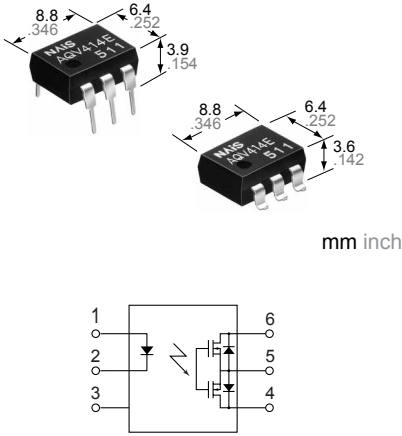


Panasonic
ideas for life

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

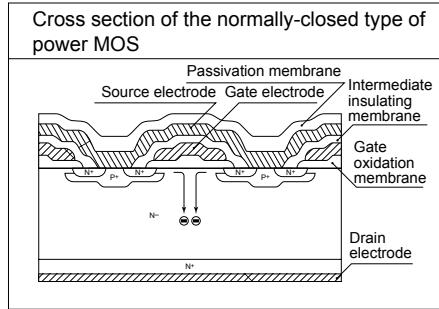
**GU-E PhotoMOS
(AQV414E,
AQV410EH)**



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
Part No.	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	Tape and reel
					Tube packing style		Tape and reel packing style		
Load voltage	Load current	Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side	Tube	Tape and reel				
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.
		60 V	550 mA	AQV412EH	AQV412EHA	AQV412EHAX	AQV412EHAZ		
	5,000 V AC (Reinforced)	350 V	130 mA	AQV410EH	AQV410EHA	AQV410EHAX	AQV410EHAZ		
		400 V	120 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					

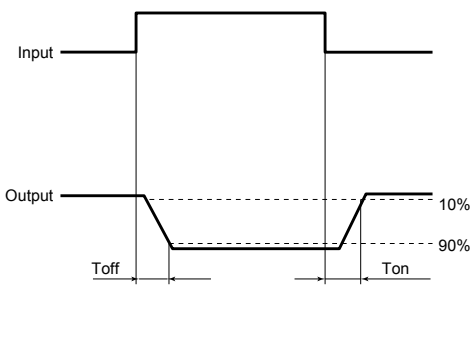
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

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		
		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		
		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	
		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

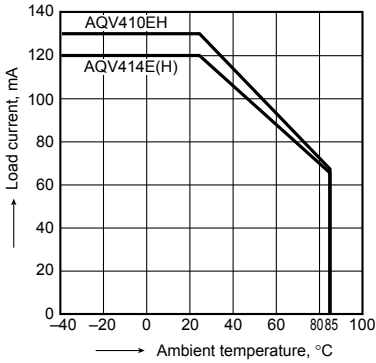


REFERENCE DATA

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

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

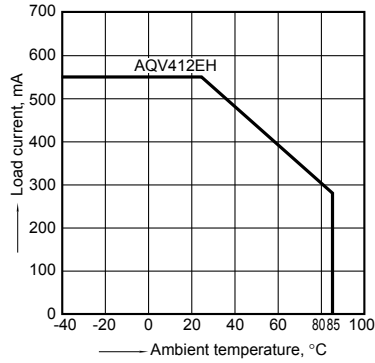
Type of connection: A



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

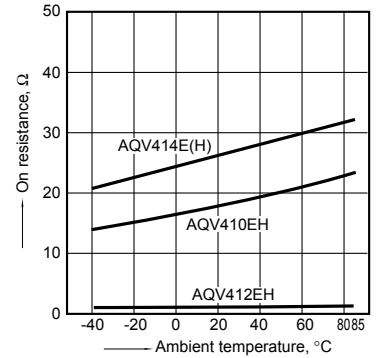
Allowable ambient temperature: -40°C to $+85^{\circ}\text{C}$
 -40°F to $+185^{\circ}\text{F}$

Type of connection: A



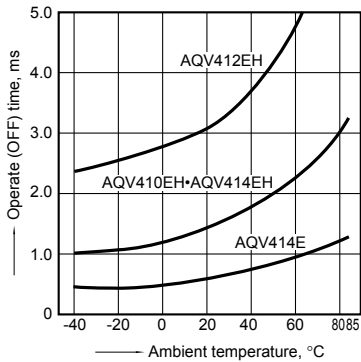
2. On resistance vs. ambient temperature characteristics

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



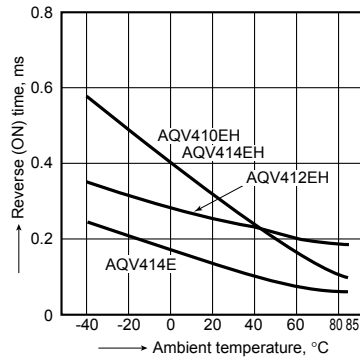
3. Operate (OFF) time vs. ambient temperature characteristics

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



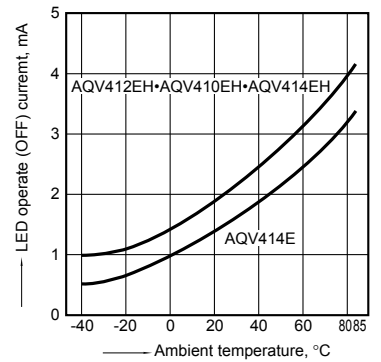
4. Reverse (ON) time vs. ambient temperature characteristics

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



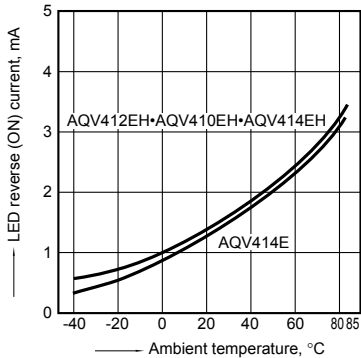
5. LED operate (OFF) current vs. ambient temperature characteristics

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



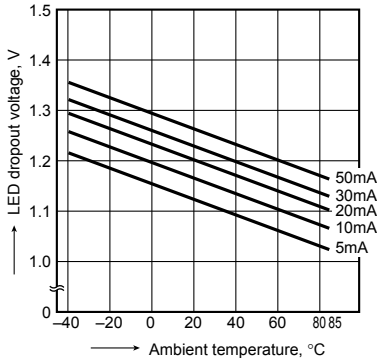
6. LED reverse (ON) current vs. ambient temperature characteristics

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



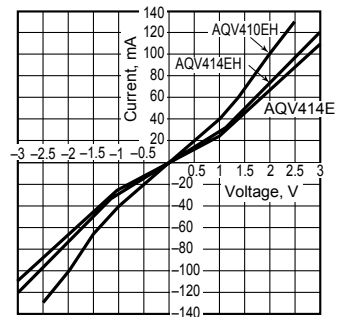
7. LED dropout voltage vs. ambient temperature characteristics

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



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

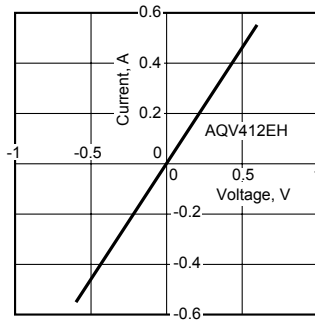
Measured portion: between terminals 4 and 6;
 Ambient temperature: 25°C 77°F



GU-E PhotoMOS (AQV414E, AQV410EH)

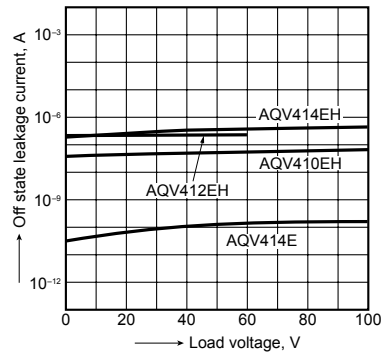
8-(2). Current vs. voltage characteristics of output at MOS portion

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



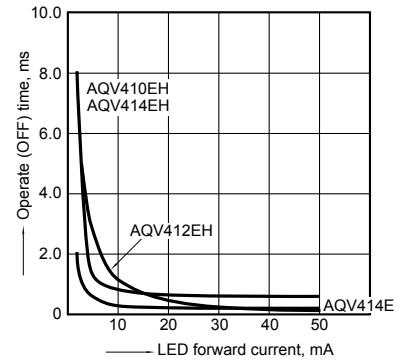
9. Off state leakage current vs. load voltage characteristics

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



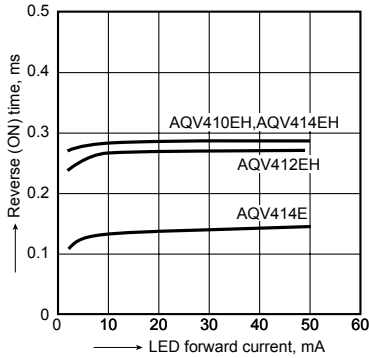
10. Operate (OFF) time vs. LED forward current characteristics

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

