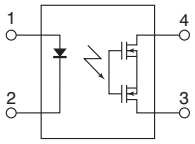
Panasonic
ideas for life

Normally closed SOP4-pin type of 60V/350V/400V load voltage

PhotoMOS Relays
GU SOP 1 Form B
(AQY41○S)

CAD Data

mm inch

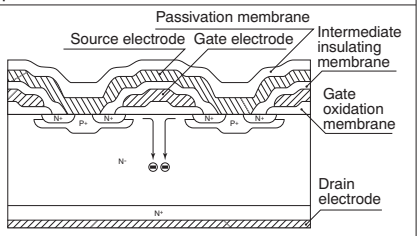


FEATURES

1. Small SOP4-pin package
The device comes in a super-miniature SO package 4-pin type measuring (W) 4.3×(L) 4.4×(H) 2.1 mm (W) .169×(L) .173×(H) .083 inch

2. Low on-resistance
The AQ○4 series (normally closed type) has a low on-resistance.
This has been achieved thanks to the built-in MOSFET processed by our proprietary method, DSD (Double-diffused and Selective Doping) method.

Cross section of the normally-closed type of power MOS



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 of max. 1 μA

TYPICAL APPLICATIONS

- Power supply
- Measuring instruments
- Security equipment
- Telephone equipment
- Sensing equipment

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-pin side	Picked from the 3/4-pin side		
AC/DC dual use	60V	500mA	SOP4-pin	AQY412S	AQY412SX	AQY412SZ	1 tube contains: 100 pcs. 1 batch contains: 2,000 pcs.	1,000 pcs.
	350V	120mA		AQY410S	AQY410SX	AQY410SZ		
	400V	100mA		AQY414S	AQY414SX	AQY414SZ		

* Indicate the peak AC and DC values.
Note: For space reasons, the three initial letters of the part number “AQY”, the surface mount terminal shape indicator “S” and the packing style indicator “X” or “Z” are not marked on the relay. (Ex. the label for product number AQY412SX is 412)

RATING

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

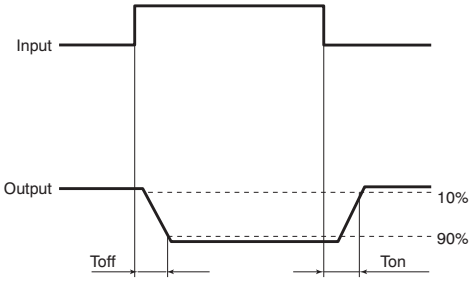
Item		Symbol	AQY412S	AQY410S	AQY414S	Remarks
Input	LED forward current	I_F	50 mA			
	LED reverse voltage	V_R	5 V			
	Peak forward current	I_{FP}	1 A			f = 100 Hz, Duty factor = 0.1%
	Power dissipation	P_{in}	75 mW			
Output	Load voltage (peak AC)	V_L	60 V	350 V	400 V	
	Continuous load current	I_L	0.5 A	0.12 A	0.1 A	Peak AC, DC
	Peak load current	I_{peak}	1.5 A	0.3 A	0.24 A	100ms (1 shot), V_L = DC
	Power dissipation	P_{out}	300 mW			
Total power dissipation		P_T	350 mW			
I/O isolation voltage		V_{iso}	1,500 V AC			
Temperture 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			

GU SOP 1 Form B (AQY41❍S)

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

Item			Symbol	AQY412S	AQY410S	AQY414S	Remarks
Input	LED operate (OFF) current	Typical	I_{Foff}	0.9 mA			I_L = Max.
		Maximum		3 mA			
	LED reverse (ON) current	Minimum	I_{Fon}	0.4 mA			I_L = Max.
		Typical		0.85 mA			
	LED dropout voltage	Typical	V_F	1.25 V (1.14 V at I_F = 5 mA)			I_F = 50 mA
		Maximum		1.5 V			
Output	On resistance	Typical	R_{on}	1 Ω	18 Ω	26 Ω	I_F = 0 mA I_L = Max. Within 1 s on time
		Maximum		2.5 Ω	25 Ω	35 Ω	
	Off state leakage current	Maximum	I_{Leak}	1 μA			I_F = 5 mA V_L = Max.
Transfer characteristics	Operate (OFF) time*	Typical	T_{off}	0.9 ms	0.52 ms	0.47 ms	I_F = 0 mA → 5 mA I_L = Max.
		Maximum		3 ms	1 ms		
	Reverse (ON) time*	Typical	T_{on}	0.21 ms	0.23 ms	0.28 ms	I_F = 5 mA → 0 mA I_L = Max.
		Maximum		1 ms	1 ms		
	I/O capacitance	Typical	C_{iso}	0.8 pF			f = 1 MHz V_B = 0 V
		Maximum		1.5 pF			
	Initial I/O isolation resistance	Minimum	R_{iso}	1,000 MΩ			500 V DC

*Operate/Reverse 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

■ Dimensions

■ Schematic and Wiring Diagrams

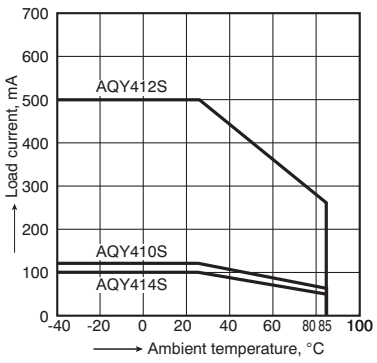
■ Cautions for Use

■ 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.
Please refer to our information on PhotoMOS Relays for Automotive Applications.

REFERENCE DATA

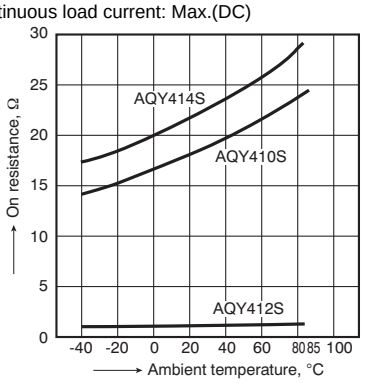
1. Load current vs. ambient temperature characteristics

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



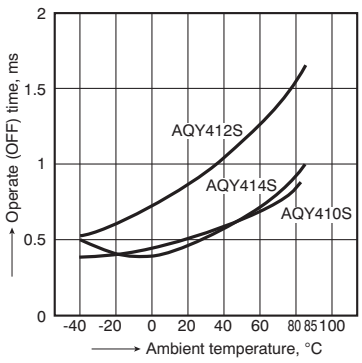
2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4;
LED current: 0 mA;
Continuous load current: Max.(DC)



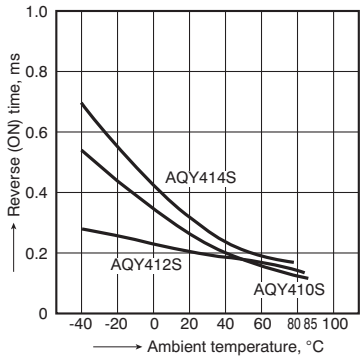
3. Operate (OFF) time vs. ambient temperature characteristics

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



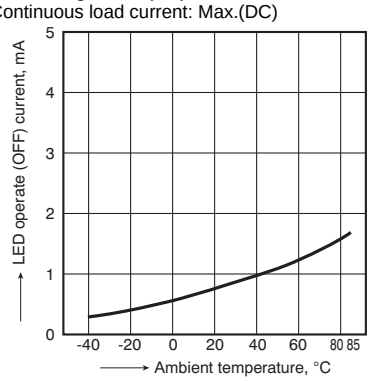
4. Reverse (ON) time vs. ambient temperature characteristics

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



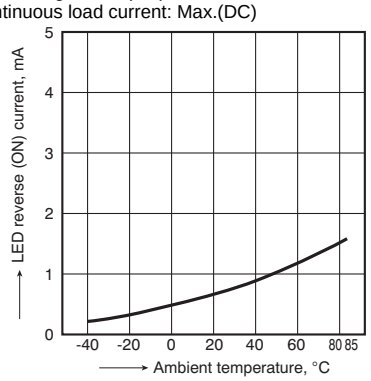
5. LED operate (OFF) current vs. ambient temperature characteristics

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



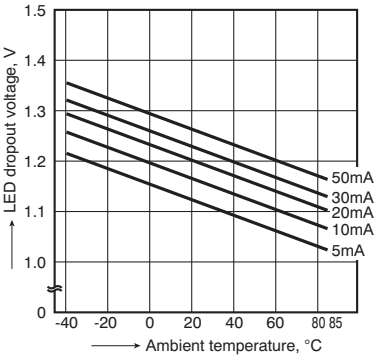
6. LED reverse (ON) current vs. ambient temperature characteristics

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



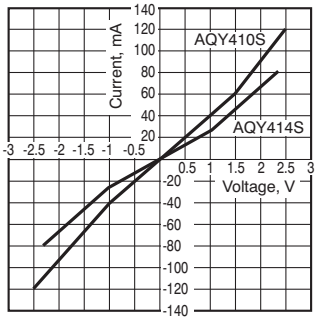
7. LED dropout voltage vs. ambient temperature characteristics

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



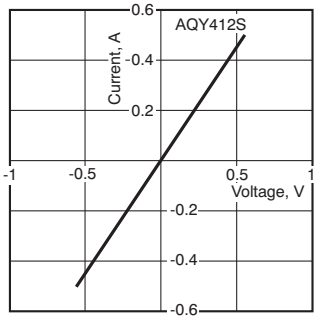
8-(1). Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 3 and 4;
Ambient temperature: 25°C 77°F



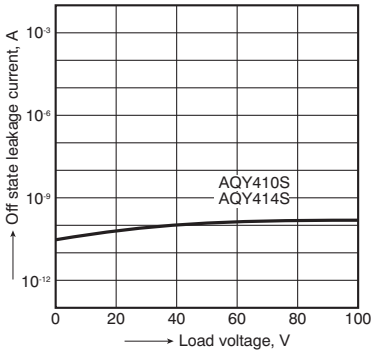
8-(2). Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 3 and 4;
Ambient temperature: 25°C 77°F



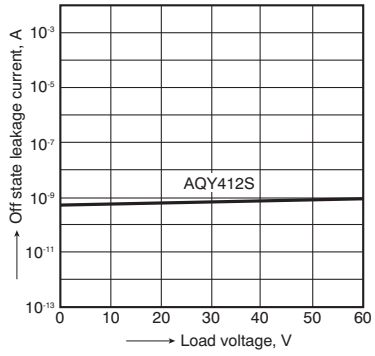
9-(1). Off state leakage current vs. load voltage characteristics

Measured portion: between terminals 3 and 4;
LED current: 5 mA; Ambient temperature: 25°C 77°F



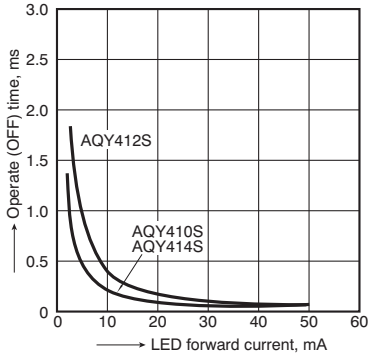
9-(2). Off state leakage current vs. load voltage characteristics

Measured portion: between terminals 3 and 4;
LED current: 5 mA; Ambient temperature: 25°C 77°F



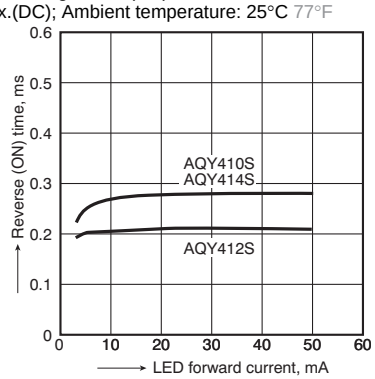
10. Operate (OFF) time vs. LED forward current characteristics

Measured portion: between terminals 3 and 4;
Load voltage: Max.(DC); Continuous load current: Max.(DC); Ambient temperature: 25°C 77°F



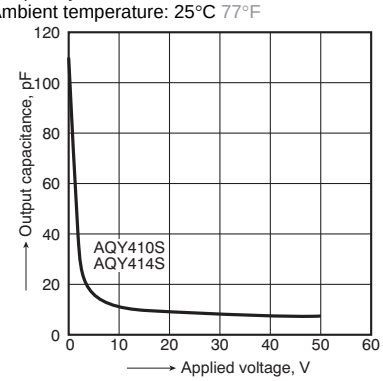
11. Reverse (ON) time vs. LED forward current characteristics

Measured portion: between terminals 3 and 4;
Load voltage: Max.(DC); Continuous load current: Max.(DC); Ambient temperature: 25°C 77°F



12-(1). Output capacitance vs. applied voltage characteristics

Measured portion: between terminals 3 and 4;
Frequency: 1 MHz;
Ambient temperature: 25°C 77°F



12-(2). Output capacitance vs. applied voltage characteristics

Measured portion: between terminals 3 and 4;
Frequency: 1 MHz;
Ambient temperature: 25°C 77°F