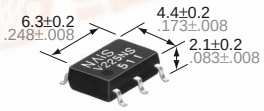
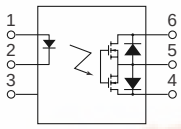
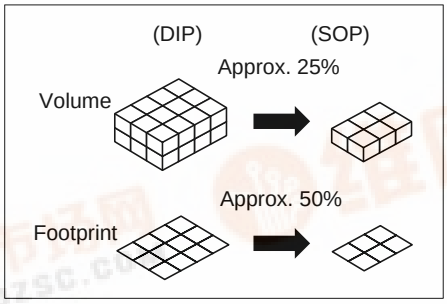
NAiS

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

PhotoMOS RELAYS







FEATURES

1. 1-channel (Form A) in super miniature design
The device comes in a super-miniature SO package measuring (W) 4.4 × (L) 6.3 ×(H) 2.1 mm (W).173× (L) .248× (H) .083 inch —approx. 25% of the volume and 50% of the footprint size of DIP type PhotoMOS Relays.

2. Low capacitance between output terminals ensure high response speed:
The capacitance between output terminals is small, typically 10 pF. This enables for a fast operation speed of 200 µs.

3. 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 (AQV225NS).

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

5. Tape and reel
The device comes standard in a tape and reel (1,000 pcs./reel) to facilitate automatic insertion machines.

TYPICAL APPLICATIONS

- Telephones
- Measuring instruments
- Computer
- Industrial robots
- High-speed inspection machines

TYPES

1. AC/DC type

Output rating*		Part No.		Packing quantity in tape and reel
		Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side	
Load voltage	Load current	1 Form A	1 Form A	
80 V	120 mA	AQV225NSX	AQV225NSZ	1,000 pcs.
200 V	50 mA	AQV227NSX	AQV227NSZ	
400 V	40 mA	AQV224NSX	AQV224NSZ	

*Indicate the peak AC and DC values.

Notes: (1) Tape package is the standard packing style. Also available in tube. (Part No. suffix "X" or "Z" is not needed when ordering; Tube: 75 pcs.; Case: 1,500 pcs.)
(2) For space reasons, the top two letters of the product number "AQ" are omitted on the product seal. The package type indicator "X" and "Z" are also omitted from the seal. (Ex. the label for product number AQV224NS is V224NS).

RATING

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

Item		Symbol	Type of connection	AQV225NS	AQV227NS	AQV224NS	Remarks
Input	LED forward current	I_F		50 mA			
	LED reverse voltage	V_R		3 V			
	Peak forward current	I_{FP}		1 A			f = 100 Hz, Duty factor = 0.1%
	Power dissipation	P_{in}		75 mW			
Output	Load voltage (peak AC)	V_L		80 V	200 V	400 V	
	Continuous load current	I_L	A	0.12 A	0.05 A	0.04 A	A connection: Peak AC, DC B, C connection: DC
			B	0.15 A	0.06 A	0.05 A	
			C	0.25 A	0.08 A	0.06 A	
	Peak load current	I_{peak}		0.36 A	0.15 A	0.12 A	A connection: 100 ms (1 shot), V_L = DC
	Power dissipation	P_{out}		450 mW			
Total power dissipation		P_T		500 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			

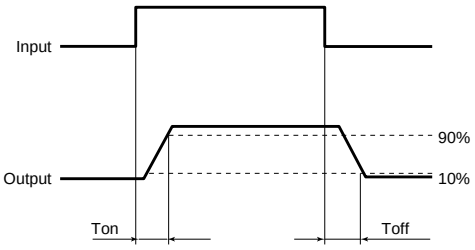
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item			Symbol	Type of connection	AQV225NS	AQV227NS	AQV224NS	Remarks
Input	LED operate current	Typical	I_{Fon}	—	0.7 mA			I_L = Max.
		Maximum			3 mA			
	LED turn off current	Minimum	I_{Foff}	—	0.4 mA			I_L = Max.
		Typical			0.65 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			10.0 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			5.0 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	Turn on time*	Typical	T_{on}	—	0.25 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 mA.

For type of connection, see Page 31.

*Turn on/Turn off time



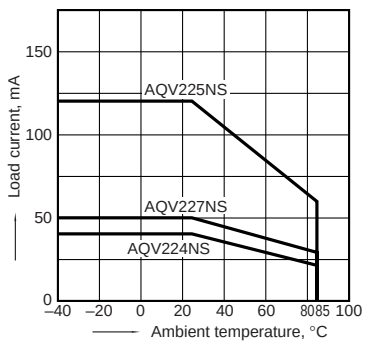
■ **For Dimensions, see Page 28.**
■ **For Schematic and Wiring Diagrams, see Page 31.**
■ **For Cautions for Use, see Page 36.**

REFERENCE DATA

1. Load current vs. ambient temperature characteristics

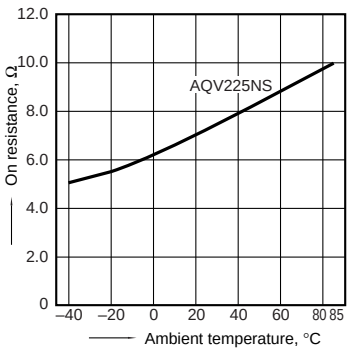
Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F

Type of connection: A



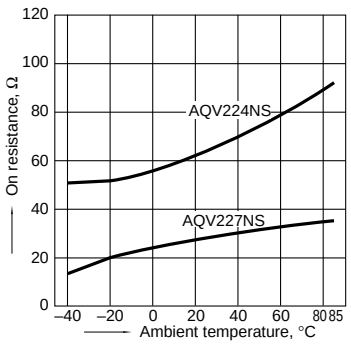
2.-(1) On resistance vs. ambient temperature characteristics

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



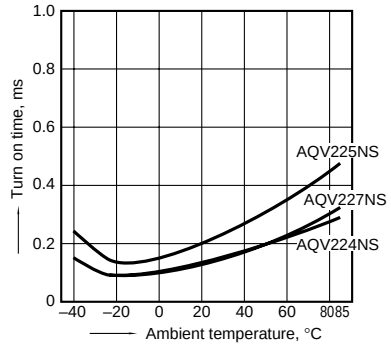
2.-(2) On resistance vs. ambient temperature characteristics

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



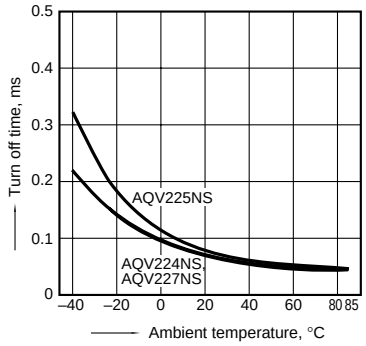
3. Turn on time vs. ambient temperature characteristics

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



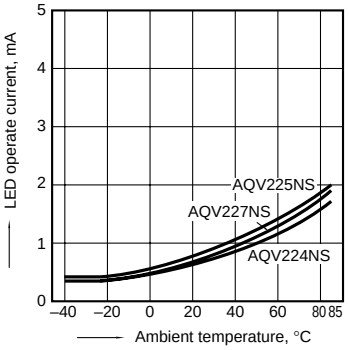
4. Turn off time vs. ambient temperature characteristics

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



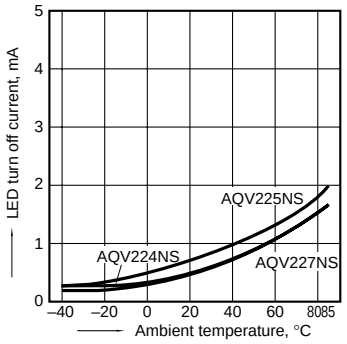
5. LED operate current vs. ambient temperature characteristics

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



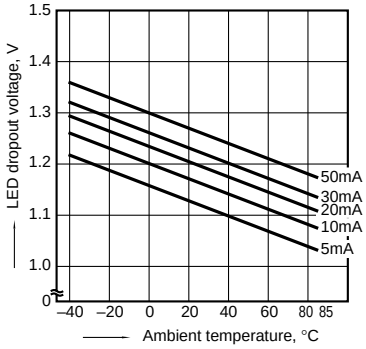
6. LED turn off current vs. ambient temperature characteristics

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



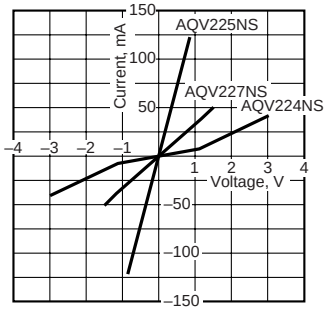
7. LED dropout voltage vs. ambient temperature characteristics

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



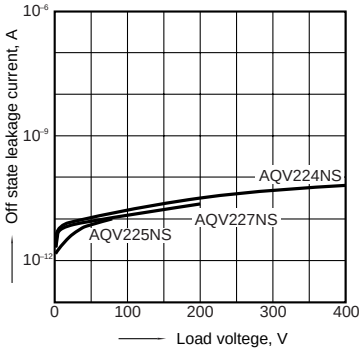
8. Voltage vs. current characteristics of output at MOS portion

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



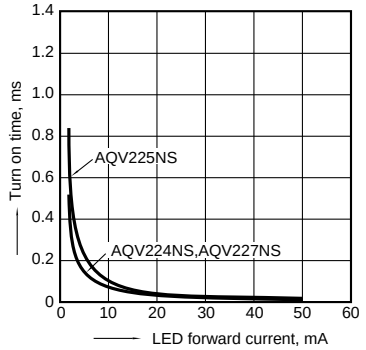
9. Off state leakage current

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



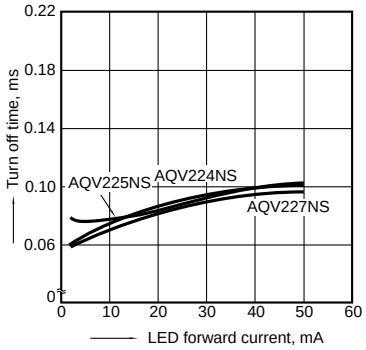
10. LED forward current vs. turn on time characteristics

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



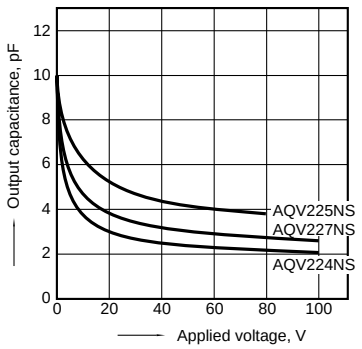
11. LED forward current vs. turn off time characteristics

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



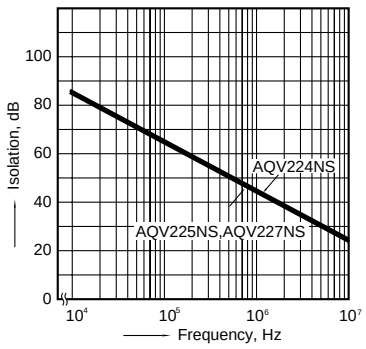
12. Applied voltage vs. output capacitance characteristics

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