

NAIS

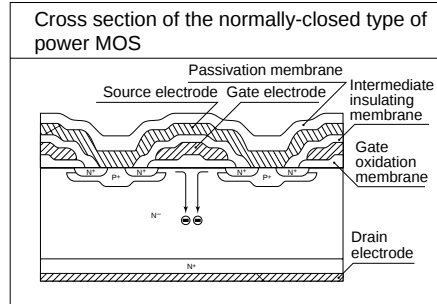
HE (High-function Economy) Type 1- Channel (Form B) Type

PhotoMOS RELAYS

FEATURES

1. Form B (Normally-closed) type

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 0.15 A load current with a 5 mA input current. Low ON resistance of 16 Ω (AQV454). Stable operation because there are no metallic contact parts.

4. Controls various types of load such as relays, motors, lamps and solenoids.

5. 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.

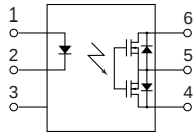
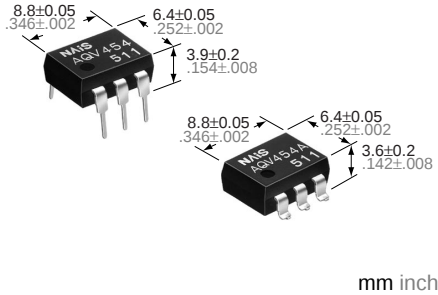
6. Low thermal electromotive force (Approx. 1 μ V) (Basic insulation)

7. Reinforced insulation 5,000 V type also available.

More than 0.4 mm .016 inch internal insulation distance between inputs and outputs. Conforms to IEC950 (reinforced insulation).

TYPICAL APPLICATIONS

- Security equipment
- High-speed inspection machines
- Measuring instruments
- Telephone equipment
- Sensors



TYPES

Type	I/O isolation	Output rating*		Part No.				Packing quantity	
		Load voltage	Load current	Through hole terminal	Surface-mount terminal				
				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	1,500 V AC	250 V	200 mA	AQV453	AQV453A	AQV453AX	AQV453AZ	1 tube contains 50 pcs. 1 batch contains 500 pcs.	1,000 pcs.
	Reinforced 5,000 V AC	400 V	150 mA	AQV454	AQV454A	AQV454AX	AQV454AZ		
				AQV454H	AQV454HA	AQV454HAX	AQV454HAZ		

* 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	AQV453(A)	AQV454(A)	AQV454H(A)	Remarks
Input	LED forward current	I _F		50 mA			f = 100 Hz, Duty factor = 0.1%
	LED reverse voltage	V _R		3 V			
	Peak forward current	I _{FP}		1 A			
	Power dissipation	P _{in}		75 mW			
Output	Load voltage (peak AC)	V _L		250 V	400 V		A connection: Peak AC, DC B,C connection: DC
	Continuous load current	I _L		A	0.2 A		
				B	0.3 A		
		C	0.4 A				
	Peak load current	I _{PEAK}		0.6 A	0.5 A		A connection: 100 ms (1 shot), V _L = DC
	Power dissipation	P _{OUT}		360 mW			
Total power dissipation		P _T	410 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	AQV453(A)	AQV454(A)	AQV454H(A)	Remarks
Input	LED operate (OFF) current		Typical	I _{Foff}	—	1 mA	0.9 mA	1.4 mA	I _L = Max.
			Maximum			3 mA			
	LED reverse (ON) current		Minimum	I _{Fon}	—	0.4 mA			I _L = Max.
			Typical			0.9 mA	0.8 mA	1.3 mA	
	LED dropout voltage		Typical	V _F	—	1.14 V (1.25V at I _F =50 mA)			I _F = 5 mA
			Maximum			1.5 V			
Output	On resistance		Typical	R _{on}	A	5.5 Ω	10.5 Ω	10.5 Ω	I _F = 0 mA I _L = Max. Within 1 s on time
			Maximum			8 Ω	16 Ω	16 Ω	
			Typical	R _{on}	B	2.7 Ω	6.3 Ω	6.3 Ω	I _F = 0 mA I _L = Max. Within 1 s on time
			Maximum			4 Ω	8 Ω	8 Ω	
			Typical	R _{on}	C	1.4 Ω	3.1 Ω	3.1 Ω	I _F = 0 mA I _L = Max. Within 1 s on time
			Maximum			2 Ω	4 Ω	4 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}	—	1.52 ms	1.2 ms	1.8 ms
Maximum				3 ms			2.0 ms	3.0 ms	
Reverse (ON) time*			Typical	T _{on}	—	0.4 ms	0.36 ms	0.4 ms	I _F = 5 mA → 0 mA I _L = Max.
			Maximum			1 ms	1.0 ms	1.0 ms	
I/O capacitance		Typical	C _{iso}	—	1.3 pF			f = 1 MHz V _B = 0	
		Maximum			3 pF				
Initial I/O isolation resistance			Minimum	R _{iso}	—	1,000 MΩ			500 V DC

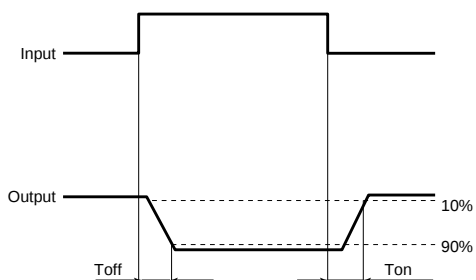
Note: Recommendable LED forward current.

Standard type: $I_F = 5 \text{ mA}$

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

*Operate/Reverse time

For type of connection, see Page 32.



■ For Dimensions, see Page 27.

■ For Schematic and Wiring Diagrams, see Page 32.

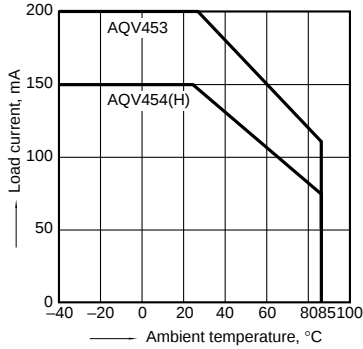
■ For Cautions for Use, see Page 36.

REFERENCE DATA

1. Load current vs. ambient temperature characteristics

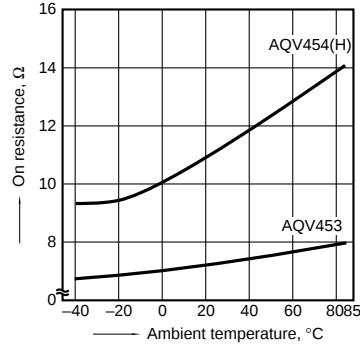
Allowable ambient temperature: -40°C to $+85^{\circ}\text{C}$
 -40°F to $+185^{\circ}\text{F}$

Type of connection: A



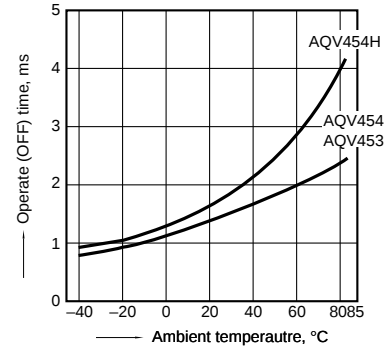
2. On resistance vs. ambient temperature characteristics

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



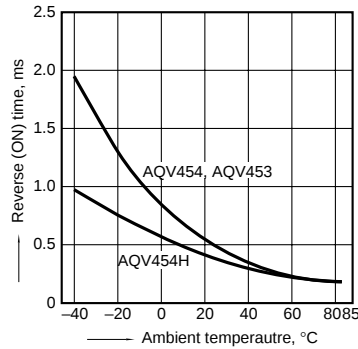
3. Operate (OFF) time vs. ambient temperature characteristics

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



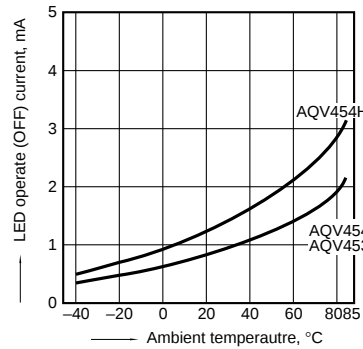
4. Reverse (ON) time vs. ambient temperature characteristics

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



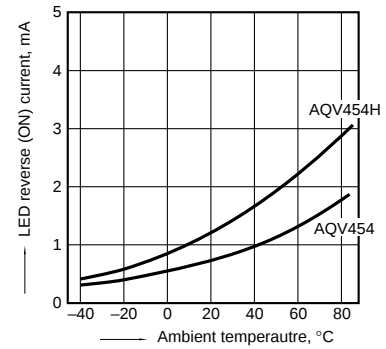
5. LED operate (OFF) current vs. ambient temperature characteristics

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



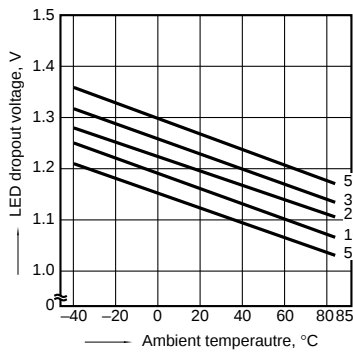
6. LED reverse (ON) current vs. ambient temperature characteristics

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



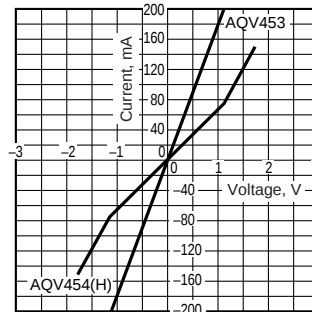
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



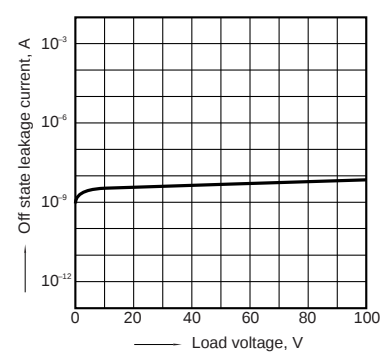
8. Voltage vs. current characteristics of output at MOS portion

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



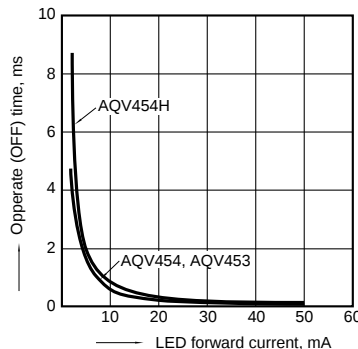
9. Off state leakage current

Sample: AQV454;
 Measured portion: between terminals 4 and 6;
 Ambient temperature: 25°C 77°F



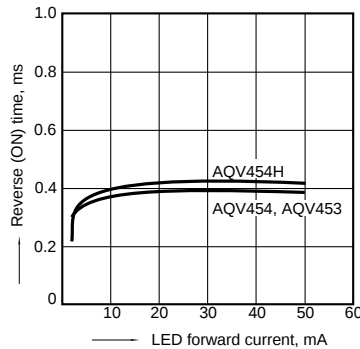
10. LED forward current vs. operate (OFF) time characteristics

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

