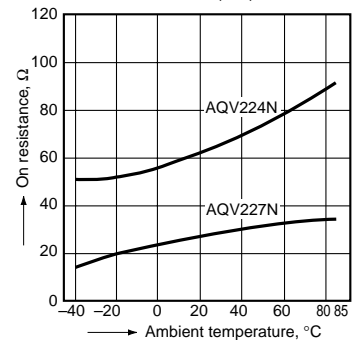
### 2.-(1) On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;  
LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



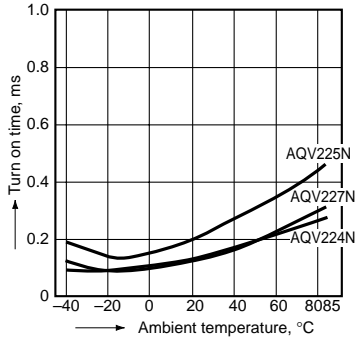
### 2.-(2) On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;  
LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



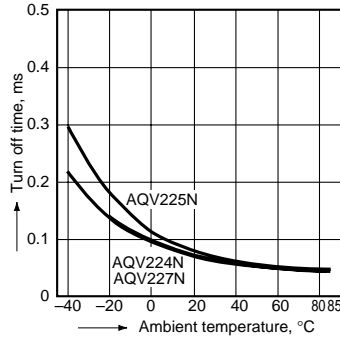
### 3. Turn on time vs. ambient temperature characteristics

Sample: AQV225N, AQV227N, AQV224N;  
LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



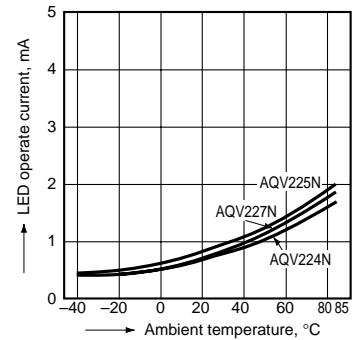
### 4. Turn off time vs. ambient temperature characteristics

Sample: AQV225N, AQV227N, AQV224N;  
LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



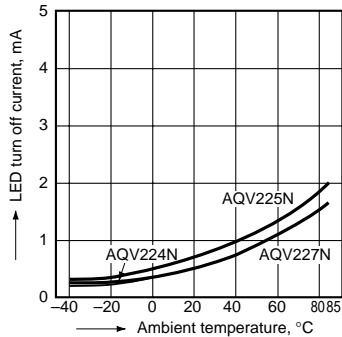
### 5. LED operate current vs. ambient temperature characteristics

Sample: AQV225N, AQV227N, AQV224N;  
Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



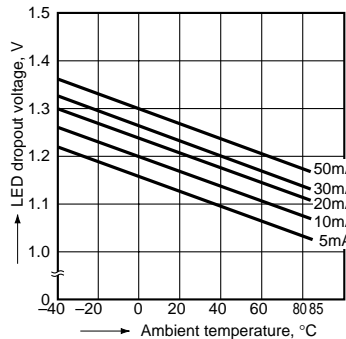
### 6. LED turn off current vs. ambient temperature characteristics

Sample: AQV225N, AQV227N, AQV224N;  
Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



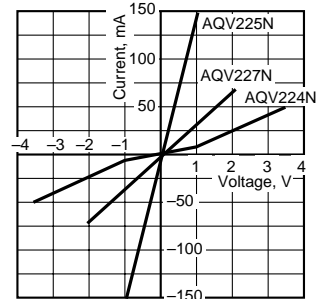
### 7. LED dropout voltage vs. ambient temperature characteristics

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



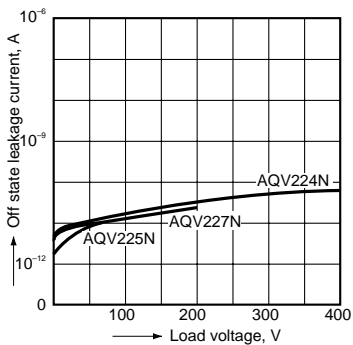
### 8. Voltage vs. current characteristics of output at MOS portion

Measured portion: between terminals 4 and 6;  
Ambient temperature: 25°C 77°F



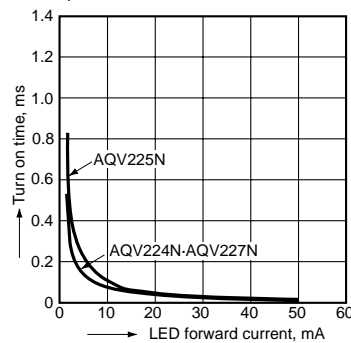
### 9. Off state leakage current

Sample: AQV225N, AQV227N, AQV224N;  
Measured portion: between terminals 4 and 6;  
Ambient temperature: 25°C 77°F



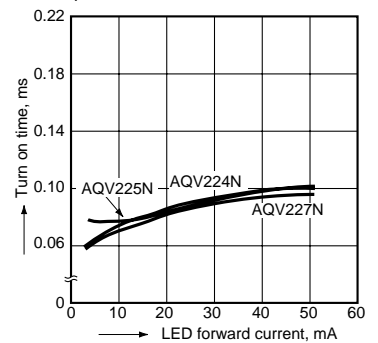
### 10. LED forward current vs. turn on time characteristics

Sample: AQV225N, AQV227N, AQV224N;  
Measured portion: between terminals 4 and 6;  
Load voltage: Max. (DC);  
Continuous load current: Max. (DC);  
Ambient temperature: 25°C 77°F



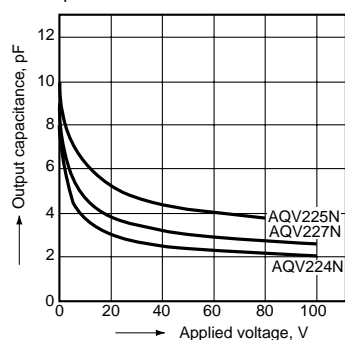
### 11. LED forward current vs. turn off time characteristics

Sample: AQV225N, AQV227N, AQV224N;  
Measured portion: between terminals 4 and 6;  
Load voltage: Max. (DC);  
Continuous load current: Max. (DC);  
Ambient temperature: 25°C 77°F



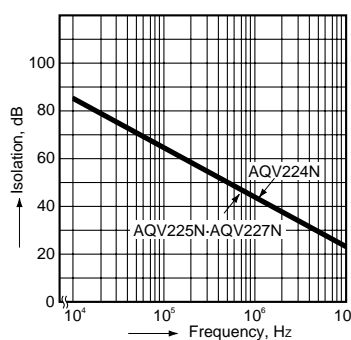
### 12. Applied voltage vs. output capacitance characteristics

Measured portion: between terminals 4 and 6;  
Frequency: 1 MHz, 30 mVrms;  
Ambient temperature: 25°C 77°F



### 13. Isolation characteristics (50 Ohm impedance)

Measured portion: between terminals 4 and 6;  
Ambient temperature: 25°C 77°F



### 14. Insertion loss characteristics (50 Ohm impedance)

Measured portion: between terminals 4 and 6;  
Ambient temperature: 25°C 77°F

