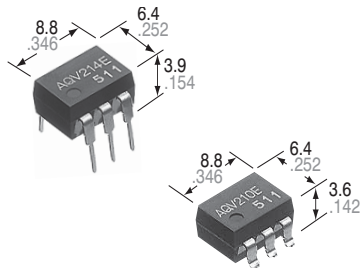


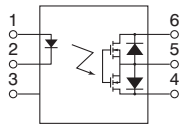
**High cost-performance  
DIP6-pin type, reinforced  
insulation available**

**PhotoMOS<sup>®</sup>  
GU-E 1 Form A  
(AQV210E, AQV210EH)**



[CAD Data](#)

mm inch



## FEATURES

- Reinforced insulation of I/O isolation voltage 5,000V (Reinforced insulation type)**
- Controls low-level analog signals**  
PhotoMOS relays feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.
- Stable on-resistance**
- Low-level off state leakage current of max. 1  $\mu$ A**

## TYPICAL APPLICATIONS

- High-speed inspection machines
- Telephone equipment
- Data communication equipment
- Computers

## TYPES

	I/O isolation	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	Standard 1,500 V AC	350 V	130 mA	DIP6-pin	AQV210E	AQV210EA	AQV210EAX	AQV210EAZ	1 tube contains: 50 pcs. 1 batch contains: 500 pcs.	1,000 pcs.
		400 V	120 mA		AQV214E	AQV214EA	AQV214EAX	AQV214EAZ		
	Reinforced 5,000 V	350 V	130 mA		AQV210EH	AQV210EHA	AQV210EHAX	AQV210EHAZ		
		400 V	120 mA		AQV214EH	AQV214EHA	AQV214EHAX	AQV214EHAZ		

\*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)

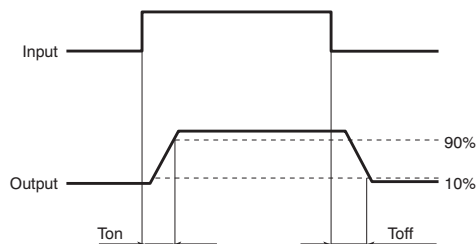
Item		Symbol	Type of connection	AQV210E(A)	AQV214E(A)	AQV210EH(A)	AQV214EH(A)	Remarks
Input	LED forward current	$I_F$		50 mA				
	LED reverse voltage	$V_R$		5 V				
	Peak forward current	$I_{FP}$		1 A				$f = 100$ Hz, Duty factor = 0.1%
	Power dissipation	$P_{in}$		75 mW				
Output	Load voltage (peak AC)	$V_L$		350 V	400 V	350 V	400 V	
	Continuous load current	$I_L$	A	0.13 A	0.12 A	0.13 A	0.12 A	A connection: Peak AC, DC B, C connection: DC
			B	0.15 A	0.13 A	0.15 A	0.13 A	
			C	0.17 A	0.15 A	0.17 A	0.15 A	
	Peak load current	$I_{peak}$		0.4 A	0.3 A	0.4 A	0.3 A	A connection: 100 ms (1 shot), $V_L=DC$
Power dissipation	$P_{out}$		500 mW					
Total power dissipation		$P_T$		550 mW				
I/O isolation voltage		$V_{iso}$		1,500 V AC		5,000 V AC		
Temperature limits	Operating	$T_{opr}$		-40°C to +85°C -40°F to +185°F				Non-condensing at low temp.
	Storage	$T_{stg}$		-40°C to +100°C -40°F to +212°F				

# GU-E 1 Form A (AQV210E, AQV210EH)

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

Item		Symbol	Type of connection	AQV210E(A)	AQV214E(A)	AQV210EH(A)	AQV214EH(A)	Condition	
Input	LED operate current	Typical	I <sub>Fon</sub>	—	1.1 mA		1.6 mA		I <sub>L</sub> = Max.
		Maximum			3 mA				
	LED turn off current	Minimum	I <sub>Foff</sub>	—	0.3 mA		0.4 mA		I <sub>L</sub> = Max.
		Typical			1.0 mA		1.5 mA		
LED dropout voltage	Typical	V <sub>F</sub>	—	1.25 V (1.14 V at I <sub>F</sub> = 5 mA)				I <sub>F</sub> = 50 mA	
	Maximum			1.5 V					
Output	On resistance	Typical	R <sub>on</sub>	A	23 Ω	30 Ω	23 Ω	30 Ω	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max. Within 1 s on time
		Maximum			35 Ω	50 Ω	35 Ω	50 Ω	
		Typical	R <sub>on</sub>	B	11.5 Ω	22.5 Ω	11.5 Ω	22.5 Ω	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max. Within 1 s on time
		Maximum			17.5 Ω	25 Ω	17.5 Ω	25 Ω	
	Typical	R <sub>on</sub>	C	6.0 Ω	11.3 Ω	6.0 Ω	11.3 Ω	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max. Within 1 s on time	
	Maximum			8.8 Ω	12.5 Ω	8.8 Ω	12.5 Ω		
Output capacitance	Typical	C <sub>out</sub>	A	45 pF				I <sub>F</sub> = 0 mA V <sub>B</sub> = 0 V f = 1 MHz	
Off state leakage current	Maximum	I <sub>Leak</sub>	—	1 μA				I <sub>F</sub> = 0 mA V <sub>L</sub> = Max.	
Transfer characteristics	Turn on time*	Typical	T <sub>on</sub>	—	0.5 ms		0.7 ms		I <sub>F</sub> = 0 mA → 5 mA** I <sub>L</sub> = Max.
		Maximum			2.0 ms				
	Turn off time*	Typical	T <sub>off</sub>	—	0.05 ms				I <sub>F</sub> = 0 mA → 5 mA I <sub>L</sub> = Max.
		Maximum			1.0 ms				
	I/O capacitance	Typical	C <sub>iso</sub>	—	0.8 pF				f = 1 MHz V <sub>B</sub> = 0 V
Maximum		1.5 pF							
Initial I/O isolation resistance	Minimum	R <sub>iso</sub>	—	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 <sub>F</sub>	Standard type: 5 Reinforced type: 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 technical representative.

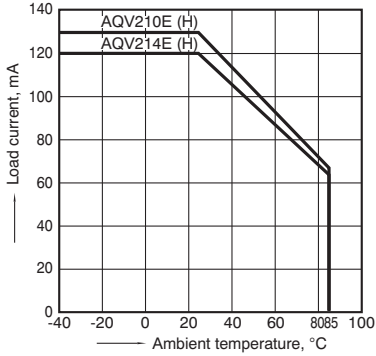
Please refer to our information on [PhotoMOS Relays for Automotive Applications](#).

## REFERENCE DATA

### 1. Load current vs. ambient temperature characteristics

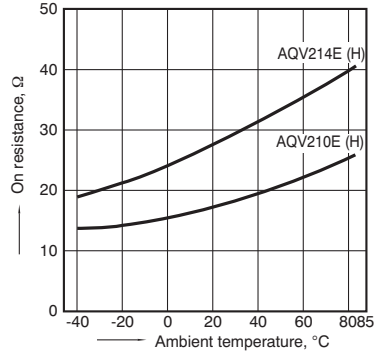
Allowable ambient temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 $-40^{\circ}\text{F}$  to  $+185^{\circ}\text{F}$

Type of connection: A



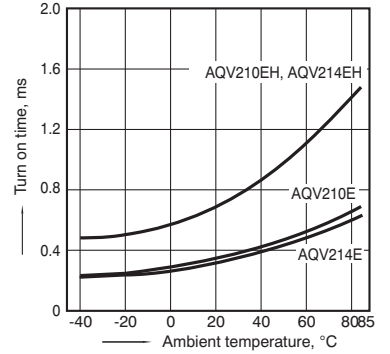
### 2. On-resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;  
 LED current: 5 mA; Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



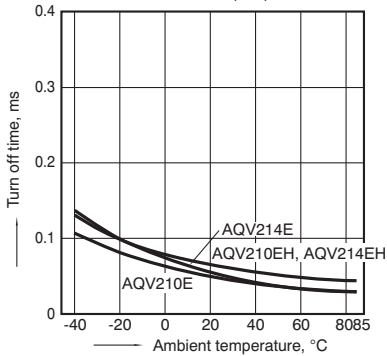
### 3. Turn on time vs. ambient temperature characteristics

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



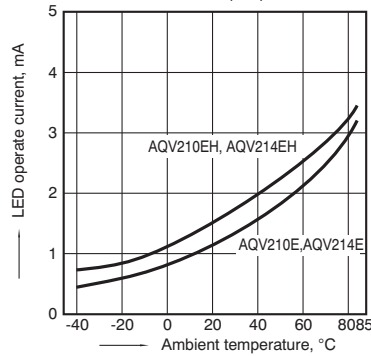
### 4. Turn off time vs. ambient temperature characteristics

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



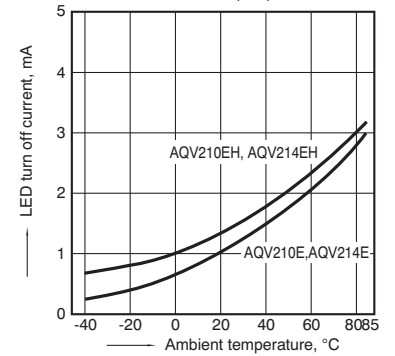
### 5. LED operate current vs. ambient temperature characteristics

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



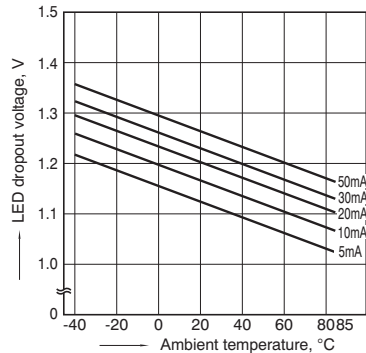
### 6. LED turn off current vs. ambient temperature characteristics

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



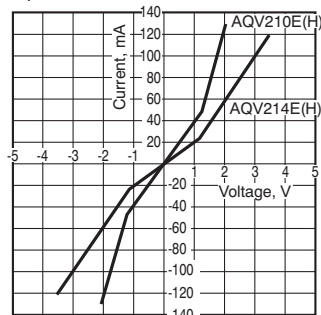
### 7. LED dropout voltage vs. ambient temperature characteristics

Sample: All types  
 LED current: 5 to 50 mA



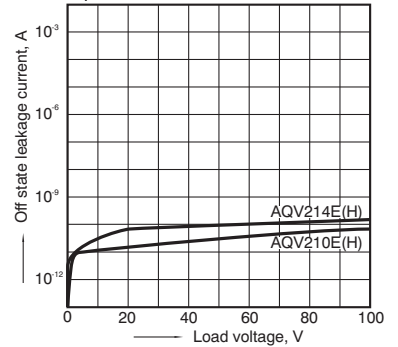
### 8. Current vs. voltage characteristics of output at MOS portion

Measured portion: between terminals 4 and 6;  
 Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



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

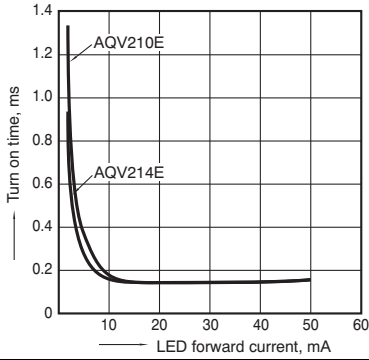
Measured portion: between terminals 4 and 6;  
 Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



# GU-E 1 Form A (AQV210E, AQV210EH)

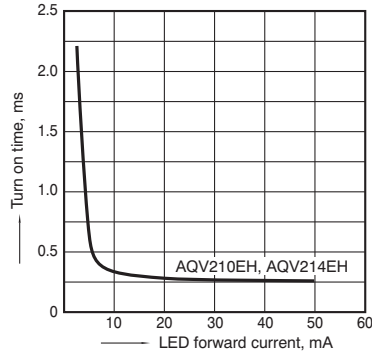
10-(1). Turn on time vs. LED forward current characteristics

Measured portion: between terminals 4 and 6;  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



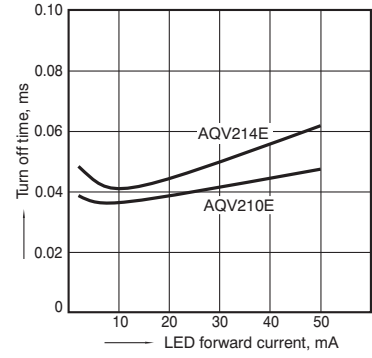
10-(2). Turn on time vs. LED forward current characteristics

Measured portion: between terminals 4 and 6;  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



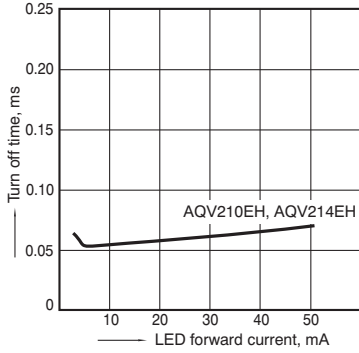
11-(1). Turn off time vs. LED forward current characteristics

Measured portion: between terminals 4 and 6;  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



11-(2). Turn off time vs. LED forward current characteristics

Measured portion: between terminals 4 and 6;  
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 4 and 6;  
Frequency: 1 MHz;  
Ambient temperature: 25°C 77°F

