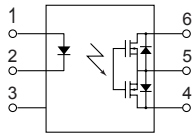
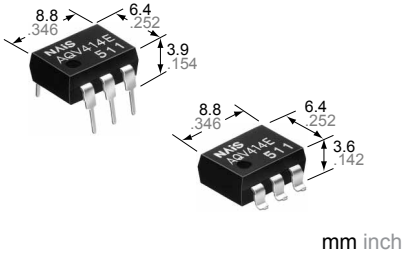


**Panasonic**  
ideas for life

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

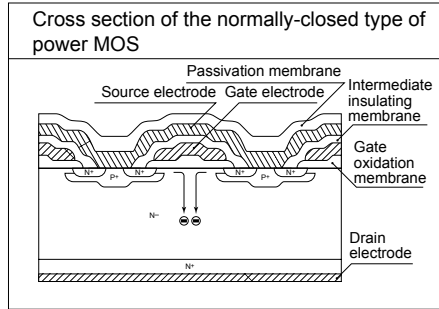
**GU-E PhotoMOS  
(AQV414E,  
AQV410EH)**



**2. This is the low-cost version PhotoMOS 1 Form B output type relay.** Compared to the previous GU PhotoMOS 1 Form B type relay, the attainment of an economical price that is approximately 22% lower will further broaden its market.

**3. Normally closed type (2 Form B) is low on-resistance. (All AQ○4 PhotoMOS are Form B types. And also the Form A types have a low on-resistance.)**

This has been realized thanks to the built-in MOSFET processed by our proprietary method, DSD (Double-diffused and Selective Doping) method.



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

**5. High sensitivity, low ON resistance**  
Can control a maximum 0.13 A load current with a 5 mA input current. Low ON resistance of 18 Ω (AQV410EH). Stable operation because there are no metallic contact parts.

**6. Low-level off-state leakage current**  
The SSR has an off-state leakage current of several milliamperes, whereas the PhotoMOS relay has typ. 100 pA even with the rated load voltage of 400 V (AQV414E).

**7. Reinforced insulation 5,000 V type also available.**  
More than 0.4 mm internal insulation distance between inputs and outputs. Conforms to EN41003, EN60950 (reinforced insulation).

## FEATURES

**1. 60V type couples high capacity (0.55A) with low on-resistance (1Ω).**

Item	GU-E (1 Form B type) type	
	AQV410EH	AQV412EH
Load voltage	350V	60V
Continuous load current	0.13A	0.55A
ON resistance (typ.)	18Ω	1Ω

**NEW**

## TYPICAL APPLICATIONS

- Power supply
- Measuring equipment
- Security equipment
- Telephone equipment
- Sensors

## TYPES

Type	I/O isolation voltage	Output rating*		Part No.				Packing quantity	
				Through hole terminal	Surface-mount terminal		Tube		
					Tube packing style	Tape and reel packing style			
AC/DC type	1,500 V AC (Standard)	400 V	120 mA	AQV414E	AQV414EA	AQV414EAX	AQV414EAZ	1 tube contains 50 pcs. 1 batch contains 500 pcs.	1,000 pcs.
				AQV412EH	AQV412EHA	AQV412EHAX	AQV412EHAZ		
	5,000 V AC (Reinforced)	60 V	550 mA	AQV410EH	AQV410EHA	AQV410EHAX	AQV410EHAZ		
		350 V	130 mA	AQV414EH	AQV414EHA	AQV414EHAX	AQV414EHAZ		

\*Indicate the peak AC and DC values.

Note: For space reasons, the SMD terminal shape indicator "A" and the package type indicator "X" and "Z" are omitted from the seal.

# GU-E PhotoMOS (AQV414E, AQV410EH)

## RATING

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

Item	Symbol	Type of connection	AQV414E(A)	AQV412EH(A)	AQV410EH(A)	AQV414EH(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)	$V_L$		400 V	60 V	350 V	400 V		
Output	Continuous load current	$I_L$	A	0.12 A	0.55 A	0.13 A	0.12 A	A connection: Peak AC, DC B,C connection: DC
			B	0.13 A	0.65 A	0.15 A	0.13 A	
			C	0.15 A	0.8 A	0.17 A	0.15 A	
Peak load current	$I_{peak}$		0.3 A	1.5 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 temperatures	
	Storage	$T_{stg}$	-40°C to +100°C -40°F to +212°F					

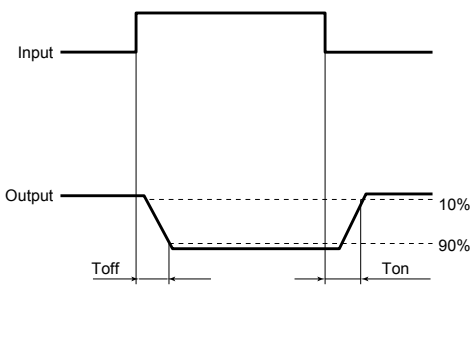
### 2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item	Symbol	Type of connection	AQV414E(A)	AQV412EH(A)	AQV410EH(A)	AQV414EH(A)	Condition			
Input	LED operate (OFF) current	Typical	1.45 mA	1.9 mA	1.9 mA	1.9 mA	$I_L = \text{Max.}$			
		Maximum	3.0 mA							
	LED reverse (ON) current	Minimum	$I_{Fon}$	0.3 mA	0.4 mA	0.4 mA	0.4 mA	$I_L = \text{Max.}$		
Typical			1.40 mA	1.8 mA	1.8 mA	1.8 mA				
LED dropout voltage	Typical	$V_F$	1.25 V (1.14 V at $I_F = 5 \text{ mA}$ )				$I_F = 50 \text{ mA}$			
	Maximum		1.5 V							
Output	On resistance	Typical	$R_{on}$	A	26 Ω	1 Ω	18 Ω	25.2 Ω	$I_F = 0 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time	
		Maximum			50 Ω	2.5 Ω	35 Ω	50 Ω		
	On resistance	Typical	$R_{on}$	B	20 Ω	0.55 Ω	13 Ω	19 Ω	$I_F = 0 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time	
		Maximum			25 Ω	1.3 Ω	17.5 Ω	25 Ω		
	On resistance	Typical	$R_{on}$	C	10 Ω	0.3 Ω	6.5 Ω	10 Ω	$I_F = 0 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time	
		Maximum			12.5 Ω	0.7 Ω	8.8 Ω	12.5 Ω		
Off state leakage current	Maximum	$I_{Leak}$	1 μA	10 μA	10 μA	10 μA	$I_F = 5 \text{ mA}$ $V_L = \text{Max.}$			
Transfer characteristics	Switching speed	Operate (OFF) time*	Typical	$T_{off}$	—	0.7 ms	3 ms	1.5 ms	1.3 ms	$I_F = 0 \text{ mA} \rightarrow 5 \text{ mA}$ $I_L = \text{Max.}$
			Maximum			2.0 ms	10 ms	3.0 ms	3.0 ms	
	Switching speed	Reverse (ON) time*	Typical	$T_{on}$	—	0.1 ms	0.3 ms	0.3 ms	0.3 ms	$I_F = 5 \text{ mA} \rightarrow 0 \text{ mA}$ $I_L = \text{Max.}$
			Maximum			1.0 ms	1.5 ms	1.5 ms	1.5 ms	
	I/O capacitance	Typical	$C_{iso}$	—	0.8 pF				f = 1 MHz $V_B = 0 \text{ V}$	
	Maximum	1.5 pF								
Initial I/O isolation resistance	Minimum	$R_{iso}$	—	1,000 MΩ				500 V DC		

Note: Recommendable LED forward current

Standard type  $I_F = 5 \text{ mA}$   
Reinforced type  $I_F = 5 \text{ to } 10 \text{ mA}$

\*Operate/Reverse time

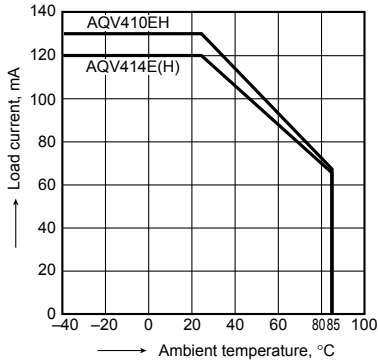


## REFERENCE DATA

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

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

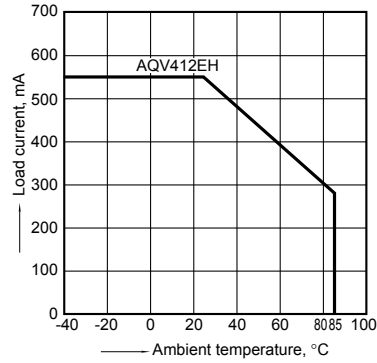
Type of connection: A



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

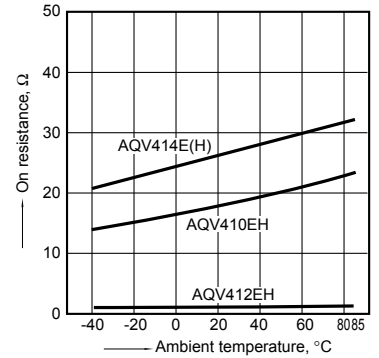
Allowable ambient temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 $-40^{\circ}\text{F}$  to  $+185^{\circ}\text{F}$

Type of connection: A



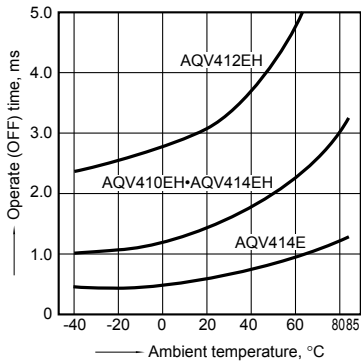
2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;  
 LED current: 0 mA; Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



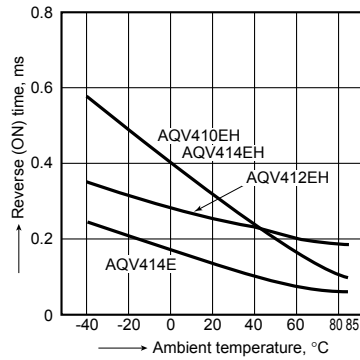
3. Operate (OFF) time vs. ambient temperature characteristics

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



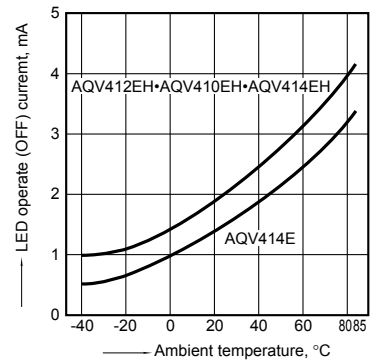
4. Reverse (ON) time vs. ambient temperature characteristics

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



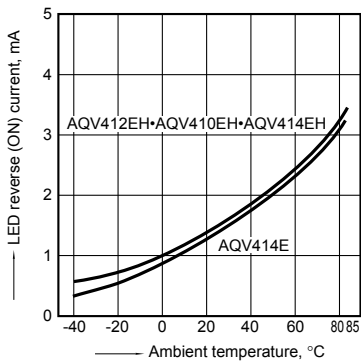
5. LED operate (OFF) current vs. ambient temperature characteristics

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



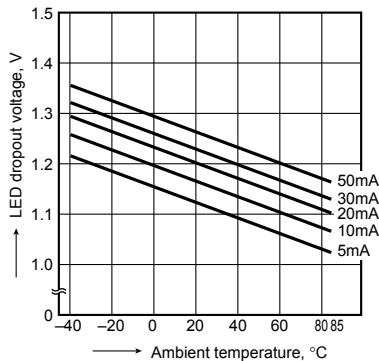
6. LED reverse (ON) current vs. ambient temperature characteristics

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



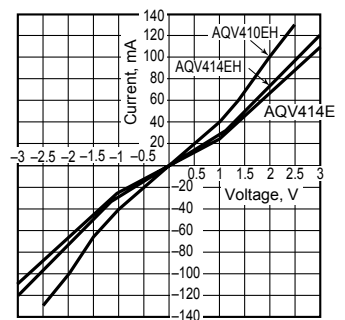
7. LED dropout voltage vs. ambient temperature characteristics

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



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

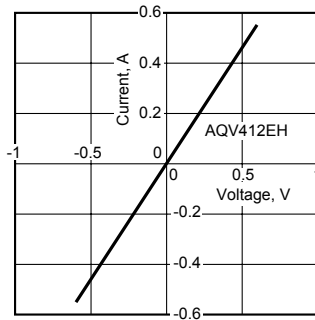
Measured portion: between terminals 4 and 6;  
 Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



# GU-E PhotoMOS (AQV414E, AQV410EH)

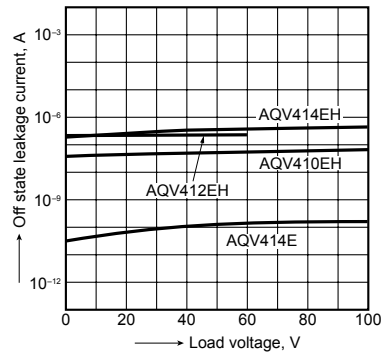
## 8-(2). Current vs. voltage characteristics of output at MOS portion

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



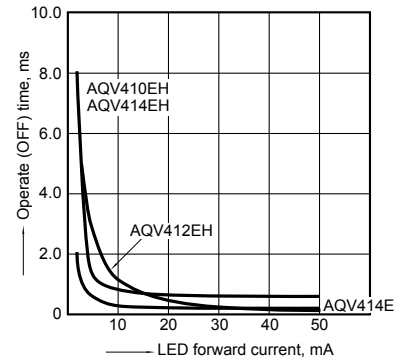
## 9. Off state leakage current vs. load voltage characteristics

Sample: All types;  
Measured portion: between terminals 4 and 6;  
LED current: 5 mA; Ambient temperature: 25°C 77°F



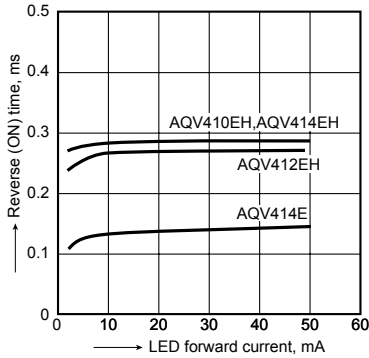
## 10. Operate (OFF) time vs. LED forward current characteristics

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



## 11. Reverse (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



## 12. Output capacitance vs. applied voltage characteristics

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

