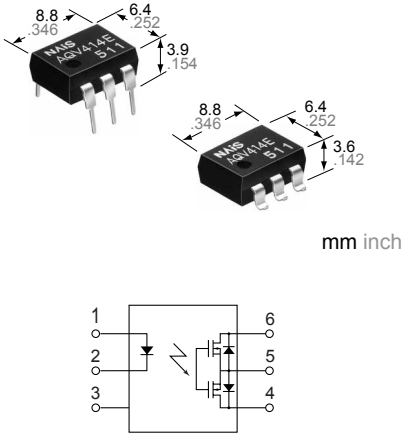




General use and economy type.
DIP (1 Form B) 6-pin type.
Reinforced insulation
5,000V type.

GU-E PhotoMOS
(AQV414E,
AQV410EH)



FEATURES

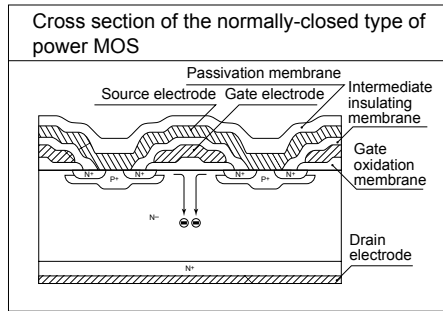
1. 60V type couples high capacity (0.55A) with low on-resistance (1Ω).

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

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).

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				
		Load voltage	Load current	Tube packing style		Tape and reel packing style		Tube	Tape and reel
		Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side						
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.
	5,000 V AC (Reinforced)	60 V	550 mA	AQV412EH	AQV412EHA	AQV412EHAX	AQV412EHAZ		
		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				f = 100 Hz, Duty factor = 0.1%	
	LED reverse voltage	V _R		5 V					
	Peak forwrd current	I _{FP}		1 A					
	Power dissipation	P _{in}		75 mW					
Output	Load voltage (peak AC)	V _L		400 V	60 V	350 V	400 V	A connection: Peak AC, DC B,C connection: DC	
	Continuous load current	I _L		A	0.12 A	0.55 A	0.13 A		0.12 A
				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 _{sta}		−40°C to +100°C −40°F to +212°F					

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

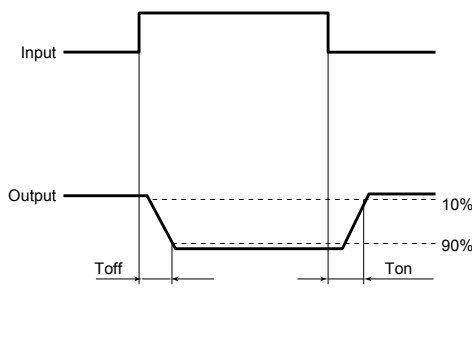
Item				Symbol	Type of connection	AQV414E(A)	AQV412EH(A)	AQV410EH(A)	AQV414EH(A)	Condition
Input	LED operate (OFF) current		Typical	I _{Foff}	—	1.45 mA	1.9 mA	1.9 mA	1.9 mA	I _L = Max.
			Maximum			3.0 mA				
	LED reverse (ON) current		Minimum	I _{Fon}	—	0.3 mA	0.4 mA	0.4 mA	0.4 mA	I _L = Max.
			Typical			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 mA)				I _F = 50 mA
			Maximum			1.5 V				
Output	On resistance		Typical	R _{On}	A	26 Ω	1 Ω	18 Ω	25.2 Ω	I _F = 0 mA I _L = 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 mA I _L = 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 mA I _L = 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 mA V _L = Max.
	Transfer characteristics	Switching speed	Operate (OFF) time*	Typical	T _{off}	—	0.7 ms	3 ms	1.5 ms	1.3 ms
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 mA → 0 mA I _L = 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 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

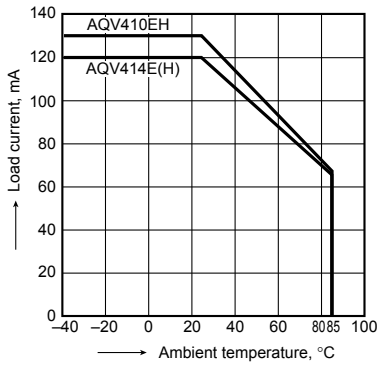


REFERENCE DATA

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

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

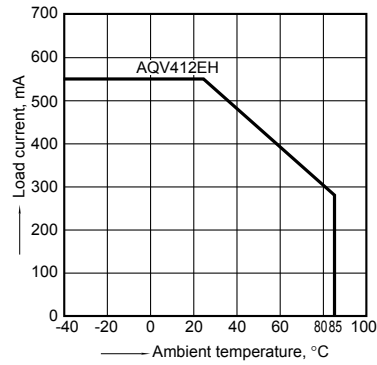
Type of connection: A



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

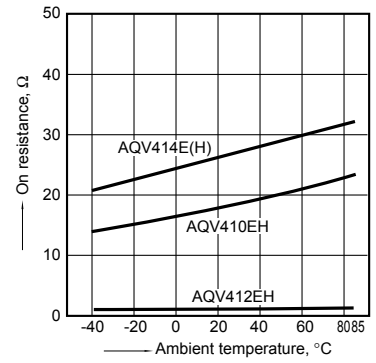
Allowable ambient temperature: -40°C to $+85^{\circ}\text{C}$
 -40°F to $+185^{\circ}\text{F}$

Type of connection: A



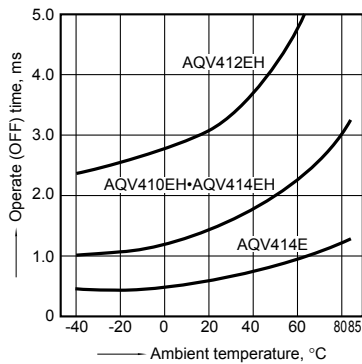
2. On resistance vs. ambient temperature characteristics

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



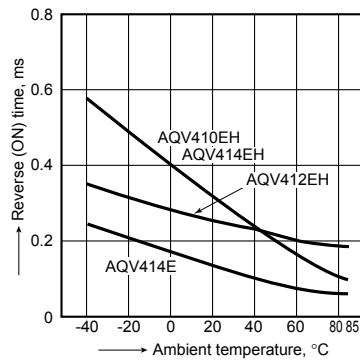
3. Operate (OFF) time vs. ambient temperature characteristics

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



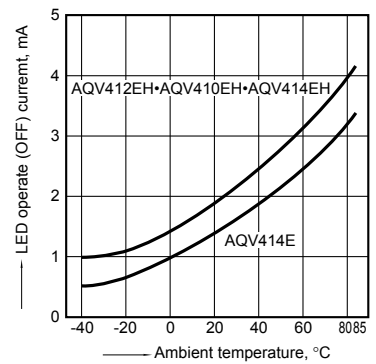
4. Reverse (ON) time vs. ambient temperature characteristics

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



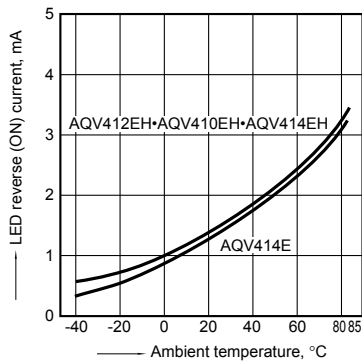
5. LED operate (OFF) current vs. ambient temperature characteristics

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



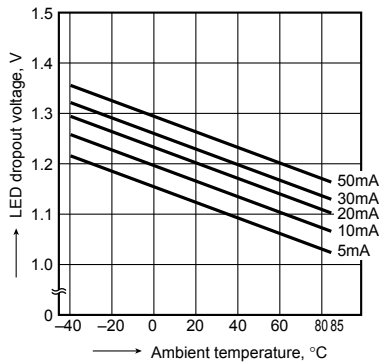
6. LED reverse (ON) current vs. ambient temperature characteristics

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



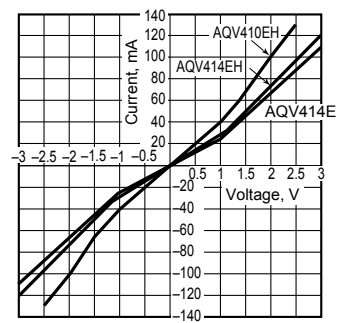
7. LED dropout voltage vs. ambient temperature characteristics

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



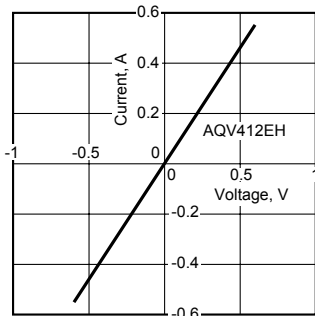
8-(1). Current vs. voltage characteristics of output at MOS portion

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

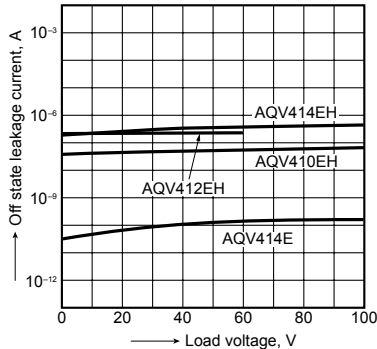


GU-E PhotoMOS (AQV414E, AQV410EH)

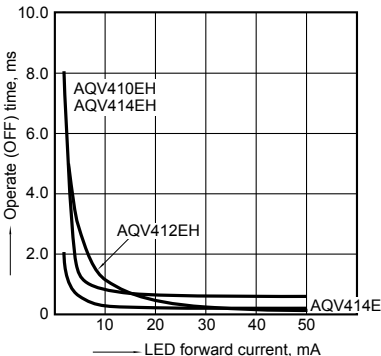
8-(2). Current vs. voltage characteristics of output at MOS portion
Measured portion: between terminals 4 and 6;
Ambient temperature: 25°C 77°F



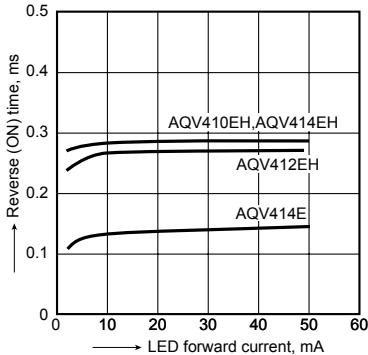
9. Off state leakage current vs. load voltage characteristics
Sample: All types;
Measured portion: between terminals 4 and 6;
LED current: 5 mA; Ambient temperature: 25°C 77°F



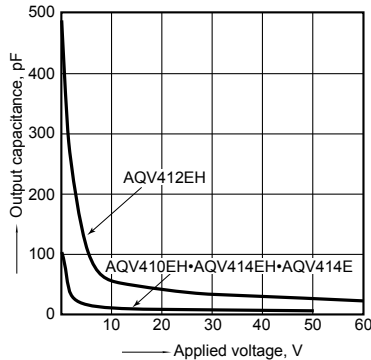
10. Operate (OFF) time vs. LED forward current characteristics
Measured portion: between terminals 4 and 6;
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



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



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