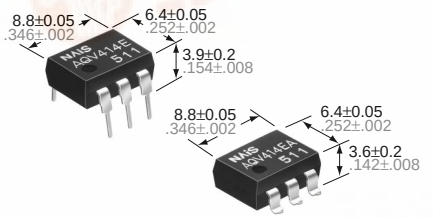
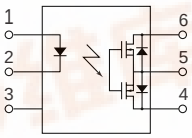
(Standard type) (Reinforced type)

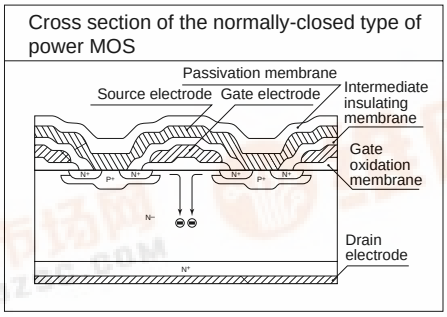
NAiS

GU (General Use)-E Type [1-Channel (Form B) Type]

PhotoMOS RELAYS







FEATURES

1. Low on resistance for normally-closed type
This has been realized thanks to the built-in MOSFET processed by our proprietary method, DSD (Double-diffused and Selective Doping) method.

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

3. 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.

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

5. 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

- Security equipment
- Telepone equipment (Dial pulse)
- Measuring equipment

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)	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 package type indicator "X" and "Z" are omitted from the seal.

RATING

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

Item		Symbol	Type of connection	AQV414E(A)	AQV410EH(A)	AQV414EH(A)	Remarks
Input	LED forward current	I_F		50 mA			
	LED reverse voltage	V_R		3 V			
	Peak forwrd 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		400 V	350 V	400 V	
	Continuous load current	I_L	A	0.12 A	0.13 A	0.12 A	A connection: Peak AC, DC B,C connection: DC
			B	0.13 A	0.15 A	0.13 A	
			C	0.15 A	0.17 A	0.15 A	
	Peak load current	I_{peak}		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	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			

AQV414E, AQV41❍EH

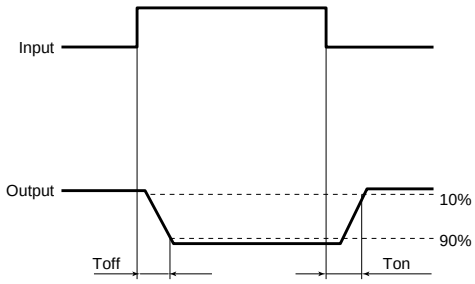
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item				Symbol	Type of connection	AQV414E(A)	AQV410EH(A)	AQV414EH(A)	Condition
Input	LED operate (OFF) current		Typical	I_{Foff}	—	1.45 mA	1.9 mA	1.75 mA	I_L= Max.
			Maximum			3.0 mA			
	LED reverse (ON) current		Minimum	I_{Fon}	—	0.3 mA	0.4 mA	0.3 mA	I_L= Max.
			Typical			1.40 mA	1.8 mA	1.70 mA	
	LED dropout voltage		Typical	V_F	—	1.14 V (1.25 V at I_F= 50 mA)			I_F= 5 mA
			Maximum			1.5 V			
Output	On resistance		Typical	R_{on}	A	26 Ω	18 Ω	25.2 Ω	I_F = 0 mA I_L= Max. Within 1 s on time
			Maximum			50 Ω	35 Ω	50 Ω	
			Typical	R_{on}	B	20 Ω	13 Ω	19 Ω	I_F= 0 mA I_L= Max. Within 1 s on time
			Maximum			25 Ω	17.5 Ω	25 Ω	
			Typical	R_{on}	C	10 Ω	6.5 Ω	10 Ω	I_F= 0 mA I_L= Max. Within 1 s on time
			Maximum			12.5 Ω	8.8 Ω	12.5 Ω	
	Off state leakage current		Maximum	I_{Leak}	—	1 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	1.5 ms	1.3 ms	I_F = 0 mA → 5 mA I_L = Max.
			Maximum			2.0 ms	3.0 ms	3.0 ms	
		Reverse (ON) time*	Typical	T_{on}	—	0.1 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	
	I/O capacitance		Typical	C_{iso}	—	0.8 pF	0.8 pF	0.8 pF	f = 1 MHz V_B = 0
			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 mA
Reinforced type I_F = 5 to 10 mA

For type of connection, see Page 32.

*Operate/Reverse time



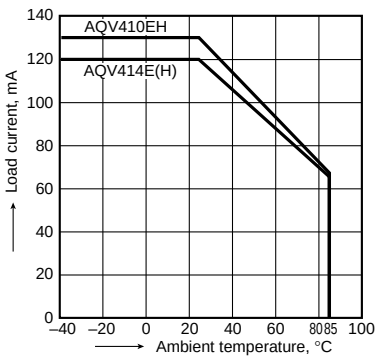
■ **For Dimensions, see Page 27.**
■ **For Schematic and Wiring Diagrams, see Page 32.**
■ **For Cautions for Use, see Page 36.**

REFERENCE DATA

1. Load current vs. ambient temperature characteristics

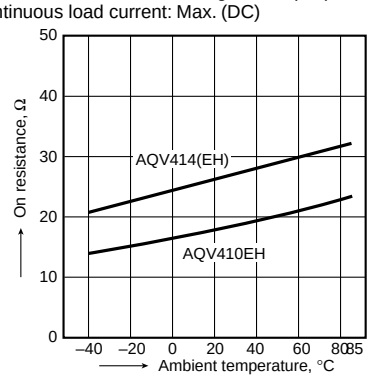
Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F

Type of connection: A



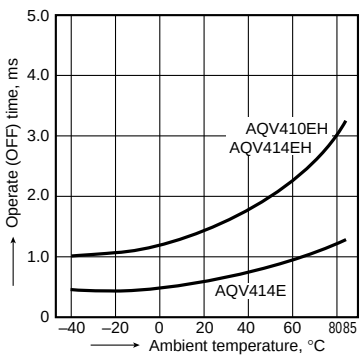
2. On resistance vs. ambient temperature characteristics

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



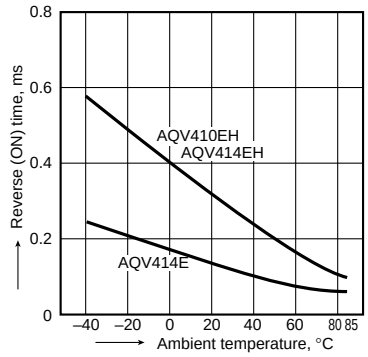
3. Operate (OFF) time vs. ambient temperature characteristics

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



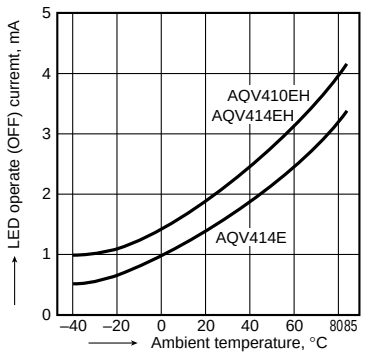
4. Reverse (ON) time vs. ambient temperature characteristics

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



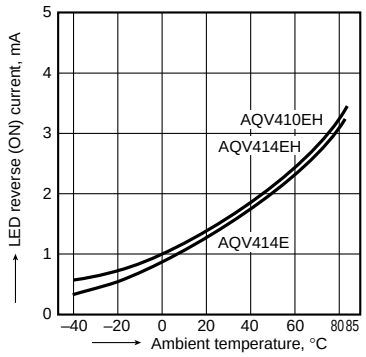
5. LED operate (OFF) current vs. ambient temperature characteristics

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



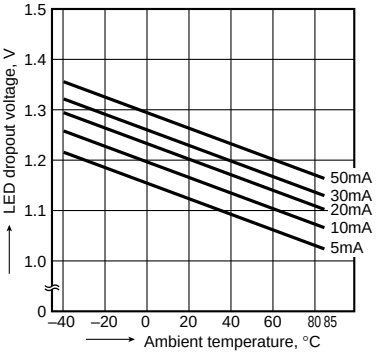
6. LED reverse (ON) current vs. ambient temperature characteristics

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



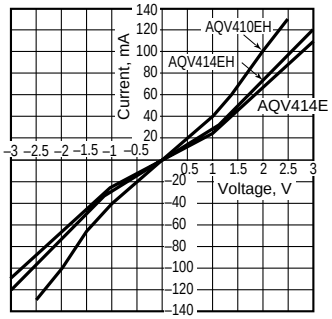
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



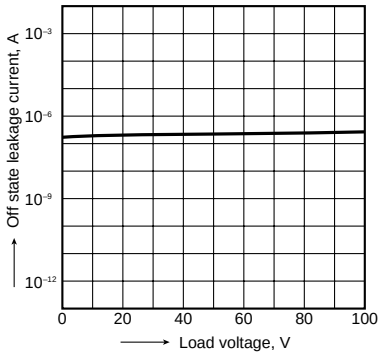
8. Voltage vs. current characteristics of output at MOS portion

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



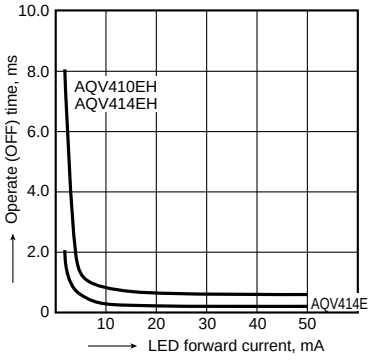
9. Off state leakage current

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



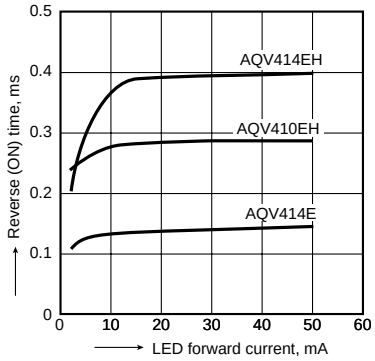
10. LED forward current vs. operate (OFF) time characteristics

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



11. LED forward current vs. reverse (ON) time characteristics

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



12. Applied voltage vs. output capacitance characteristics

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