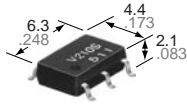


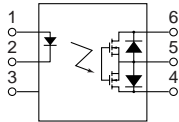
## Miniature SOP6-pin type of 60 to 400V load voltage

## PhotoMOS Relays

# GU SOP 1 Form A (AQV210S)



mm inch



Compliance with RoHS Directive

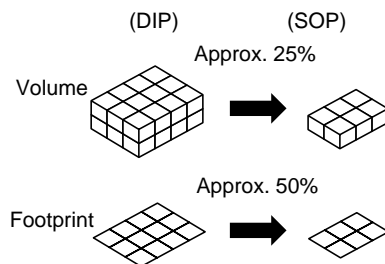
### FEATURES

- 1. Controls low-level analog signals**  
PhotoMOS relays feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.
- 2. Small SOP6-Pin package**  
The device comes in a miniature SOP 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

- 3. Low-level off state leakage current of max. 1 μA**
- 4. Wide variation of load voltage 60V to 600V**

### TYPICAL APPLICATIONS

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



### TYPES

	Output rating*		Package	Part No.			Packing quantity	
	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 dual use	60V	500mA	SOP6-pin	AQV212S	AQV212SX	AQV212SZ	1 tube contains: 75 pcs. 1 batch contains: 1,500 pcs.	1,000 pcs.
	100V	300mA		AQV215S	AQV215SX	AQV215SZ		
	200V	160mA		AQV217S	AQV217SX	AQV217SZ		
	350V	120mA		AQV210S	AQV210SX	AQV210SZ		
	400V	100mA		AQV214S	AQV214SX	AQV214SZ		
	600V	40mA		AQV216S	AQV216SX	AQV216SZ		

\* Indicate the peak AC and DC values.  
Note: For space reasons, the two initial letters of the part number "AQ" and the packing style indicator "X" or "Z" are not marked on the relay. (Ex. the label for product number AQV212SX is V212S.)

### RATING

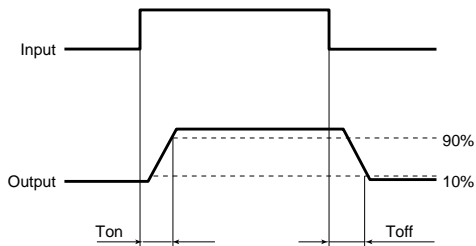
1. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

Item		Symbol	Type of connection	AQV212S	AQV215S	AQV217S	AQV210S	AQV214S	AQV216S	Remarks
Input	LED forward current	I <sub>F</sub>		50 mA						f = 100 Hz, Duty factor = 0.1%
	LED reverse voltage	V <sub>R</sub>		5 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>		60 V	100 V	200 V	350 V	400 V	600 V	
	Continuous load current	I <sub>L</sub>	A	0.50 A	0.30 A	0.16 A	0.12 A	0.10 A	0.04 A	A connection: Peak AC, DC
			B	0.65 A	0.40 A	0.20 A	0.13 A	0.11 A	0.05 A	B, C connection: DC
			C	0.80 A	0.56 A	0.28 A	0.15 A	0.12 A	0.06 A	
	Peak load current	I <sub>peak</sub>		1.0A	0.90A	0.48A	0.3 A	0.3 A	0.12 A	A connection: 100 ms (1 shot) V <sub>L</sub> = DC
Power dissipation	P <sub>out</sub>		450 mW							
Total power dissipation	P <sub>T</sub>		500 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	Type of connection	AQV212S	AQV215S	AQV217S	AQV210S	AQV214S	AQV216S	Remarks
Input	LED operate current	Typical	$I_{Fon}$	—	0.7 mA					$I_L = \text{Max.}$	
		Maximum			3 mA						
	LED turn off current	Minimum	$I_{Foff}$	—	0.4 mA					$I_L = \text{Max.}$	
		Typical			0.65 mA						
LED dropout voltage	Typical	$V_F$	—	1.25 V (1.14 V at $I_F = 5 \text{ mA}$ )					$I_F = 50 \text{ mA}$		
	Maximum			1.5 V							
Output	On resistance	Typical	$R_{on}$	A	0.83 $\Omega$	2.3 $\Omega$	11 $\Omega$	23 $\Omega$	30 $\Omega$	70 $\Omega$	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time
		Maximum			2.5 $\Omega$	4.0 $\Omega$	15 $\Omega$	35 $\Omega$	50 $\Omega$	120 $\Omega$	
		Typical	$R_{on}$	B	0.44 $\Omega$	1.15 $\Omega$	5.5 $\Omega$	11.5 $\Omega$	22.5 $\Omega$	55 $\Omega$	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time
		Maximum			1.25 $\Omega$	2.0 $\Omega$	7.5 $\Omega$	17.5 $\Omega$	25 $\Omega$	100 $\Omega$	
	Typical	$R_{on}$	C	0.25 $\Omega$	0.6 $\Omega$	2.8 $\Omega$	6.0 $\Omega$	11.3 $\Omega$	28 $\Omega$	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time	
	Maximum			0.63 $\Omega$	1.0 $\Omega$	3.8 $\Omega$	8.8 $\Omega$	12.5 $\Omega$	50 $\Omega$		
Off state leakage current	Maximum	$I_{Leak}$	—	1 $\mu\text{A}$					$I_F = 0 \text{ mA}$ $V_L = \text{Max.}$		
Transfer characteristics	Turn on time*	Typical	$T_{on}$	—	0.65 ms	0.60 ms	0.25 ms	0.25 ms	0.25 ms	0.25 ms	$I_F = 5 \text{ mA}$ $V_L = \text{Max.}$
		Maximum			2.0 ms	2.0 ms	1.0 ms	0.5 ms	0.5 ms	0.5 ms	
	Turn off time	Typical	$T_{off}$	—	0.08 ms	0.06 ms	0.05 ms	0.05 ms	0.05 ms	0.05 ms	$I_F = 5 \text{ mA}$ $V_L = \text{Max.}$
		Maximum			0.2 ms						
	I/O capacitance	Typical	$C_{iso}$	—	0.8 pF					$f = 1 \text{ MHz}$ $V_b = 0 \text{ V}$	
Maximum		1.5 pF									
Initial I/C isolation resistance	Minimum	$R_{iso}$	—	1,000 M $\Omega$					500 V DC		

\*Turn on/Turn off time



## RECOMMENDED OPERATING CONDITIONS

Please obey the following conditions to ensure proper relay operation and resetting.

Item	Symbol	Recommended value	Unit
Input LED current	$I_F$	5	mA

- For Dimensions
- For Schematic and Wiring Diagrams
- For Cautions for Use

■ These products are not designed for automotive use.

If you are considering to use these products for automotive applications, please contact your local Panasonic Electric Works technical representative.

For more information

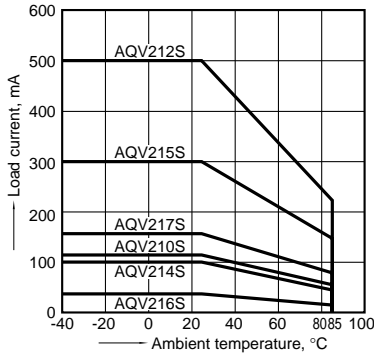
# GU SOP 1 Form A (AQV21OS)

## REFERENCE DATA

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

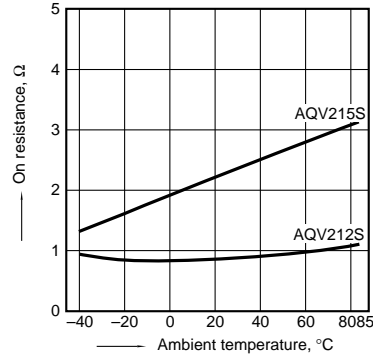
Allowable ambient temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 $-40^{\circ}\text{F}$  to  $+185^{\circ}\text{F}$

Type of connection: A



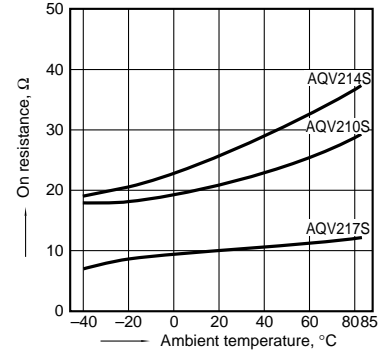
### 2.-(1) On resistance vs. ambient temperature characteristics

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



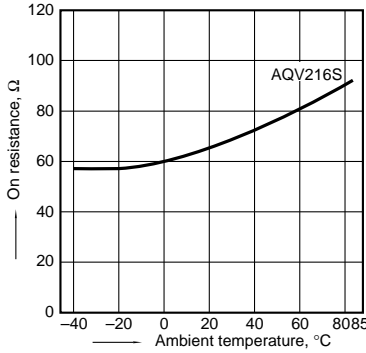
### 2.-(2) On resistance vs. ambient temperature characteristics

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



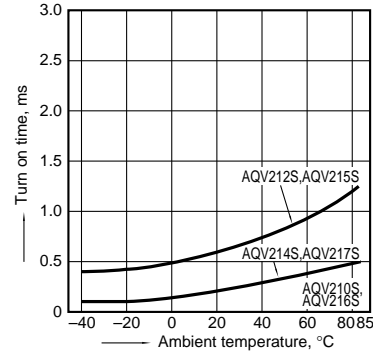
### 2.-(3) On resistance vs. ambient temperature characteristics

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



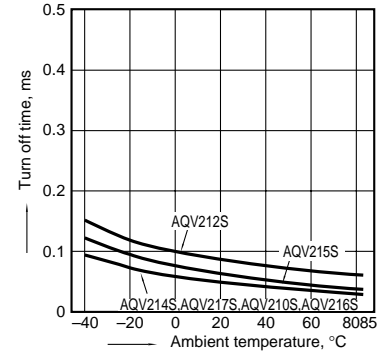
### 3. Turn on time vs. ambient temperature characteristics

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



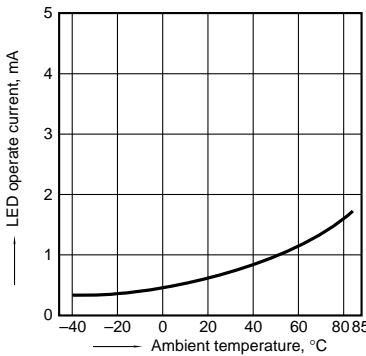
### 4. Turn off time vs. ambient temperature characteristics

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



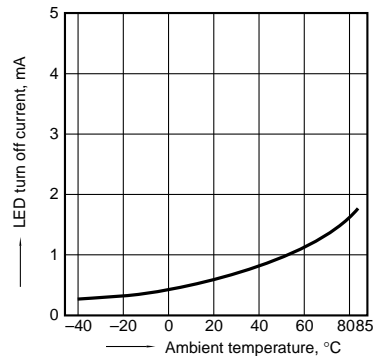
### 5. LED operate current vs. ambient temperature characteristics

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



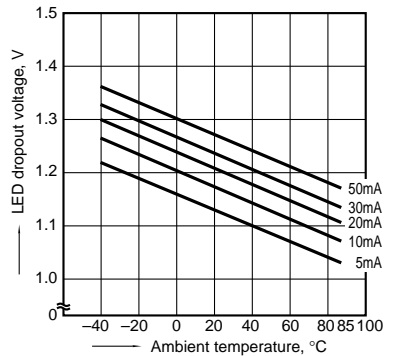
### 6. LED turn off current vs. ambient temperature characteristics

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



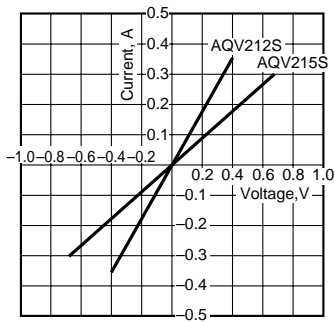
### 7. LED dropout voltage vs. ambient temperature characteristics

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



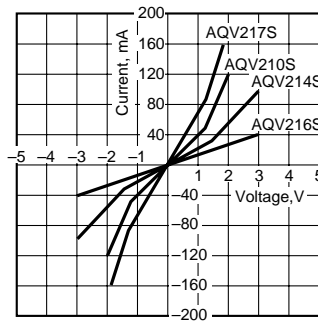
## 8.-(1). Current vs. voltage characteristics of output at MOS portion

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



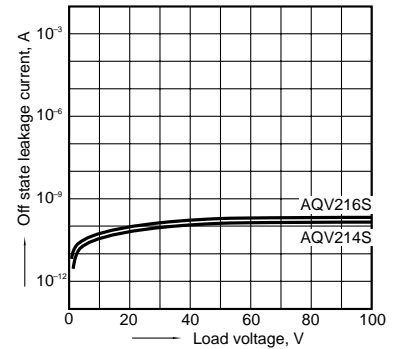
## 8.-(2). Current vs. voltage characteristics of output at MOS portion

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



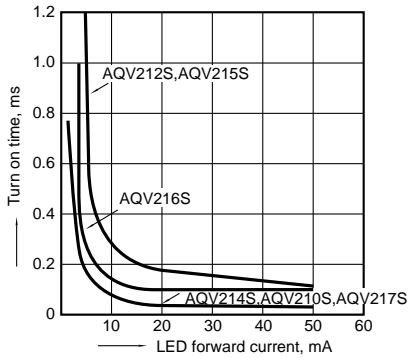
## 9. Off state leakage current vs. load voltage characteristics

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



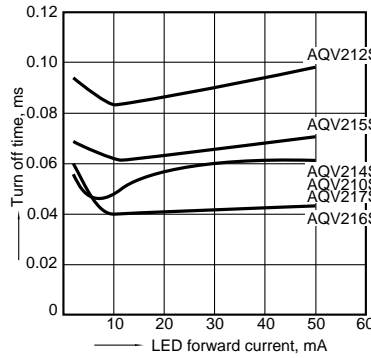
## 10. Turn on time vs. LED forward current characteristics

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



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

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



## 12. Output capacitance vs. applied voltage characteristics

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

