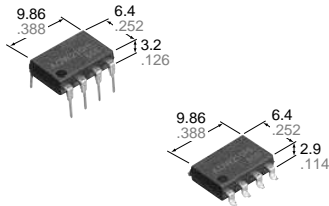


## Two output type with current limiting and reinforced insulation

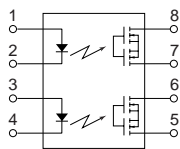
### PhotoMOS Relays

# GU 2 Form A

## Current Limiting (AQW210HL)



mm inch



**Compliance with RoHS Directive**

### 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. Applicable for 2 Form A use as well as two independent 1 Form A use.**
- 5. Controls low-level analog signals**

- 6. High sensitivity and high speed response.**  
Can control max. 0.12 A load current with 5 mA input current. This enables fast operation speed of typ. 0.5 ms
- 7. 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 AC	350 V	100 mA	DIP8-pin	AQW210HL		AQW210HLA	AQW210HLAX		

\*Indicate the peak AC and DC values.  
 Note: The surface mount terminal shape indicator "A" and the packing style indicator "X" or "Z" are not marked on the relay.

### RATING

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

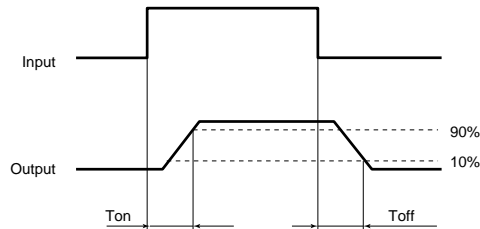
Item		Symbol	AQW210HL(A)	Remarks
Input	LED forward current	I <sub>F</sub>	50 mA	
	LED reverse voltage	V <sub>R</sub>	5 V	
	Peak forward current	I <sub>FP</sub>	1 A	f = 100 Hz, Duty factor = 0.1%
	Power dissipation	P <sub>in</sub>	75 mW	
Output	Load voltage (peak AC)	V <sub>L</sub>	350 V	
	Continuous load current	I <sub>L</sub>	0.1 A (0.12 A)	Peak AC, DC ( ): in case of using only 1 channel
	Power dissipation	P <sub>out</sub>	800 mW	
Total power dissipation		P <sub>T</sub>	850 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 2 Form A Current Limiting (AQW210HL)

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

Item		Symbol	AQW210HL(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	$V_F$	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	$I_{Leak}$	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	$C_{iso}$	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 relay operation and resetting.

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

### ■ For Dimensions

### ■ For Schematic and Wiring Diagrams

### ■ For Cautions for Use

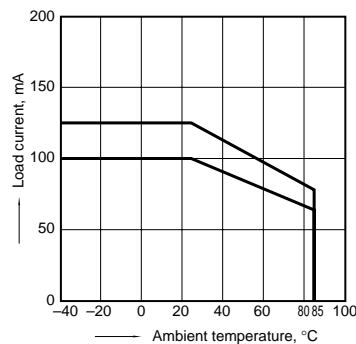
■ These products are not designed for automotive use.

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

## REFERENCE DATA

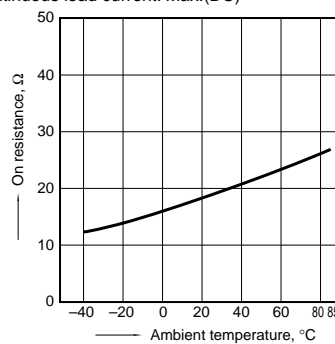
1. Load current vs. ambient temperature characteristics

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



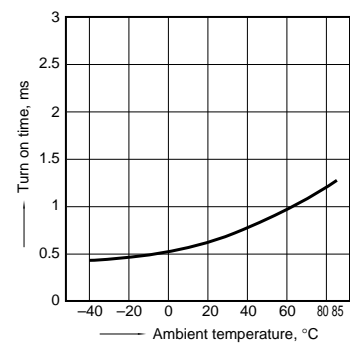
2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 5 and 6, 7 and 8;  
LED current: 5 mA; Load voltage: Max. (DC)  
Continuous load current: Max. (DC)



3. Turn on time vs. ambient temperature characteristics

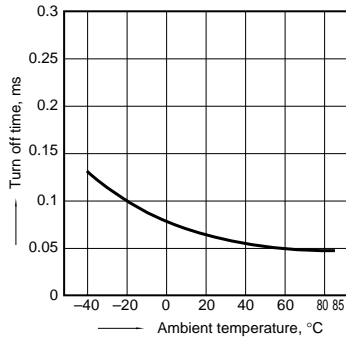
LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



# GU 2 Form A Current Limiting (AQW210HL)

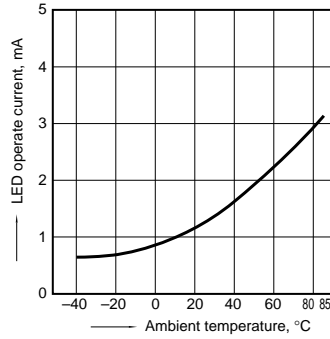
## 4. Turn off time vs. ambient temperature characteristics

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



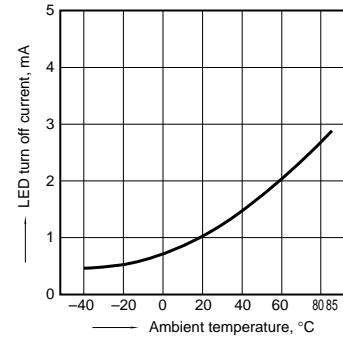
## 5. LED operate current vs. ambient temperature characteristics

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



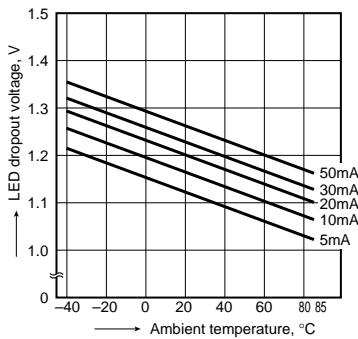
## 6. LED turn off current vs. ambient temperature characteristics

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



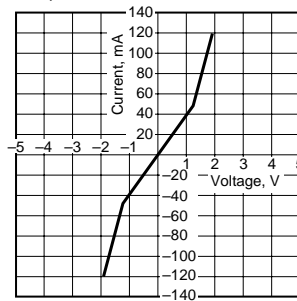
## 7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



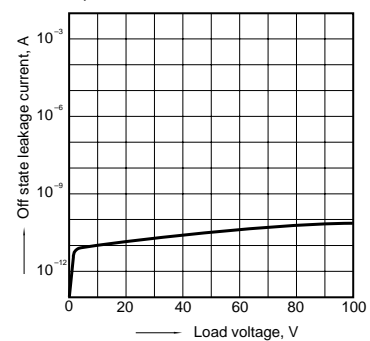
## 8. Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 5 and 6, 7 and 8;  
Ambient temperature: 25°C 77°F



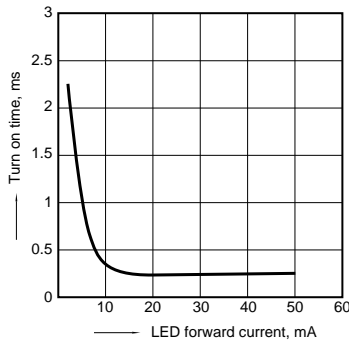
## 9. Off state leakage current vs. load voltage characteristics

Measured portion: between terminals 5 and 6, 7 and 8;  
Ambient temperature: 25°C 77°F



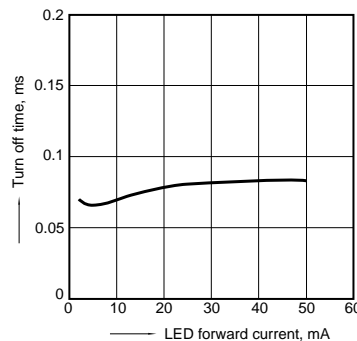
## 10. Turn on time vs. LED forward current characteristics

Measured portion: between terminals 5 and 6, 7 and 8;  
Load voltage: Max.(DC); Continuous load current:  
Max.(DC); Ambient temperature: 25°C 77°F



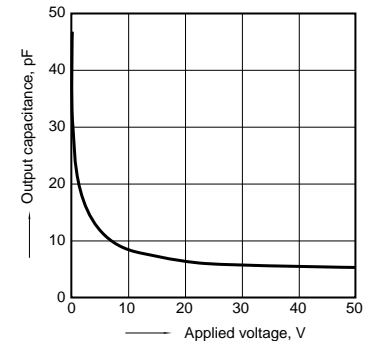
## 11. Turn off time vs. LED forward current characteristics

Measured portion: between terminals 5 and 6, 7 and 8;  
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 5 and 6, 7 and 8;  
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 relay thus controls the instantaneous load current to effectively ensure circuit safety.

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

But, if the current-limiting feature is used longer than the specified time, the PhotoMOS relay 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

