

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 μ s.

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 Ω (AQV225N) On resistance is less than our conventional models. With no metallic contacts, the PhotoMOS relay has stable switching characteristics.

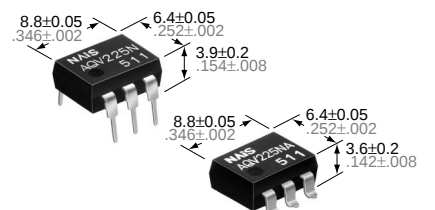
4. Low-level off state leakage current

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).

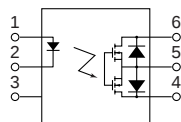
5. Controls low-level analog signals

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 μ V)



mm inch



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
					Picked from the 1/2/3-pin side	Picked from the 4/5/6-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)

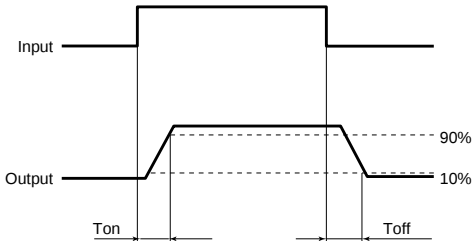
Item		Symbol	Type of connection	AQV225N(A)	AQV227N(A)	AQV224N(A)	Remarks
Input	LED forward current	I _F		50 mA			f = 100 Hz, Duty factor = 0.1%
	LED reverse voltage	V _R		3 V			
	Peak forward current	I _{FP}		1 A			
	Power dissipation	P _{in}		75 mW			
Output	Load voltage (peak AC)	V _L	A	80 V	200 V	400 V	A connection: Peak AC, DC B, C connection: DC
	Continuous load current	I _L		0.15 A	0.07 A	0.05 A	
				0.20 A	0.08 A	0.06 A	
	Peak load current	I _{peak}	C	0.30 A	0.10 A	0.08 A	A connection: 100 ms (1 shot), V _L = DC
				0.45 A	0.21 A	0.15 A	
Power dissipation		P _{out}		360 mW			
Total power dissipation		P _T		410 mW			
I/O isolation voltage		V _{iso}		1,500 V AC			
Temperature limits	Operating	T _{opr}		−40°C to +85°C −40°F to +185°F			Non-condensing at low temperatures
	Storage	T _{stg}		−40°C to +100°C −40°F to +212°F			

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 _{Fon}	—	0.90 mA			I _L = Max.
			Maximum			3.0 mA			
	LED turn off current		Minimum	I _{Foff}	—	0.4 mA			I _L = Max.
			Typical			0.85 mA			
	LED dropout voltage		Typical	V _F	—	1.14 V (1.25 V at I _F = 50 mA)			I _F = 5 mA
			Maximum			1.5 V			
Output	On resistance		Typical	R _{on}	A	7.0 Ω	30 Ω	70 Ω	I _F = 5 mA I _L = Max. Within 1 s on time
			Maximum			10 Ω	50 Ω	100 Ω	
			Typical	R _{on}	B	3.5 Ω	16 Ω	55 Ω	I _F = 5 mA I _L = Max. Within 1 s on time
			Maximum			5 Ω	25 Ω	70 Ω	
			Typical	R _{on}	C	1.8 Ω	8 Ω	28 Ω	I _F = 5 mA I _L = Max. Within 1 s on time
			Maximum			2.5 Ω	12.5 Ω	35 Ω	
	Output capacitance		Typical	C _{out}	—	10 pF			I _F = 0 V _B = 0 f = 1 MHz
			Maximum			15 pF			
	Off state leakage current		Typical	I _{Leak}	—	30 pA	30 pA	90 pA	I _F = 0 V _L = Max.
			Maximum			10 nA			
Transfer characteristics	Switching speed	Turn on time*	Typical	T _{on}	—	0.20 ms			I _F = 5 mA I _L = Max.
			Maximum			0.5 ms			
		Turn off time*	Typical	T _{off}	—	0.08 ms			I _F = 5 mA I _L = Max.
			Maximum			0.2 ms			
	I/O capacitance		Typical	C _{iso}	—	0.8 pF			f = 1 MHz V _B = 0
			Maximum			1.5 pF			
	Initial I/O isolation resistance		Minimum	R _{iso}	—	1,000 MΩ			500 V DC

Note: Recommendable LED forward current $I_F = 5 \text{ mA}$.
*Turn on/Turn off time

For type of connection, see page 31.



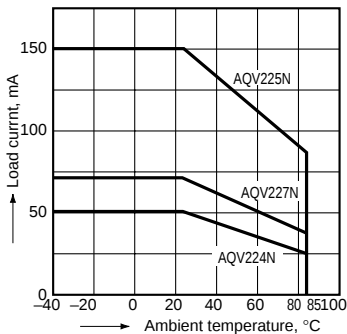
- For Dimensions, see Page 27.
- For Schematic and Wiring Diagrams, see Page 31.
- For Cautions for Use, see Page 36.

REFERENCE DATA

1. Load current vs. ambient temperature characteristics

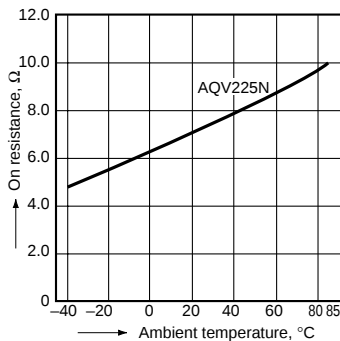
Allowable ambient temperature: -40°C to $+85^{\circ}\text{C}$
 -40°F to $+185^{\circ}\text{F}$

Type of connection: A



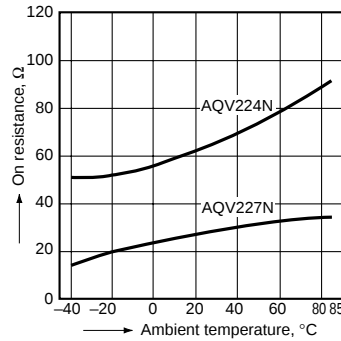
2.-(1) On resistance vs. ambient temperature characteristics

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

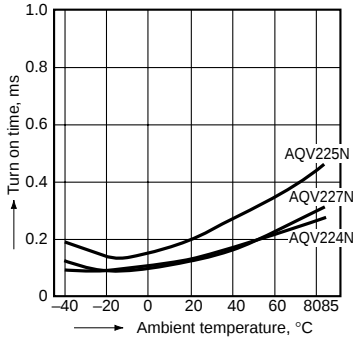
Measured portion: between terminals 4 and 6;
LED current: 5 mA; Load voltage: Max. (DC);
Continuous load current: Max. (DC)



AQV22○N

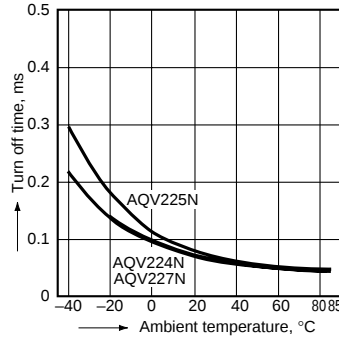
3. Turn on time vs. ambient temperature characteristics

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



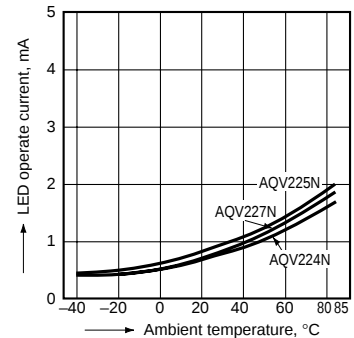
4. Turn off time vs. ambient temperature characteristics

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



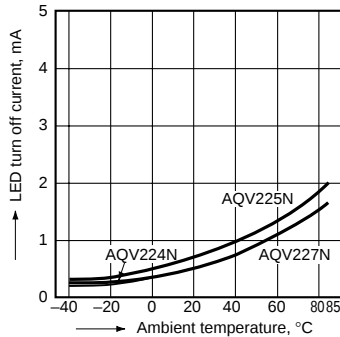
5. LED operate current vs. ambient temperature characteristics

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



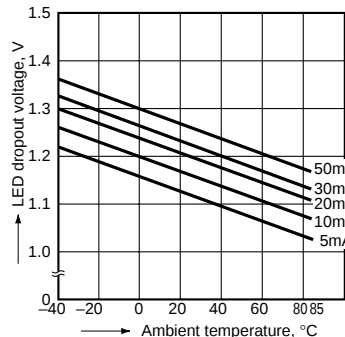
6. LED turn off current vs. ambient temperature characteristics

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



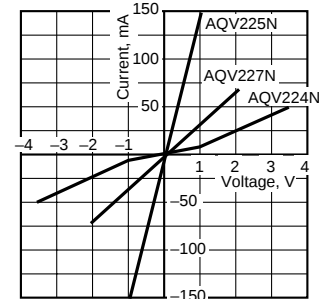
7. LED dropout voltage vs. ambient temperature characteristics

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



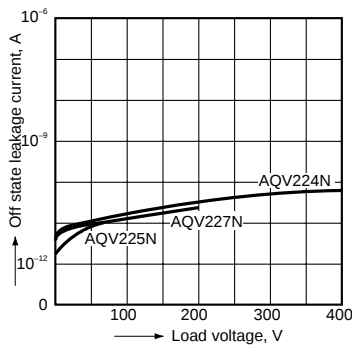
8. Voltage vs. current characteristics of output at MOS portion

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



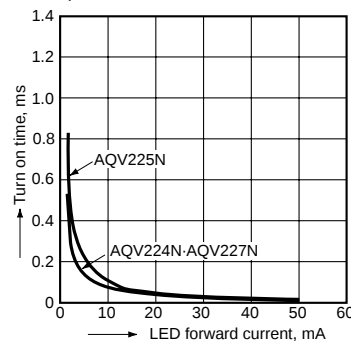
9. Off state leakage current

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



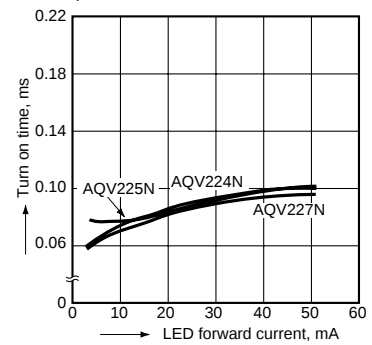
10. LED forward current vs. turn on time characteristics

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



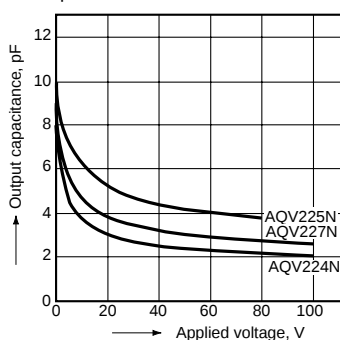
11. LED forward current vs. turn off time characteristics

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



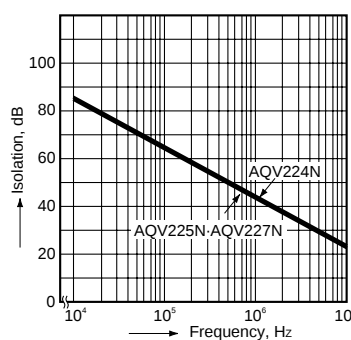
12. Applied voltage vs. output capacitance characteristics

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



13. Isolation characteristics (50 Ω impedance)

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



14. Insertion loss characteristics (50 Ω impedance)

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

