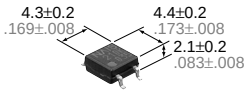
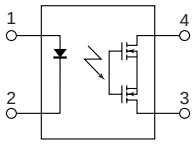
GU (General Use) Type SOP Series 1-Channel (Form A) with Short Circuit Protection 4-Pin Type

PhotoMOS RELAYS



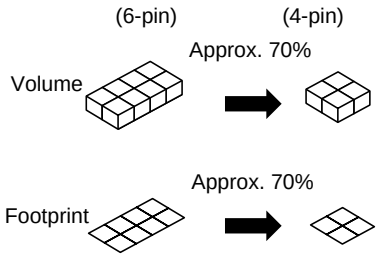
mm inch



FEATURES

1. Short circuit protection
When the output current exceeds a fixed amount, it is cut and the off state is maintained. The relay can be restored by turning off the input current and then turning it back on.

2. SO package 4-Pin type in super miniature design
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—approx. 70% of the volume and 70% of the footprint size of SO package 6-pin type PhotoMOS Relays.



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

4. Controls low-level analog signals

5. Low-level off state leakage current

TYPICAL APPLICATIONS

- Telephone equipment
- Modem
- Measuring and Testing equipment
- Security equipment
- Industrial equipment
- Traffic signal control

TYPES

Type	Output rating*		Part No.		Packing quantity in tape and reel
	Load voltage	Load current	Picked from the 1/2-pin side	Picked from the 3/4-pin side	
			1 Form A	1 Form A	
AC/DC type	350 V	120 mA	AQY210KSX	AQY210KSZ	1,000 pcs.

* 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: 100 pcs.; Case: 2,000 pcs.)
(2) For space reasons, the initial letters of the product number "AQY" and "S" are ommited on the product seal. The package type indicator "X" and "Z" are omitted from the seal. (Ex. the label for product number AQY210KS is 210K).

RATING

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

Item		Symbol	AQY210KS	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	350 V	
	Continuous load current (peak AC)	I_L	0.12 A	
	Power dissipation	P_{out}	300 mW	
Total power dissipation		P_T	350 mW	
I/O isolatiom 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	

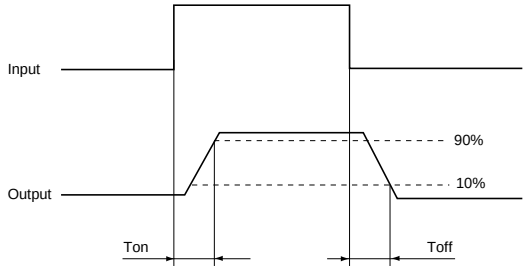
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item				Symbol	AQY210KS	Condition
Input	LED operate current		Typical	I_{Fon}	1.1 mA	I_L = 120 mA
			Maximum		3.0 mA	
	LED turn off current		Minimum	I_{Foff}	0.3 mA	I_L = 120 mA
			Typical		1.0 mA	
	LED dropout voltage		Typical	V_F	1.13 V (1.32 V at I_F = 50mA)	I_F = 5 mA
			Maximum		1.5 V	
Output	On resistance		Typical	R_{on}	23.5Ω	I_F = 5 mA I_L = 120 mA Within 1 s on time
			Maximum		35Ω	
	Off state leakage current		Maximum	I_{Leak}	1μA	I_F = 0 mA V_L = 350 V
	Over current protection	Cut off current	Minimum	I_{shut}	160 mA	I_F = 5 mA Within 20ms on time
			Typical		200 mA	
			Maximum		240 mA	
		Detection time	Typical	T_{shut}	50μs	I_F = 5 mA V_L = 350V DC short circuit
Transfer characteristics	Turn on time*		Typical	T_{on}	0.7 ms	I_F = 5 mA I_L = 120 mA
			Maximum		2 ms	
	Turn off time*		Typical	T_{off}	0.07 ms	I_F = 5 mA I_L = 120 mA
			Maximum		1 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.

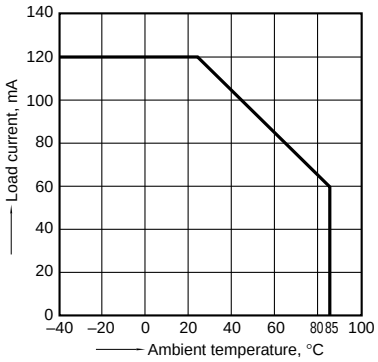
*Turn on/Turn off time



REFERENCE DATA

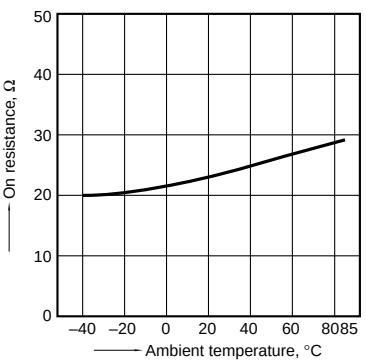
1. Load current vs. ambient temperature characteristics

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



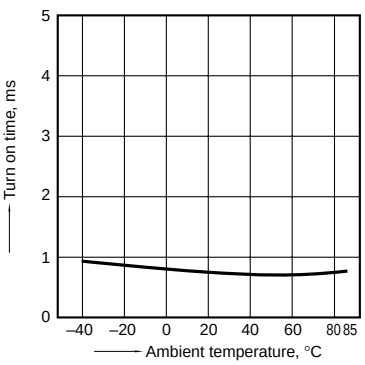
2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4;
LED current: 5 mA; Load voltage: Max. (DC)
Load current: Max.(DC)



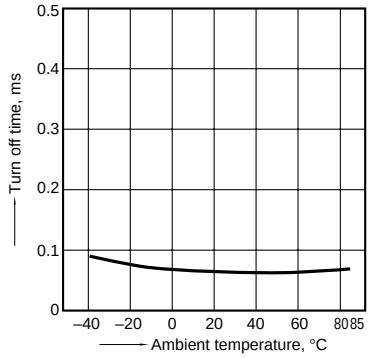
3. Turn on time vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4;
LED current: 5 mA; Load voltage: 10V (DC);
Continuous load current: Max.(DC)



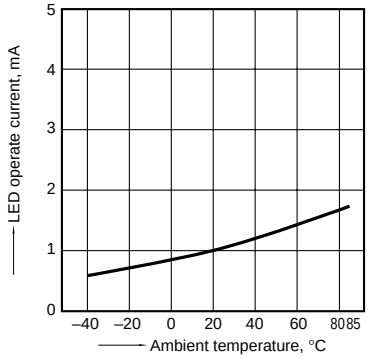
4. Turn off time vs. ambient temperature characteristics

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



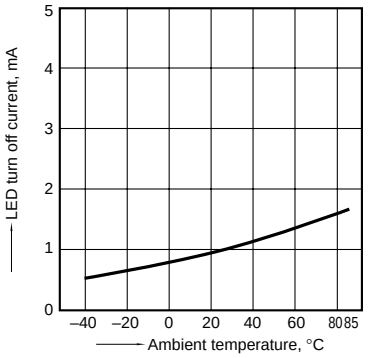
5. LED operate current vs. ambient temperature characteristics

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



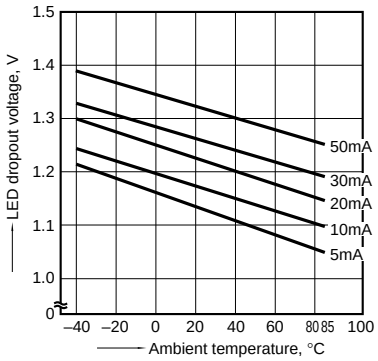
6. LED turn off current vs. ambient temperature characteristics

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



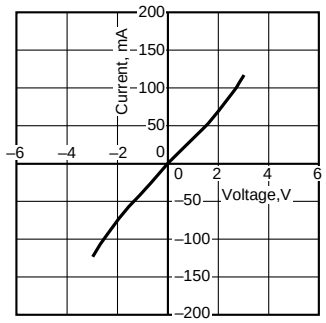
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



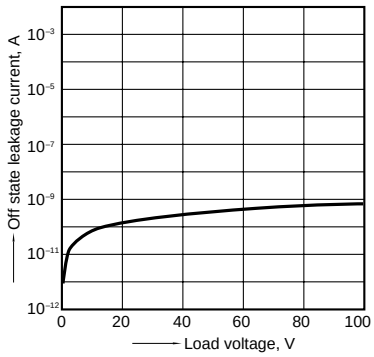
8. Voltage vs. current characteristics of output at MOS portion

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



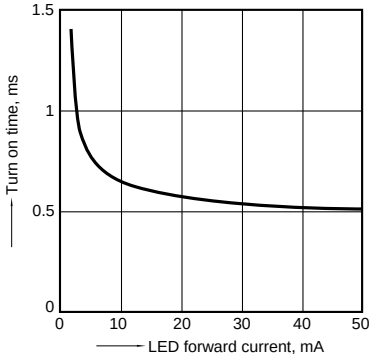
9. Off state leakage current

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



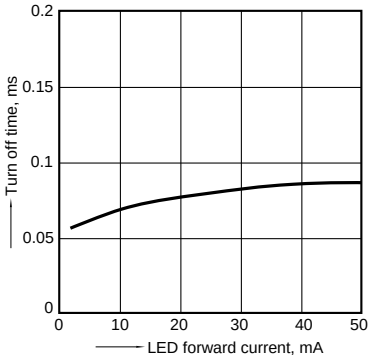
10. LED forward current vs. turn on time characteristics

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



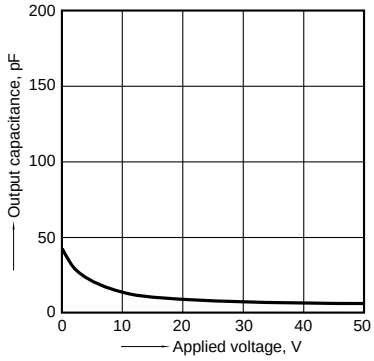
11. LED forward current vs. turn off time characteristics

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



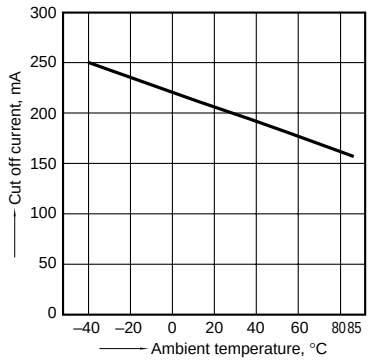
12. Applied voltage vs. output capacitance characteristics

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



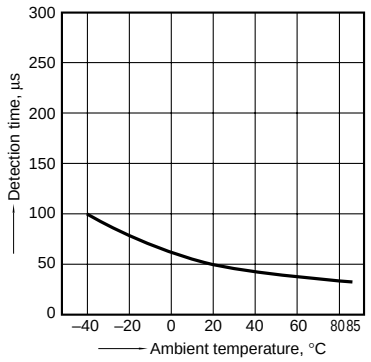
13. Cut off current vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4;
LED current: 5 mA, within 20ms on time



14. Detection time vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4;
LED current: 5 mA; Load voltage: Max.(DC);

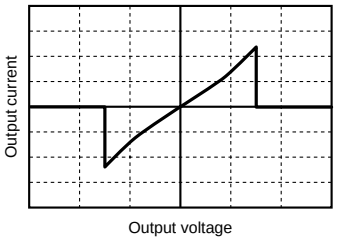


What is short circuit protection?

When the load current exceeds specifications, the short circuit protection function kicks in and completely cuts off the load current, thus turning off the relay.
The short circuit protection inside the PhotoMOS relay instantaneously (typ. 50 µs) and completely cuts of the load current.
This protects any circuits that follow the PhotoMOS relay from excess current.
There is almost no heating of the PhotoMOS relay, which prevents it from becoming damaged. To restore the function of the relay turn off the input current and then turn it back on.

Output voltage and output current characteristics

V-I characteristics of PhotoMOS relay with short circuit protection circuit



Operation chart