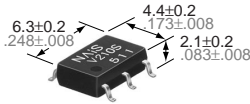


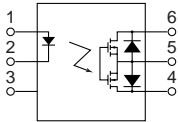
# NAIS

## GU (General Use) Type SOP Series [1-Channel (Form A) Type]

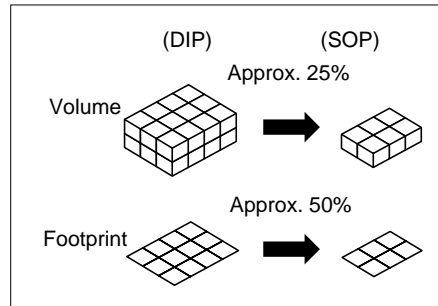
# PhotoMOS RELAYS



mm inch



×(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.



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

**4. Low-level off state leakage current**  
In contrast to the SSR with an off state leakage current of several milliamps, the PhotoMOS relay features a very small off state leakage current of only 100 pA even at the rated load voltage of 400 V (AQV214S).

## 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

### 2. 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

Type	Output ratings*		Part No.		Packing quantity in tape and reel
			Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side	
AC/DC	Load voltage	Load current	1 Form A	1 Form A	1,000 pcs.
	60 V	350 mA	AQV212SX	AQV212SZ	
	100 V	300 mA	AQV215SX	AQV215SZ	
	200 V	160 mA	AQV217SX	AQV217SZ	
	350 V	120 mA	AQV210SX	AQV210SZ	
	400 V	100 mA	AQV214SX	AQV214SZ	
600 V	40 mA	AQV216SX	AQV216SZ		

\*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 AQV214S is V214S).

## RATING

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

Item	Symbol	Type of connection	AQV212S	AQV215S	AQV217S	AQV210S	AQV214S	AQV216S	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)	$V_L$	60 V	100 V	200 V	350 V	400 V	600 V		
	Continuous load current	$I_L$	A	0.35 A	0.30 A	0.16 A	0.12 A	0.10 A	0.04 A	A connection: Peak AC, DC
			B	0.50 A	0.40 A	0.20 A	0.13 A	0.11 A	0.05 A	B,C connection: DC
			C	0.70 A	0.56 A	0.28 A	0.15 A	0.12 A	0.06 A	
Peak load current	$I_{peak}$	1.0A	0.90A	0.48A	0.3 A	0.3 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							

# AQV210S

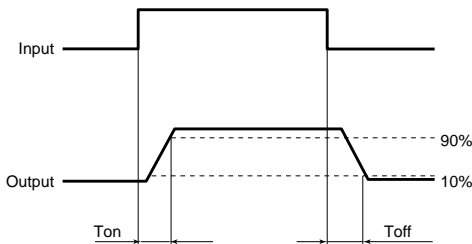
## 2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item		Symbol	Type of connection	AQV212S	AQV215S	AQV217S	AQV210S	AQV214S	AQV216S	Remarks	
Input	LED operate current	Typical	I <sub>Fon</sub>	0.7 mA						I <sub>L</sub> = Max.	
		Maximum		3 mA							
	LED turn off current	Minimum	I <sub>Foff</sub>	0.4 mA						I <sub>L</sub> = Max.	
		Typical		0.65 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	0.83 Ω	2.3 Ω	11 Ω	23 Ω	30 Ω	70 Ω	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max. Within 1 s on time
					Maximum	2.5 Ω	4.0 Ω	15 Ω	35 Ω	50 Ω	
		Typical	R <sub>on</sub>	B	0.44 Ω	1.15 Ω	5.5 Ω	11.5 Ω	22.5 Ω	55 Ω	
					Maximum	1.25 Ω	2.0 Ω	7.5 Ω	17.5 Ω	25 Ω	
		Typical	R <sub>on</sub>	C	0.25 Ω	0.6 Ω	2.8 Ω	6.0 Ω	11.3 Ω	28 Ω	
					Maximum	0.63 Ω	1.0 Ω	3.8 Ω	8.8 Ω	12.5 Ω	
	Off state leakage current	Maximum	I <sub>Leak</sub>	1 μA						I <sub>F</sub> = 0 V <sub>L</sub> = Max.	
	Transfer characteristics	Turn on time*	Typical	T <sub>on</sub>	0.65 ms	0.60 ms	0.25 ms	0.25 ms	0.25 ms	0.28 ms	I <sub>F</sub> = 5 mA V <sub>L</sub> = Max.
			Maximum		2.0 ms	2.0 ms	1.0 ms	0.5 ms	0.5 ms	0.5 ms	
		Turn off time	Typical	T <sub>off</sub>	0.08 ms	0.06 ms	0.05 ms	0.05 ms	0.05 ms	0.04 ms	I <sub>F</sub> = 5 mA V <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/C isolation resistance	Minimum	R <sub>iso</sub>	1,000 MΩ						500 V DC		

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

For type of connection, see page 31.

\*Turn on/Turn off time



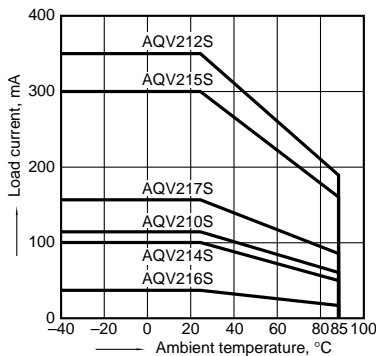
- For Dimensions, see Page 28.
- For Schematic and Wiring Diagrams, see Page 31.
- For Cautions for Use, see Page 36.

## REFERENCE DATA

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

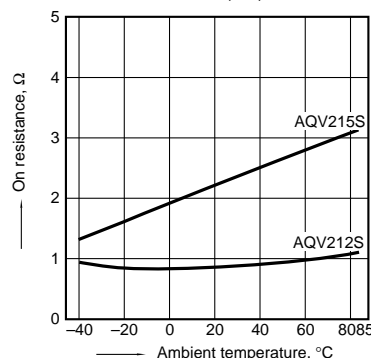
Allowable ambient temperature: -40°C to +85°C  
-40°F to +185°F

Type of connection: A



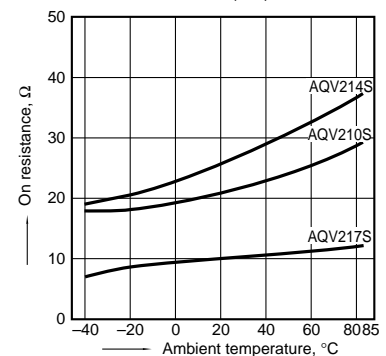
### 2.-(1) On resistance vs. ambient temperature characteristics

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



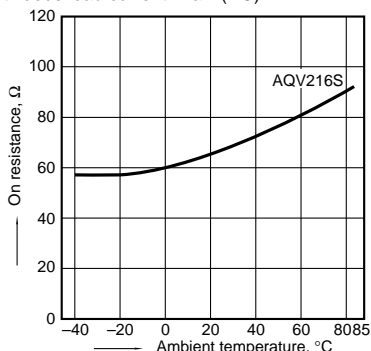
### 2.-(2) On resistance vs. ambient temperature characteristics

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



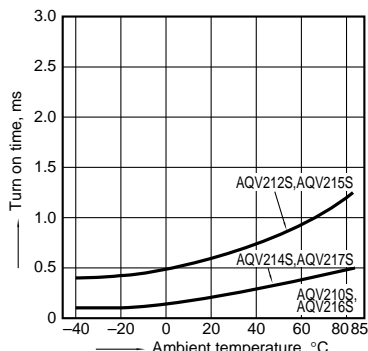
## 2.-(3) On resistance vs. ambient temperature characteristics

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



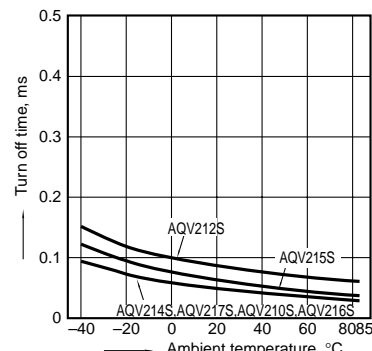
## 3. Turn on time vs. ambient temperature characteristics

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



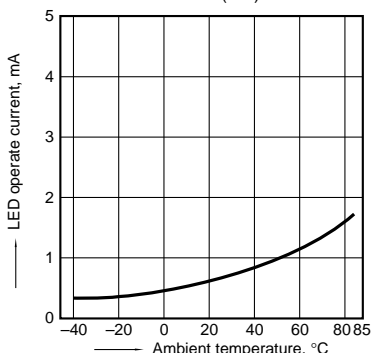
## 4. Turn off time vs. ambient temperature characteristics

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



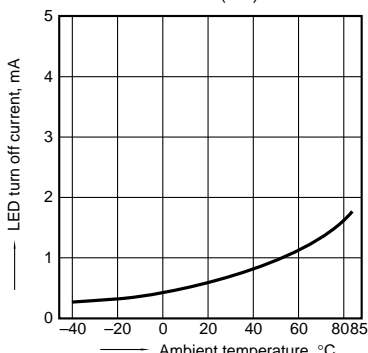
## 5. LED operate current vs. ambient temperature characteristics

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



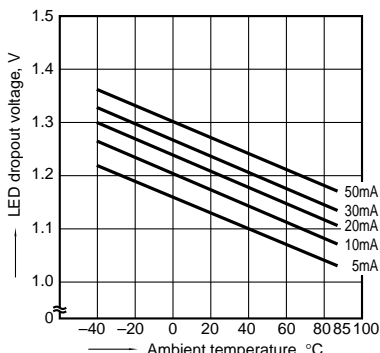
## 6. LED turn off current vs. ambient temperature characteristics

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



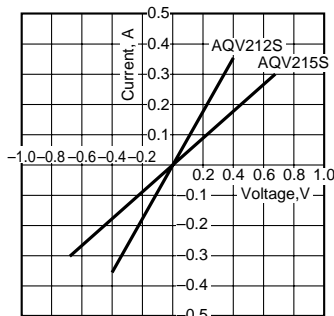
## 7. LED dropout voltage vs. ambient temperature characteristics

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



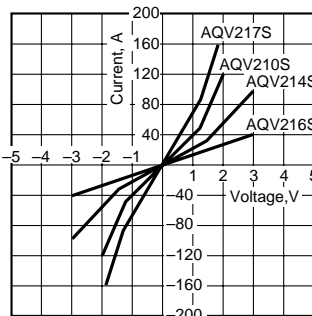
## 8.-(1). Voltage vs. current characteristics of output at MOS portion

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



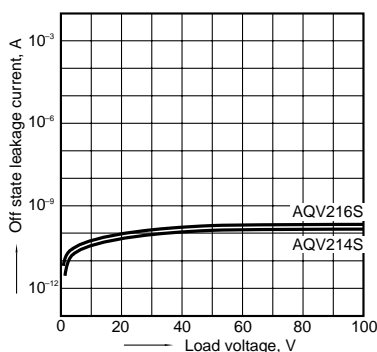
## 8.-(2). Voltage vs. current characteristics of output at MOS portion

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



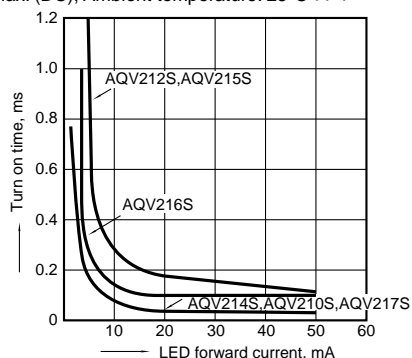
## 9. Off state leakage current

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



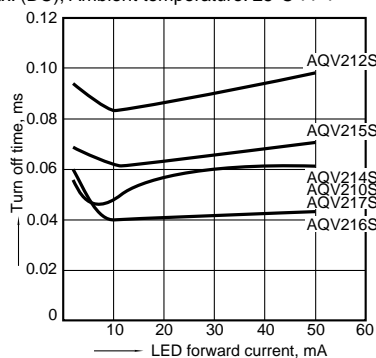
## 10. LED forward current vs. turn on time characteristics

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; Ambient temperature: 25°C 77°F

