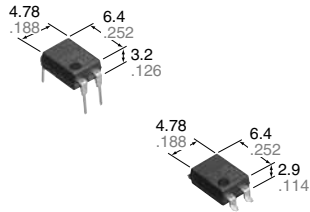


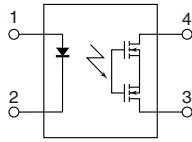


**DIP4-pin type with current limiting and reinforced insulation**

**PhotoMOS®**  
**GU 1 Form A**  
Current Limiting (AQY210HL)



mm inch



**RoHS compliant**

### FEATURES

- 1. Current Limiting Function**  
To control an over current from flowing, the current limit function has been realized. It keeps an output current at a constant value when the current reaches a specified current limit value.
- 2. Enhances the capability of surge resistance between output terminals**  
The current limit function controls the ON time surge current to enhance the capability of surge resistance between output terminals.
- 3. Reinforced insulation of 5,000 V**  
More than 0.4 mm internal insulation distance between inputs and outputs. Con-forms to EN41003, EN60950 (reinforced insulation).

- 4. Controls low-level analog signals**  
PhotoMOS feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.
- 5. High sensitivity and low on-resistance**
- 6. Low-level off state leakage current**

### TYPICAL APPLICATIONS

- Telephone equipment
- Modem

### TYPES

	I/O isolation voltage	Output rating*		Package	Part No.				Packing quantity	
					Through hole terminal	Surface-mount terminal				
						Tube packing style	Tape and reel packing style		Tube	Tape and reel
AC/DC dual use	Reinforced 5,000 V	350 V	120 mA	DIP4-pin	AQY210HL	AQY210HLA	AQY210HLAX	AQY210HLAZ		

\*Indicate the peak AC and DC values.

Note: For space reasons, only "210HL" is marked on the product. The three initial letters of the part number "AQY", the surface mount terminal shape indicator "A" 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)

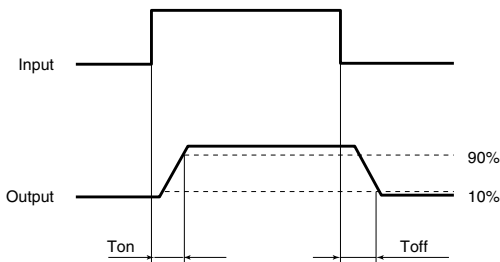
Item		Symbol	AQY210HL(A)	Remarks
Input	LED forward current	I <sub>F</sub>	50 mA	
	LED reverse voltage	V <sub>R</sub>	5 V	
	Peak forward current	I <sub>FP</sub>	1 A	f = 100 Hz, Duty factor = 0.1%
	Power dissipation	P <sub>in</sub>	75 mW	
Output	Load voltage (peak AC)	V <sub>L</sub>	350 V	
	Continuous load current	I <sub>L</sub>	0.12 A	Peak AC, DC
	Power dissipation	P <sub>out</sub>	500 mW	
Total power dissipation		P <sub>T</sub>	550 mW	
I/O isolation voltage		V <sub>iso</sub>	5,000 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	

# GU 1 Form A Current Limiting (AQY210HL)

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

Item		Symbol	AQY210HL(A)	Condition
Input	LED operate current	Typical	1.2 mA	$I_L = \text{Max.}$
		Maximum	3.0 mA	
	LED turn off current	Minimum	0.4 mA	$I_L = \text{Max.}$
		Typical	1.1 mA	
LED dropout voltage	Minimum	1.25 (1.14 V at $I_F = 5 \text{ mA}$ )	$I_F = 50 \text{ mA}$	
	Typical	1.5 V		
Output	On resistance	Typical	20Ω	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time
		Maximum	25Ω	
	Off state leakage current	Maximum	1μA	$I_F = 0 \text{ mA}$ $V_L = \text{Max.}$
Current limit	Typical	—	0.18 A	$I_F = 5 \text{ mA}$
Transfer characteristics	Turn on time*	Typical	0.5 ms	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$
		Maximum	2.0 ms	
	Turn off time*	Typical	0.08 ms	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$
		Maximum	1.0 ms	
	I/O capacitance	Typical	0.8 pF	$f = 1 \text{ MHz}$ $V_B = 0 \text{ V}$
Maximum		1.5 pF		
Initial I/O isolation resistance	Minimum	$R_{iso}$	1,000 MΩ	500 V DC

\*Turn on/Turn off time



## RECOMMENDED OPERATING CONDITIONS

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

Item	Symbol	Recommended value	Unit
Input LED current	$I_F$	5 to 10	mA

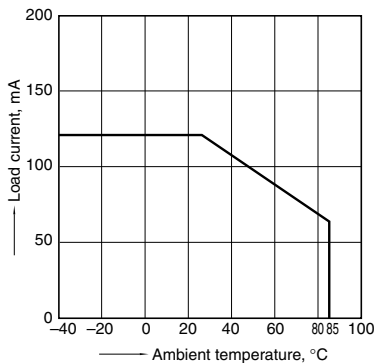
■ These products are not designed for automotive use.

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

## REFERENCE DATA

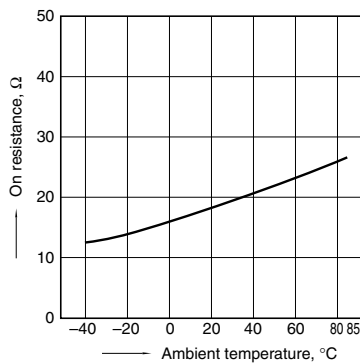
1. Load current vs. ambient temperature characteristics

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



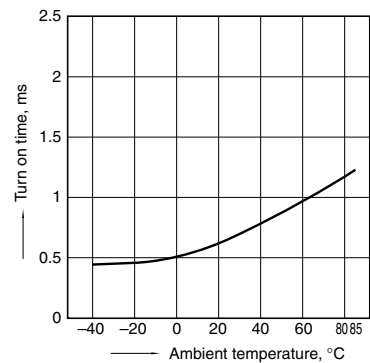
2. On resistance vs. ambient temperature characteristics

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



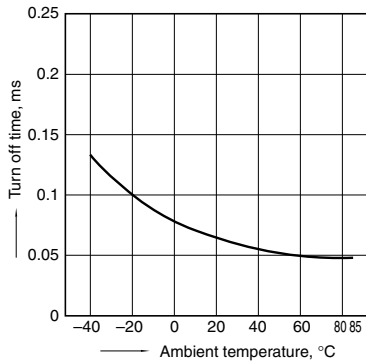
3. Turn on time vs. ambient temperature characteristics

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



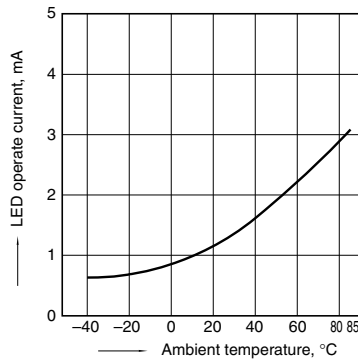
### 4. Turn off time vs. ambient temperature characteristics

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



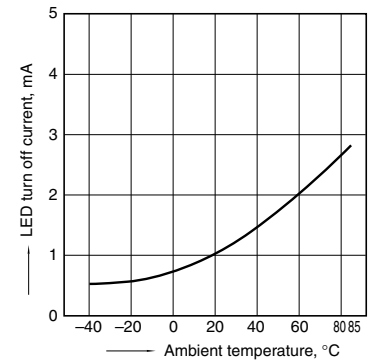
### 5. LED operate current vs. ambient temperature characteristics

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



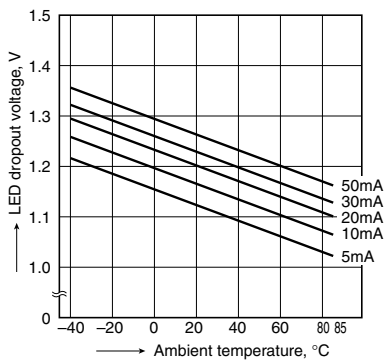
### 6. LED turn off current vs. ambient temperature characteristics

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



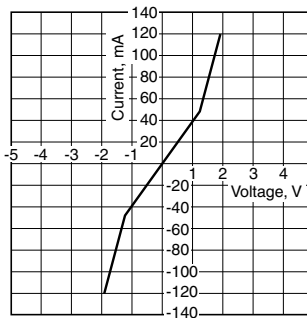
### 7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



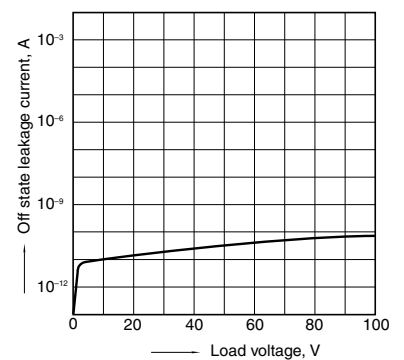
### 8. Current vs. voltage characteristics of output at MOS portion

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



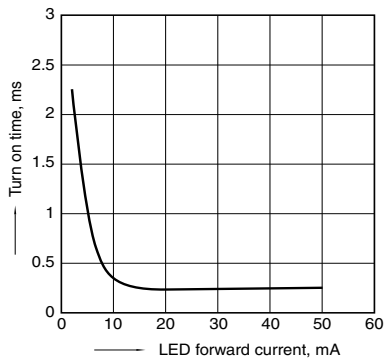
### 9. Off state leakage current vs. load voltage characteristics

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



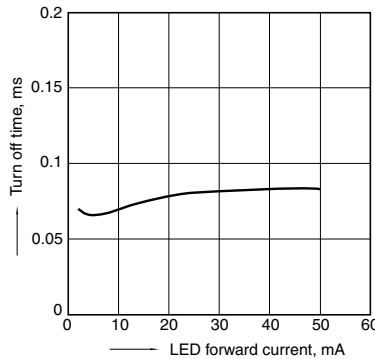
### 10. Turn on time vs. LED forward current characteristics

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



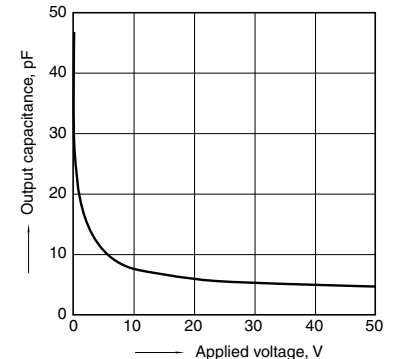
### 11. Turn off time vs. LED forward current characteristics

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



## What is current limit

When a load current reaches the specified output control current, a current limit function works against the load current to keep the current a constant value.

The current limit circuit built into the PhotoMOS thus controls the instantaneous load current to effectively ensure circuit safety.

This safety feature protects circuits downstream of the PhotoMOS against over-current.

But, if the current-limiting feature is used longer than the specified time, the PhotoMOS can be destroyed. Therefore, set the output loss to the max. rate or less.

- Comparison of output voltage and output current characteristics V-I Characteristics

