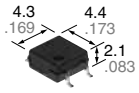
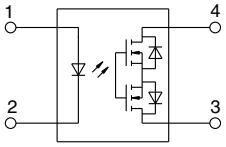
Small SOP4-pin type with short circuit protecting (Latch type)

PhotoMOS® GU SOP 1 Form A
Short Circuit Protection (AQY210KS)



mm inch



RoHS compliant

FEATURES

1. Short circuit protection (Latch type)
When the output current exceeds a fixed amount, it is cut and the off state is maintained. The device can be restored by turning off the input current and then turning it back on.
2. Miniature SOP4-pin package
3. Controls low-level analog signals
4. Low-level off state leakage current

TYPICAL APPLICATIONS

- Modem and telephone equipment
- Measuring and testing equipment
- Security equipment
- Industrial 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	350V	120mA	SOP4-pin	AQY210KS	AQY210KSX	AQY210KSZ	1 tube contains: 100 pcs. 1 batch contains: 2,000 pcs.	1,000 pcs.

* Indicate the peak AC and DC values.
Note: For space reasons, only “210K” is marked on the product. 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 device.

RATING

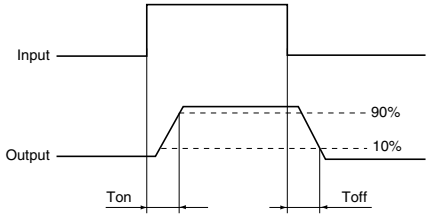
1. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

Item		Symbol	AQY210KS	Remarks
Input	LED forward current	I_F	50 mA	
	LED reverse voltage	V_R	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	350 V	
	Continuous load current	I_L	0.12 A	Peak AC, DC
	Power dissipation	P_{out}	400 mW	
Total power dissipation		P_T	450 mW	
I/O isolation voltage		V_{iso}	1,500 Vrms	
Ambient temperature	Operating	T_{opr}	–40 to +85°C –40 to +185°F	(Non-icing at low temperatures)
	Storage	T_{stg}	–40 to +100°C –40 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 = Max.
			Maximum		3.0 mA	
	LED turn off current		Minimum	I_{Foff}	0.3 mA	I_L = Max.
			Typical		1.0 mA	
	LED dropout voltage		Typical	V_F	1.13 V (1.32 V at I_F = 50 mA)	I_F = 5 mA
			Maximum		1.5 V	
Output	On resistance		Typical	R_{on}	23.5Ω	I_F = 5 mA I_L = Max. Within 1 s
			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 20 ms
			Typical		200 mA	
			Maximum		240 mA	
		Detection time	Typical	T_{shut}	50μs	I_F = 5 mA V_L = 350 V DC short circuit
Transfer characteristics	Turn on time*		Typical	T_{on}	0.7 ms	I_F = 5 mA I_L = Max.
			Maximum		2 ms	
	Turn off time*		Typical	T_{off}	0.07 ms	I_F = 5 mA I_L = Max.
			Maximum		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

*Turn on/Turn off time



3. Recommended operating conditions (Ambient temperature: 25°C 77°F)

Please use under recommended operating conditions to obtain expected characteristics.

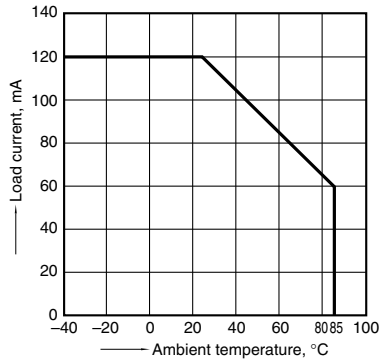
Item		Symbol	Min.	Max.	Unit
LED current		I_F	5	30	mA
AQY210KS	Load voltage (Peak AC)	V_L	—	280	V
	Continuous load current	I_L	—	0.12	A

■ **These products are not designed for automotive use.**
If you are considering to use these products for automotive applications, please contact your local Panasonic Corporation technical representative.

REFERENCE DATA

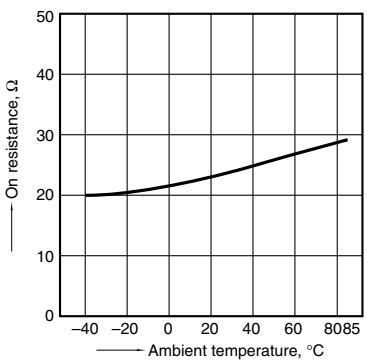
1. Load current vs. ambient temperature characteristics

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



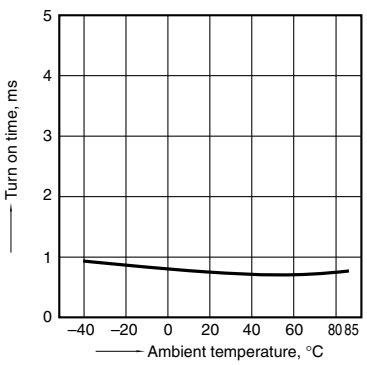
2. On resistance vs. ambient temperature characteristics

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

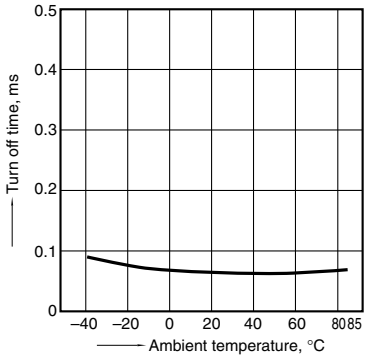


3. Turn on time vs. ambient temperature characteristics

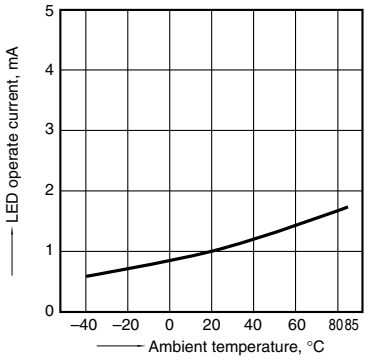
LED current: 5 mA;
Continuous load current: Max.(DC)



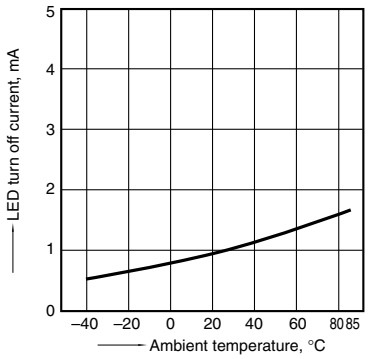
4. Turn off time vs. ambient temperature characteristics
LED current: 5 mA;
Continuous load current: Max.(DC)



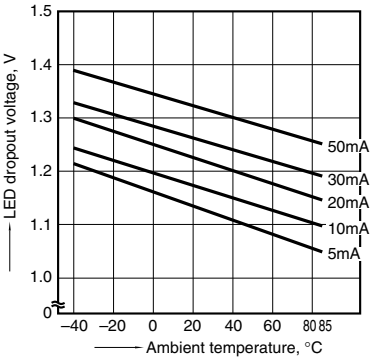
5. LED operate current vs. ambient temperature characteristics
Continuous load current: Max.(DC)



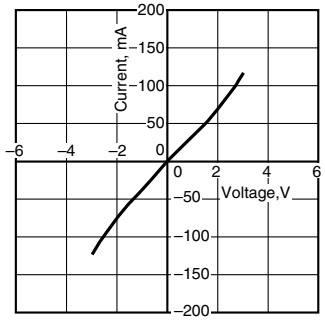
6. LED turn off current vs. ambient temperature characteristics
Continuous load current: Max.(DC)



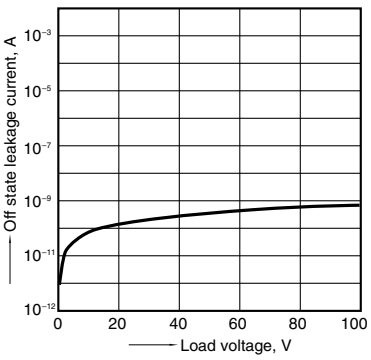
7. LED dropout voltage vs. ambient temperature characteristics
LED current: 5 to 50 mA



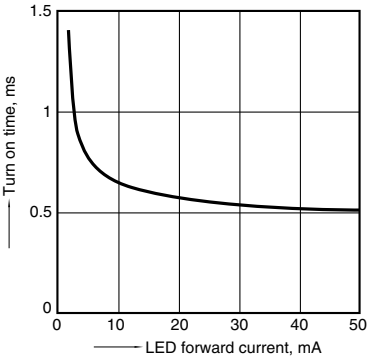
8. Current vs. voltage characteristics of output at MOS portion
Measured portion: between terminals 3 and 4;
Ambient temperature: 25°C 77°F



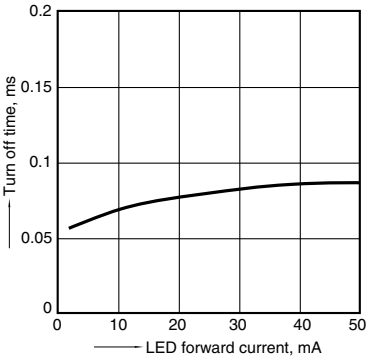
9. Off state leakage current vs. load voltage characteristics
Measured portion: between terminals 3 and 4;
Ambient temperature: 25°C 77°F



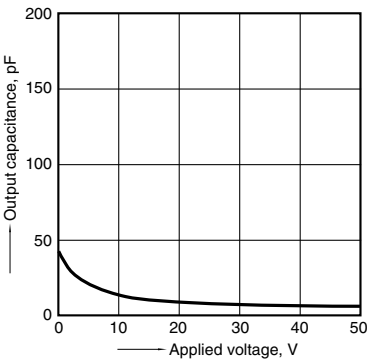
10. Turn on time vs. LED forward current characteristics
Measured portion: between terminals 3 and 4; Load voltage: Max.(DC); Continuous load current:Max.(DC);
Ambient temperature: 25°C 77°F



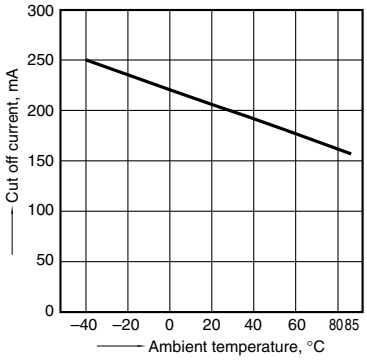
11. Turn off time vs. LED forward current characteristics
Measured portion: between terminals 3 and 4; Load voltage: Max.(DC); Continuous load current:Max.(DC);
Ambient temperature: 25°C 77°F



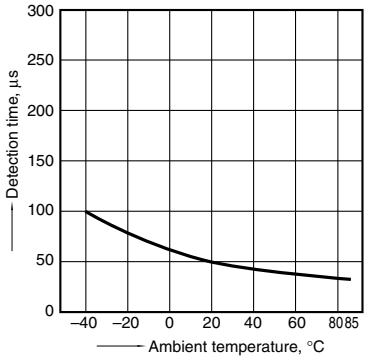
12. Output capacitance vs. applied voltage characteristics
Measured portion: between terminals 3 and 4;
Frequency: 1 MHz; Ambient temperature: 25°C 77°F



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);

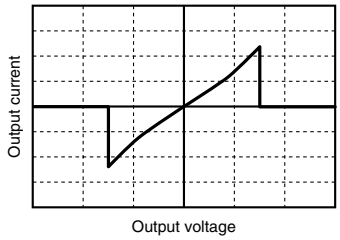


What is short circuit protection latch type?

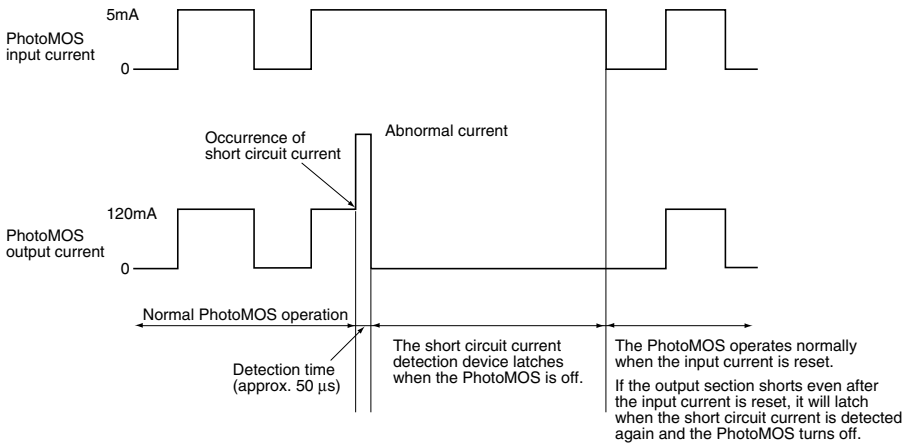
When the load current reaches a certain fixed value, the short circuit protection function activates to completely cut off the load current and keep the PhotoMOS turned off.
The short circuit protection inside the PhotoMOS instantaneously (Typ. 50 μs) and completely cuts of the load current.
This protects any circuits that follow the PhotoMOS from excess current.
There is almost no heating of the PhotoMOS, which prevents it from becoming damaged. To restore the function of the PhotoMOS turn off the input current and then turn it back on.
In order to operate the short circuit protection function, ensure that the input current is at least I_F = 5 mA.

Output voltage and output current characteristics

V-I characteristics of PhotoMOS with short circuit protection circuit



Operation chart



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