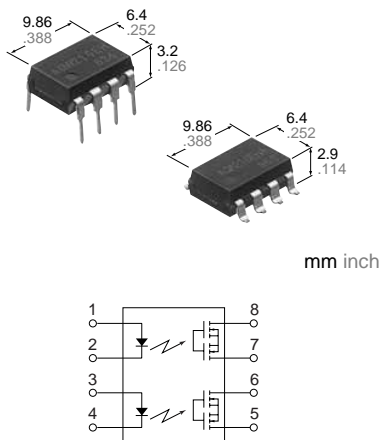


High cost-performance  
DIP8-pin type with  
reinforced insulation

PhotoMOS Relays  
GU-E 2 Form A  
(AQW210EH)



## FEATURES

- 1. 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).
- 2. Applicable for 2 Form A use as well as two independent 1 Form A use**
- 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. High sensitivity and high speed response**  
Can control max. 0.14 A load current with 5 mA input current. Fast operation speed of typ. 0.5 ms (AQW210EH).
- 5. Low-level off state leakage current of max. 1  $\mu$ A**

## TYPICAL APPLICATIONS

- Modem
- Telephone equipment
- Security equipment
- Sensing equipment

## TYPES

	I/O isolation voltage	Output rating*		Package	Part No.				Packing quantity			
		Load voltage	Load current		Through hole terminal	Surface-mount terminal		Tube	Tape and reel			
						Tube packing style				Tape and reel packing style		
AC/DC dual use	Reinforced 5,000 V	60 V	500 mA	DIP8-pin			Picked from the 1/2/3/4-pin side	Picked from the 5/6/7/8-pin side	1 tube contains: 40 pcs. 1 batch contains: 400 pcs.	1,000 pcs.		
		350 V	120 mA				AQW212EH	AQW212EHA			AQW212EHAX	AQW212EHAZ
		400 V	100 mA				AQW210EH	AQW210EHA			AQW210EHAX	AQW210EHAZ
		600 V	40 mA				AQW214EH	AQW214EHA			AQW214EHAX	AQW214EHAZ

\*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)

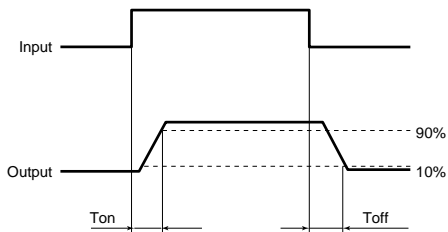
Item		Symbol	AQW212EH(A)	AQW210EH(A)	AQW214EH(A)	AQW216EH(A)	Remarks
Input	LED forward current	$I_F$	50mA				
	LED reverse voltage	$V_R$	5V				
	Peak forward current	$I_{FP}$	1A				f = 100 Hz, Duty factor = 0.1%
	Power dissipation	$P_{in}$	75mW				
Output	Load voltage (peak AC)	$V_L$	60 V	350 V	400 V	600 V	
	Continuous load current	$I_L$	0.5 A (0.6 A)	0.12 A (0.14 A)	0.1 A (0.13 A)	0.04 A (0.05 A)	Peak AC, DC ( ): in case of using only 1 channel
	Peak load current	$I_{peak}$	1.5 A	0.36 A	0.3 A	0.15 A	100 ms (1 shot), $V_L = DC$
	Power dissipation	$P_{out}$	800mW				
Total power dissipation		$P_T$	850mW				
I/O isolation voltage		$V_{iso}$	5,000 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				

# GU-E 2 Form A (AQW210EH)

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

Item			Symbol	AQW212EH(A)	AQW210EH(A)	AQW214EH(A)	AQW216EH(A)	Condition
Input	LED operate current	Typical	I <sub>Fon</sub>	1.2mA				I <sub>L</sub> =Max.
		Maximum		3.0mA				
	LED turn off current	Minimum	I <sub>Foff</sub>	0.4mA				I <sub>L</sub> =Max.
		Typical		1.1mA				
LED dropout voltage	Typical	V <sub>F</sub>	1.25 V (1.14 V at I <sub>F</sub> =5mA)				I <sub>F</sub> =50mA	
	Maximum		1.5V					
Output	On resistance	Typical	R <sub>on</sub>	0.83Ω	18Ω	26Ω	52Ω	I <sub>F</sub> =5mA I <sub>L</sub> =Max. Within 1 s on time
		Maximum		2.5Ω	25Ω	35Ω	120Ω	
	Off state leakage current	Maximum	I <sub>Leak</sub>	1μA				I <sub>F</sub> =0mA V <sub>L</sub> =Max.
Transfer characteristics	Turn on time*	Typical	T <sub>on</sub>	1ms	0.5ms			I <sub>F</sub> =5mA I <sub>L</sub> =Max.
		Maximum		4ms	2.0ms			
	Turn off time*	Typical	T <sub>off</sub>	0.08ms			0.04ms	I <sub>F</sub> =5mA I <sub>L</sub> =Max.
		Maximum		1.0ms				
	I/O capacitance	Typical	C <sub>iso</sub>	0.8pF				f = 1MHz V <sub>B</sub> = 0V
Maximum		1.5pF						
Initial I/O isolation resistance	Minimum	R <sub>iso</sub>	1,000MΩ				500V 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 <sub>F</sub>	5 to 10	mA

### ■ Dimensions

### ■ Schematic and Wiring Diagrams

### ■ Cautions for Use

■ These products are not designed for automotive use.

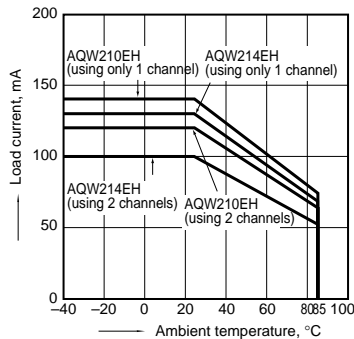
If you are considering to use these products for automotive applications, please contact your local Panasonic Electric Works technical representative.

Please refer to our information on [PhotoMOS Relays for Automotive Applications](#).

## REFERENCE DATA

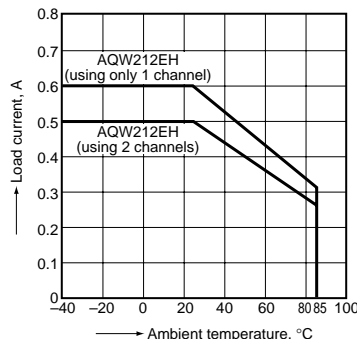
1-(1). Load current vs. ambient temperature characteristics

Allowable ambient temperature: -20°C to +85°C  
-4°F to +185°F



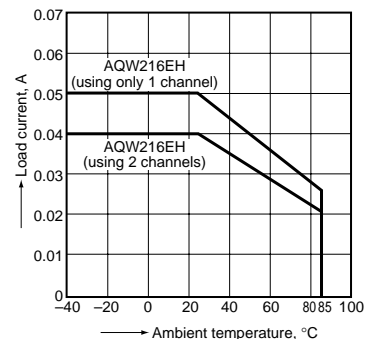
1-(2). Load current vs. ambient temperature characteristics

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



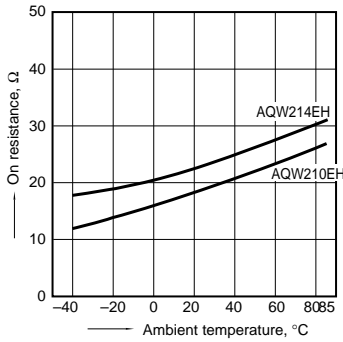
1-(3). Load current vs. ambient temperature characteristics

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



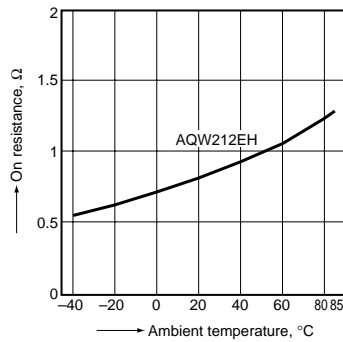
**2-(1). On resistance vs. ambient temperature characteristics**

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



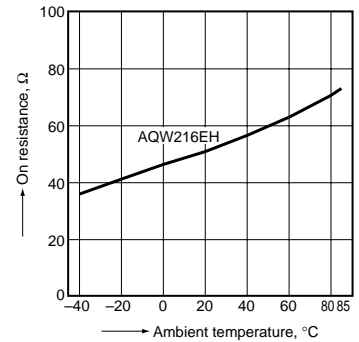
**2-(2). On resistance vs. ambient temperature characteristics**

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



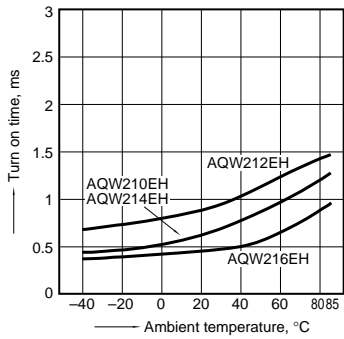
**2-(3). On resistance vs. ambient temperature characteristics**

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



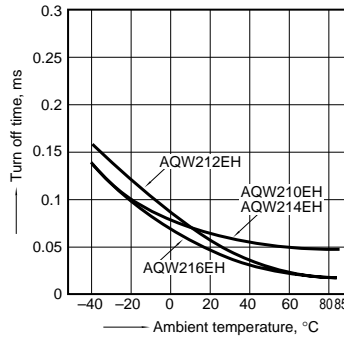
**3. Turn on time vs. ambient temperature characteristics**

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



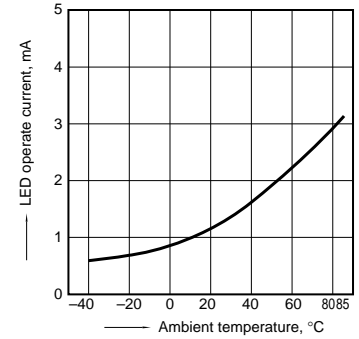
**4. Turn off time vs. ambient temperature characteristics**

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



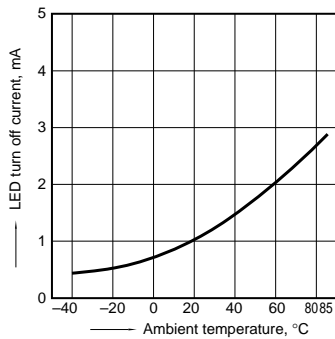
**5. LED operate current vs. ambient temperature characteristics**

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



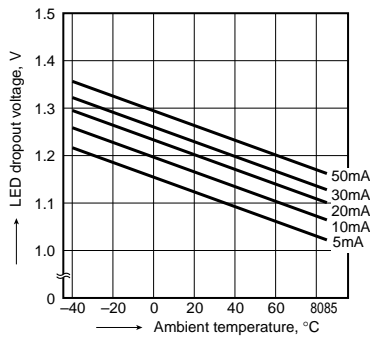
**6. LED turn off current vs. ambient temperature characteristics**

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



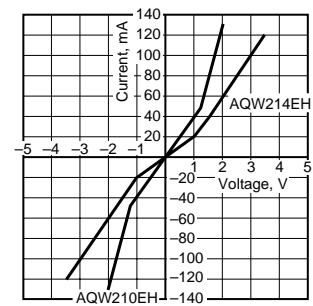
**7. LED dropout voltage vs. ambient temperature characteristics**

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



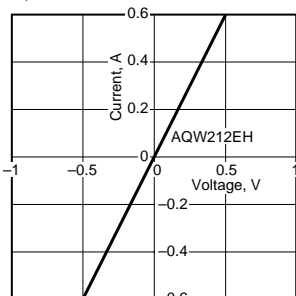
**8-(1). Current vs. voltage characteristics of output at MOS portion**

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



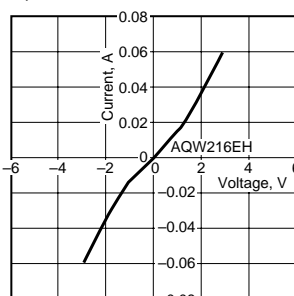
**8-(2). Current vs. voltage characteristics of output at MOS portion**

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



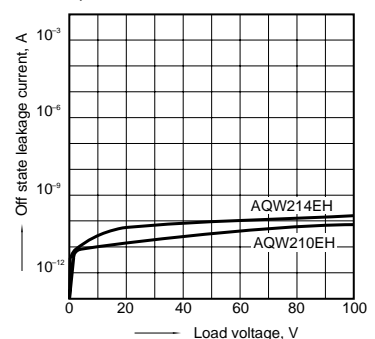
**8-(3). Current vs. voltage characteristics of output at MOS portion**

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



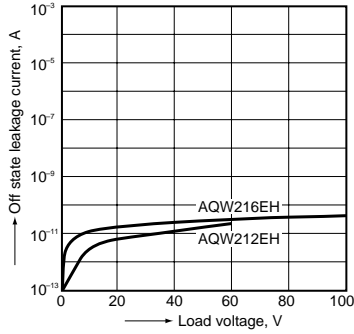
**9-(1). Off state leakage current vs. load voltage characteristics**

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

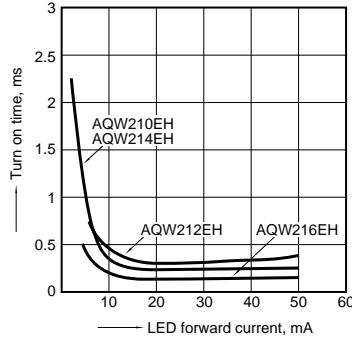


# GU-E 2 Form A (AQW210EH)

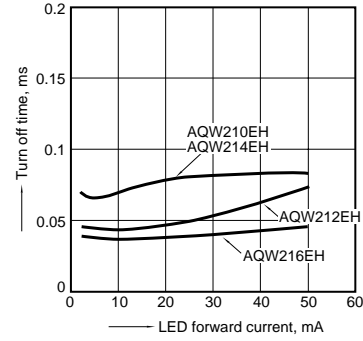
9-(2). Off state leakage current vs. load voltage characteristics  
 Measured portion: between terminals 5 and 6, 7 and 8;  
 Ambient temperature: 25°C 77°F



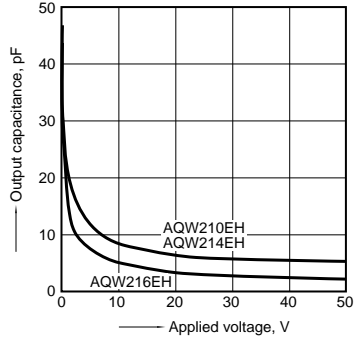
10. Turn on time vs. LED forward current characteristics  
 Sample: All types  
 Measured portion: between terminals 5 and 6, 7 and 8;  
 Load voltage: Max. (DC); Continuous load current:  
 Max. (DC); Ambient temperature: 25°C 77°F



11. Turn off time vs. LED forward current characteristics  
 Sample: All types  
 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-(1). 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



12-(2). 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

