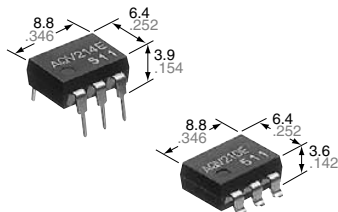


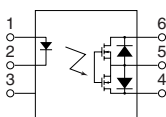
General use and economy type.  
DIP (1 Form A) 6-pin type.  
Reinforced insulation  
5,000V type.

## GU-E PhotoMOS

(AQV210E, AQV210EH)



mm inch



## FEATURES

### 1. Controls low-level analog signals

PhotoMOS relays feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.

### 2. Controlled with low-level input signals

### 3. Controls various types of loads such as relays, motors, lamps and solenoids.

### 4. Optical coupling for extremely high isolation

Unlike mechanical relays, the PhotoMOS relay combines LED and optoelectronic device to transfer signals using light for extremely high isolation.

### 5. Eliminates the need for a counter electromotive force protection diode in the drive circuits on the input side

### 6. Stable on-resistance

### 7. Low-level off state leakage current

### 8. Eliminates the need for a power supply to drive the power MOSFET

A power supply used to drive the power MOSFET is unnecessary because of the built-in optoelectronic device. This results in easy circuit design and small PC board area.

### 9. Low thermal electromotive force (Approx. 1 $\mu$ V)

## TYPICAL APPLICATIONS

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

## TYPES

Type	I/O isolation	Output rating*		Part No.				Packing quantity	
				Through hole terminal	Surface-mount terminal				
		Load voltage	Load current	Tube packing style		Tape and reel packing style		Tube	Tape and reel
AC/DC	Standard 1,500 V AC	350 V	130 mA	AQV210E	AQV210EA	AQV210EAX	AQV210EAX		
		400 V	120 mA	AQV214E	AQV214EA	AQV214EAX	AQV214EAX		
	Reinforced 5,000 V	350 V	130 mA	AQV210EH	AQV210EHA	AQV210EHAX	AQV210EHAX		
		400 V	120 mA	AQV214EH	AQV214EHA	AQV214EHAX	AQV214EHAX		

\*Indicate the peak AC and DC values.

Note: For space reasons, the SMD terminal shape indicator "A" and the package style indicator "X" or "Z" are not marked on the relay.

## 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					
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						

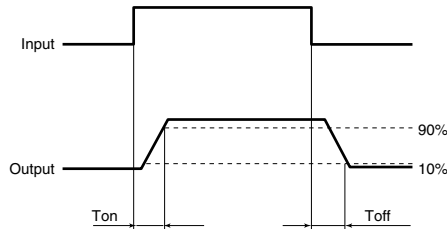
# GU-E PhotoMOS (AQV210E, AQV210EH)

## 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		
		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	—	—	1 μA				I <sub>F</sub> = 0 mA V <sub>L</sub> = Max.	
Transfer characteristics	Switching speed	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

For type of connection.



\*\* Recommendable LED forward current  
Standard type: I<sub>F</sub> = 5 mA  
Reinforced type: I<sub>F</sub> = 5 to 10 mA

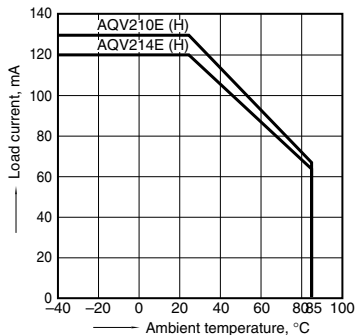
- For Dimensions.
- For Schematic and Wiring Diagrams.
- For Cautions for Use.

## REFERENCE DATA

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

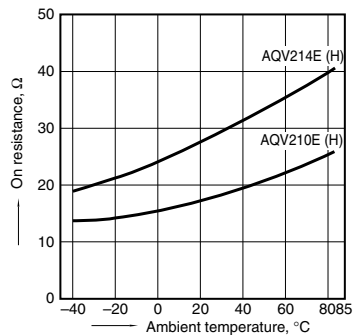
Allowable ambient temperature: -40°C to +85°C  
-40°F to +185°F

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)

