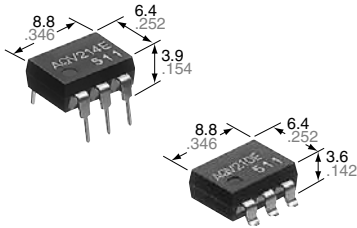


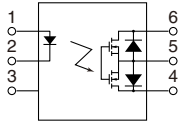
Standard type:  US / Reinforced type:  US 

**DIP6-pin type, reinforced insulation available**

**PhotoMOS®**  
**GE 1 Form A**  
(AQV210E, AQV210EH)



mm inch



**RoHS compliant**

### FEATURES

- 1. Reinforced insulation of I/O isolation voltage 5,000V (Reinforced insulation type)**
- 2. Controls low-level analog signals**  
PhotoMOS feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.
- 3. Stable on-resistance**
- 4. 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	
						Tape and reel packing style				
AC/DC dual use	Standard 1,500 V AC	350 V	130 mA	DIP6-pin	Tube packing style		Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side	1 tube contains: 50 pcs. 1 batch contains: 500 pcs.	1,000 pcs.
		400 V	120 mA		AQV210E	AQV210EA	AQV210EAX	AQV210EAZ		
	Reinforced 5,000 V	350 V	130 mA		AQV214E	AQV214EA	AQV214EAX	AQV214EAZ		
		400 V	120 mA		AQV210EH	AQV210EHA	AQV210EHAX	AQV210EHZ		

\*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)

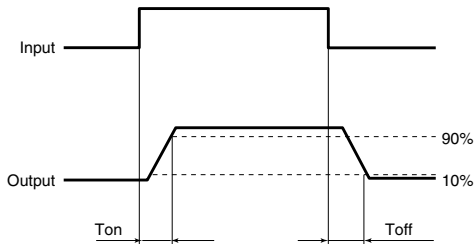
Item	Sym- bol	Type of connec- tion	AQV210E(A)	AQV214E(A)	AQV210EH(A)	AQV214EH(A)	Remarks
Input	LED forward current	$I_F$	50 mA				
	LED reverse voltage	$V_R$	5 V				
	Peak forward current	$I_{FP}$	1 A				f = 100 Hz, Duty factor = 0.1%
	Power dissipation	$P_{in}$	75 mW				
Load voltage (peak AC)	$V_L$		350 V	400 V	350 V	400 V	
Output	Continuous load current	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				

# GE 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	
	On resistance	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	
	On resistance	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	
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> = 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> = 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 device operation and resetting.

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

■ These products are not designed for automotive use.

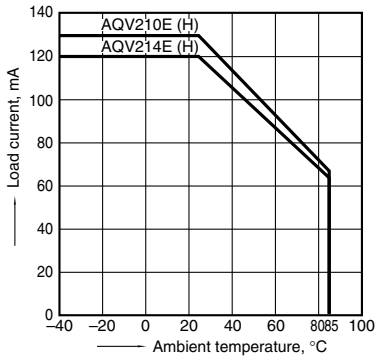
If you are considering to use these products for automotive applications, please contact your local Panasonic Corporation technical representative.

## REFERENCE DATA

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

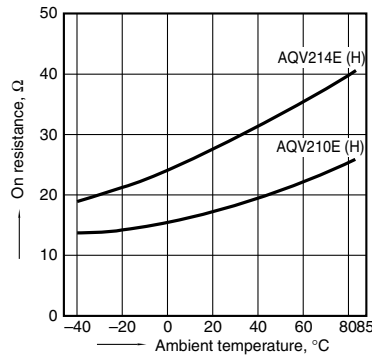
Allowable ambient temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 $-40^{\circ}\text{F}$  to  $+185^{\circ}\text{F}$

Type of connection: A



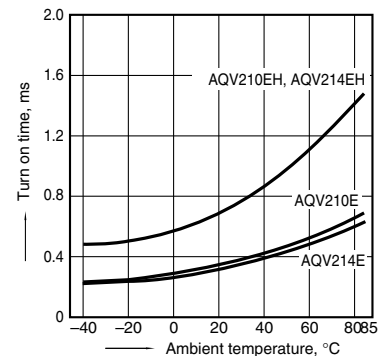
### 2. On-resistance vs. ambient temperature characteristics

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



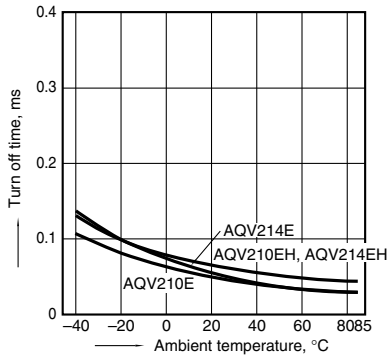
### 3. Turn on time vs. ambient temperature characteristics

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



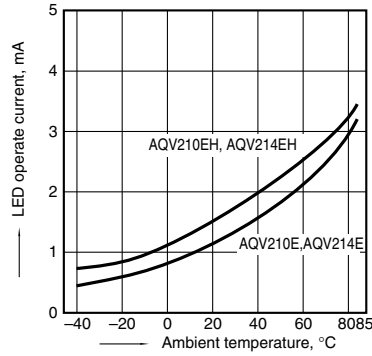
### 4. Turn off time vs. ambient temperature characteristics

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



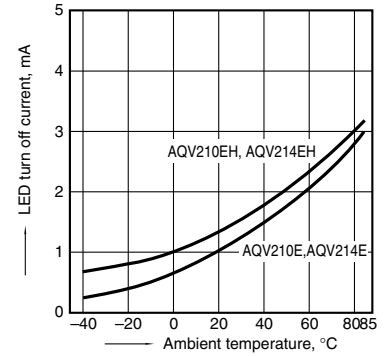
### 5. LED operate current vs. ambient temperature characteristics

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



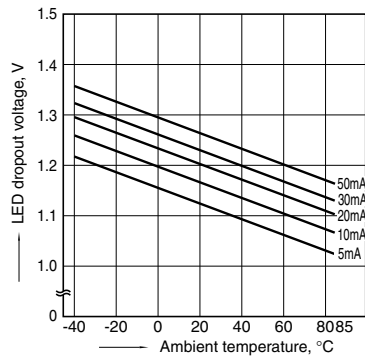
### 6. LED turn off current vs. ambient temperature characteristics

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



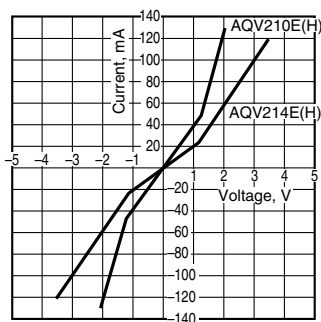
### 7. LED dropout voltage vs. ambient temperature characteristics

Sample: All types  
 LED current: 5 to 50 mA



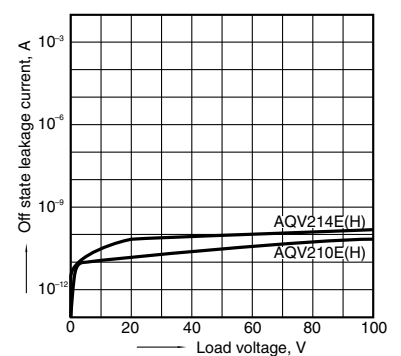
### 8. Current vs. voltage characteristics of output at MOS portion

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

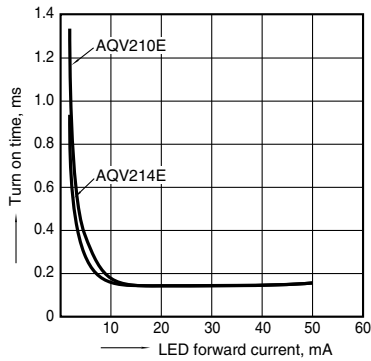
Measured portion: between terminals 4 and 6;  
 Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



# GE 1 Form A (AQV210E, AQV210EH)

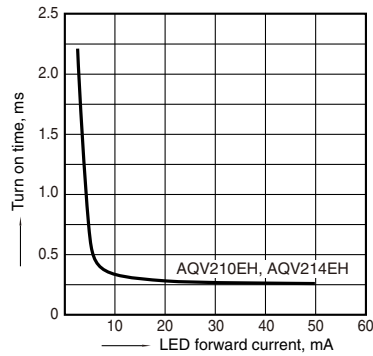
## 10-(1). Turn on time vs. LED forward current characteristics

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



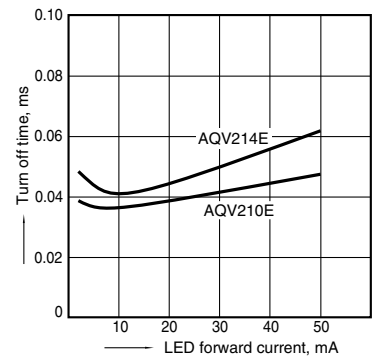
## 10-(2). Turn on time vs. LED forward current characteristics

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



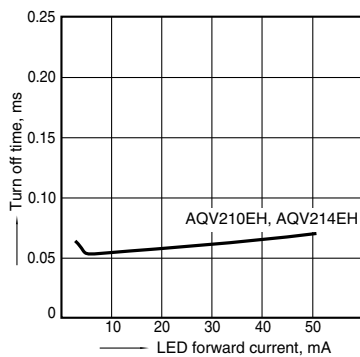
## 11-(1). Turn off time vs. LED forward current characteristics

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

