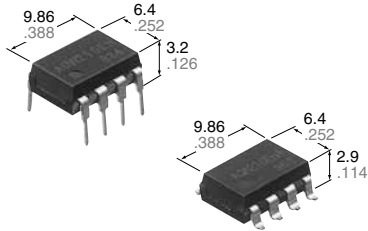
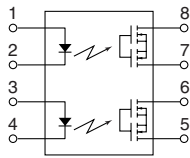


High cost-performance  
DIP8-pin type with  
reinforced insulation

PhotoMOS<sup>®</sup>  
GU-E 2 Form A  
(AQW210EH)



mm inch



RoHS compliant

## 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 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	
					Through hole terminal	Surface-mount terminal			Tube	Tape and reel
						Tube packing style	Tape and reel packing style			
							Picked from the 1/2/3/4-pin side	Picked from the 5/6/7/8-pin side		
AC/DC dual use	Reinforced 5,000 V	60 V	500 mA	DIP8-pin	AQW212EH	AQW212EHA	AQW212EHAX	AQW212EHAZ	1 tube contains: 50 pcs. 1 batch contains: 500 pcs.	1,000 pcs.
		350 V	120 mA		AQW210EH	AQW210EHA	AQW210EHAX	AQW210EHAZ		
		400 V	100 mA		AQW214EH	AQW214EHA	AQW214EHAX	AQW214EHAZ		
		600 V	40 mA		AQW216EH	AQW216EHA	AQW216EHAX	AQW216EHAZ		

\*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 device.

## RATING

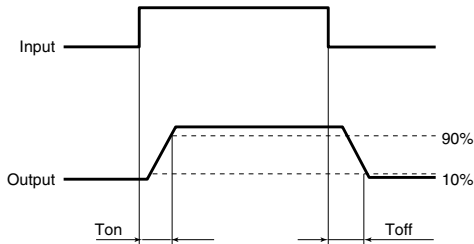
### 1. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

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				

## 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>ton</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 device operation and resetting.

Item	Symbol	Recommended value	Unit
Input LED current	I <sub>F</sub>	5 to 10	mA

- For Dimensions.
- For Schematic and Wiring Diagrams.
- For Cautions for Use.

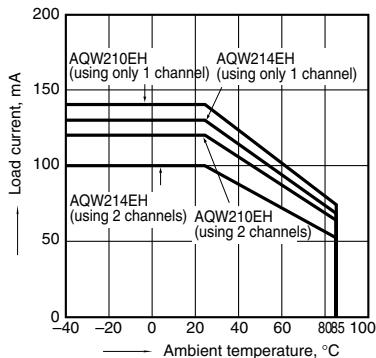
■ These products are not designed for automotive use.

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

## REFERENCE DATA

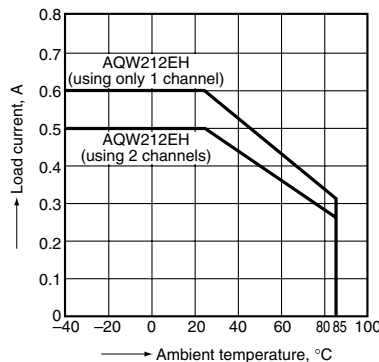
1-(1). Load current vs. ambient temperature characteristics

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



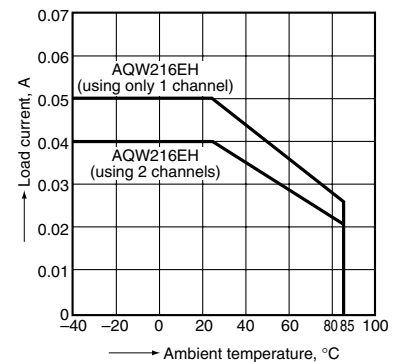
1-(2). Load current vs. ambient temperature characteristics

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



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

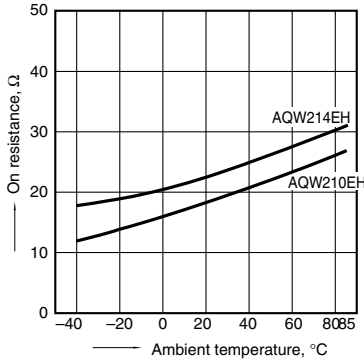
Allowable ambient temperature: -40°C to +85°C  
-40°F to +185°F



# GU-E 2 Form A (AQW21○EH)

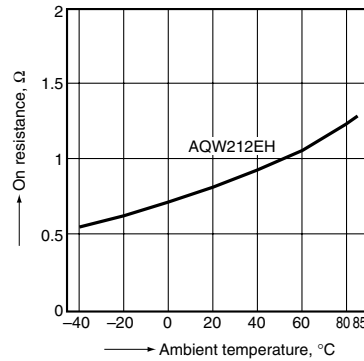
## 2-(1). On resistance vs. ambient temperature characteristics

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



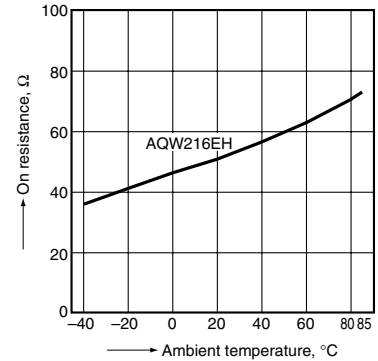
## 2-(2). On resistance vs. ambient temperature characteristics

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



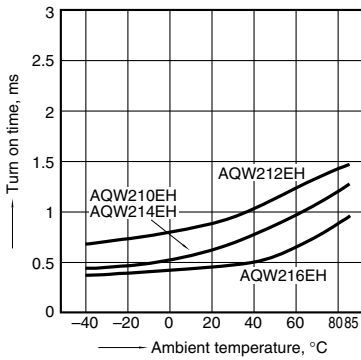
## 2-(3). On resistance vs. ambient temperature characteristics

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



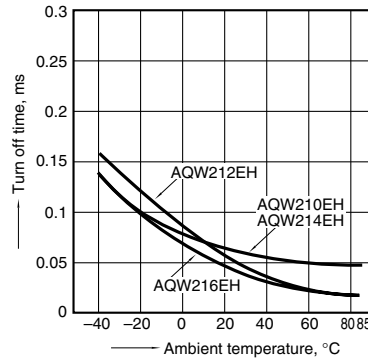
## 3. Turn on time vs. ambient temperature characteristics

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



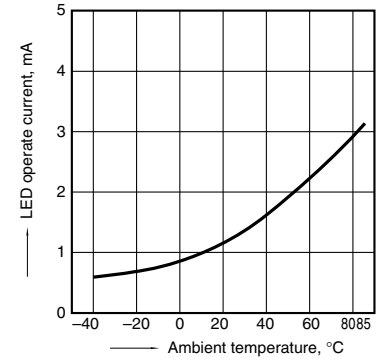
## 4. Turn off time vs. ambient temperature characteristics

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



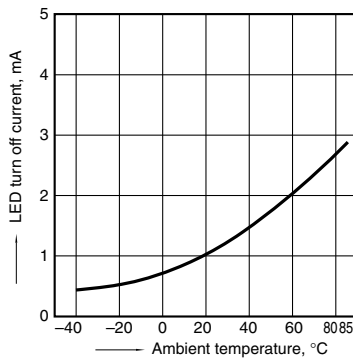
## 5. LED operate current vs. ambient temperature characteristics

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



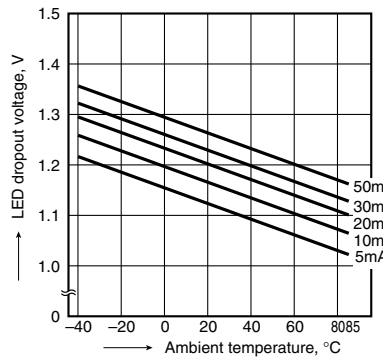
## 6. LED turn off current vs. ambient temperature characteristics

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



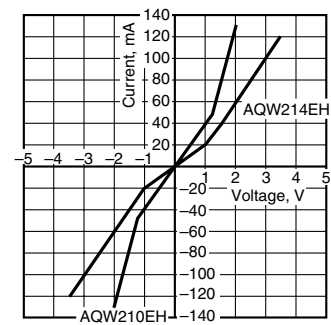
## 7. LED dropout voltage vs. ambient temperature characteristics

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



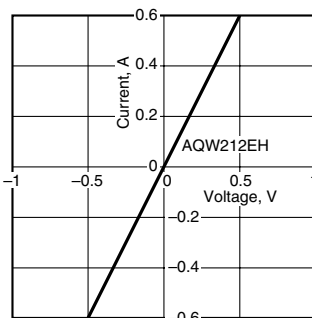
## 8-(1). Current vs. voltage characteristics of output at MOS portion

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



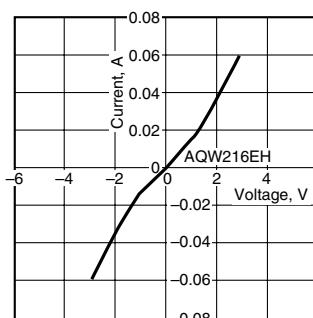
## 8-(2). Current vs. voltage characteristics of output at MOS portion

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



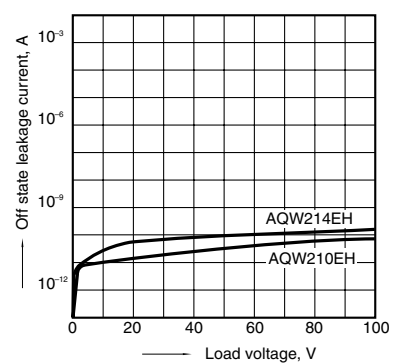
## 8-(3). Current vs. voltage characteristics of output at MOS portion

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



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

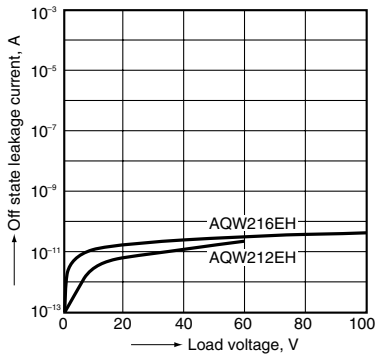
Measured portion: between terminals 5 and 6, 7 and 8;  
Ambient temperature: 25°C 77°F



# GU-E 2 Form A (AQW210EH)

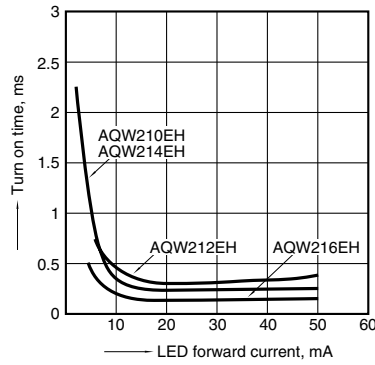
## 9-(2). Off state leakage current vs. load voltage characteristics

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



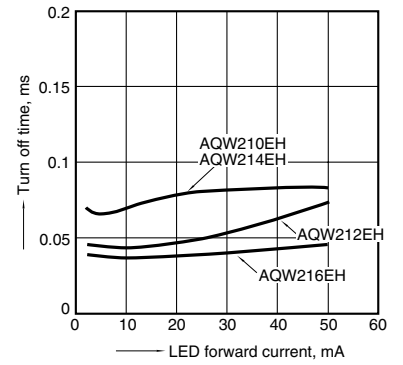
## 10. Turn on time vs. LED forward current characteristics

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



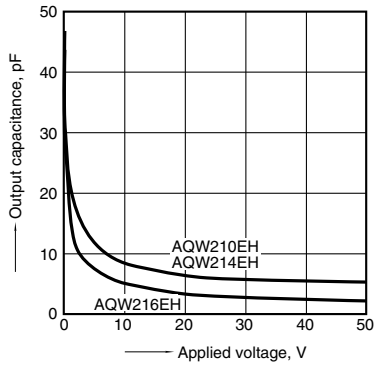
## 11. Turn off time vs. LED forward current characteristics

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



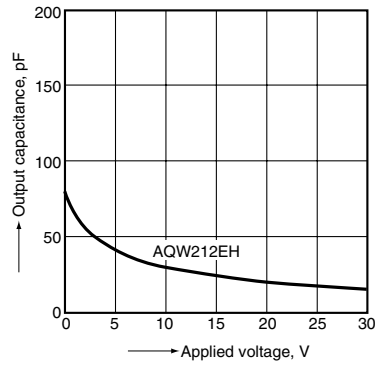
## 12-(1). Output capacitance vs. applied voltage characteristics

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



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[AQW214EHA](#) [AQW214EHAZ](#) [AQW216EH](#) [AQW216EHAZ](#) [AQW414TS](#) [AQW414TSX](#) [AQW280EH](#)