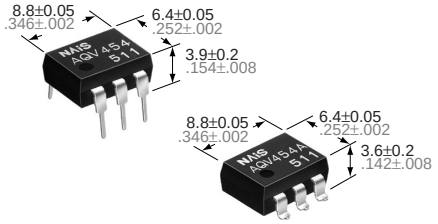
(Standard type) (Standard type)

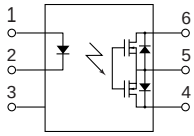
NAiS

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

PhotoMOS RELAYS



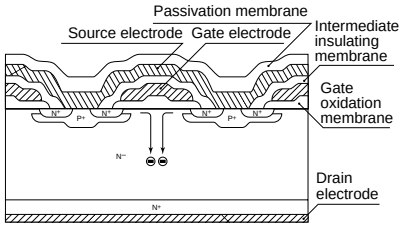
mm inch



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.

Cross section of the normally-closed type of power MOS



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 μV) (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.
		400 V	150 mA	AQV454	AQV454A	AQV454AX	AQV454AZ		
	Reinforced 5,000 V AC			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			
	LED reverse voltage	V_R		3 V			
	Peak forward 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		250 V	400 V		
	Continuous load current	I_L	A	0.2 A	0.15 A		A connection: Peak AC, DC B,C connection: DC
			B	0.3 A	0.18 A		
			C	0.4 A	0.25 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_{stg}		–40°C to +100°C –40°F to +212°F			

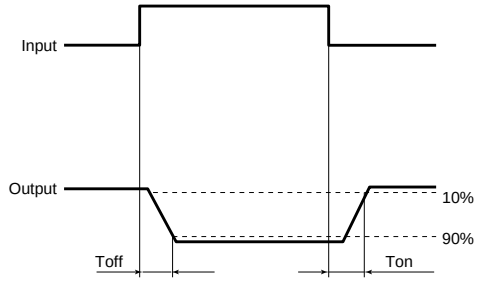
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item				Symbol	Type of connection	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	I_F = 0 mA → 5 mA I_L = Max.
			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 mA
Reinforced type: I_F= 5 to 10 mA

For type of connection, see Page 32.

*Operate/Reverse time



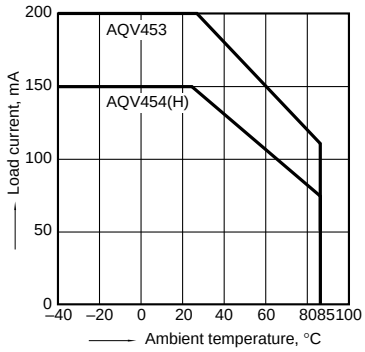
■ **For Dimensions, see Page 27.**
■ **For Schematic and Wiring Diagrams, see Page 32.**
■ **For Cautions for Use, see Page 36.**

REFERENCE DATA

1. Load current vs. ambient temperature characteristics

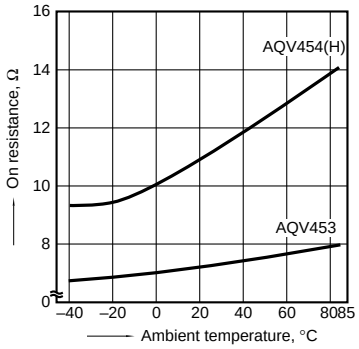
Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F

Type of connection: A



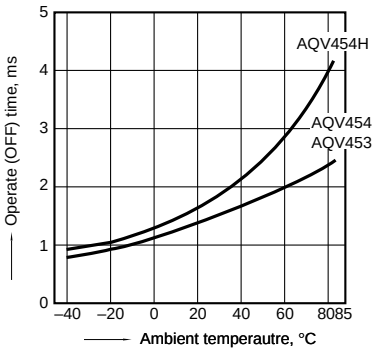
2. On resistance vs. ambient temperature characteristics

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



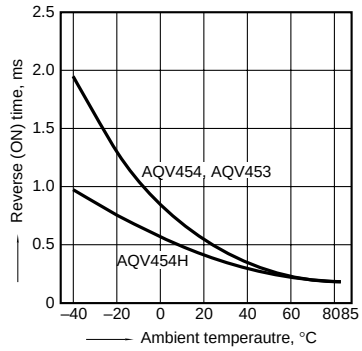
3. Operate (OFF) time vs. ambient temperature characteristics

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



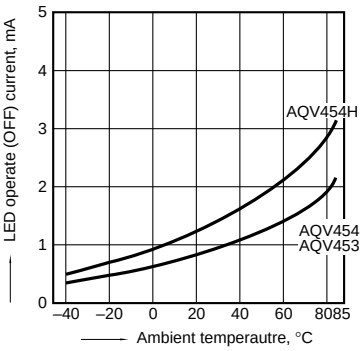
4. Reverse (ON) time vs. ambient temperature characteristics

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



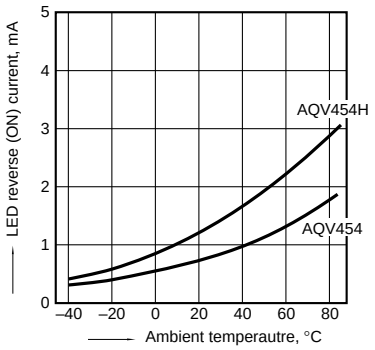
5. LED operate (OFF) current vs. ambient temperature characteristics

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



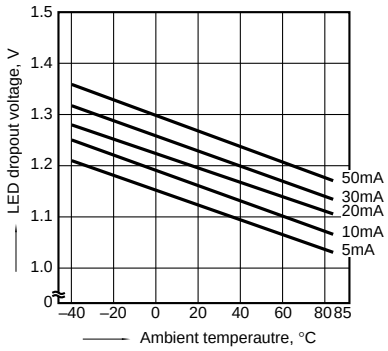
6. LED reverse (ON) current vs. ambient temperature characteristics

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



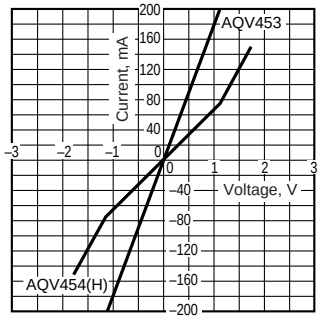
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



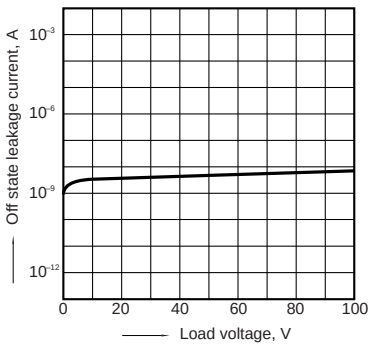
8. Voltage vs. current characteristics of output at MOS portion

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



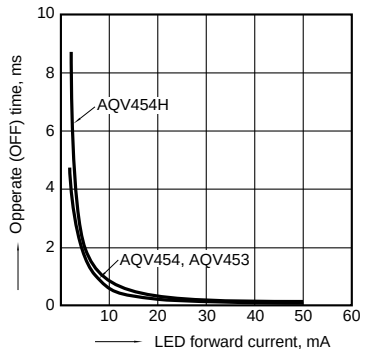
9. Off state leakage current

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



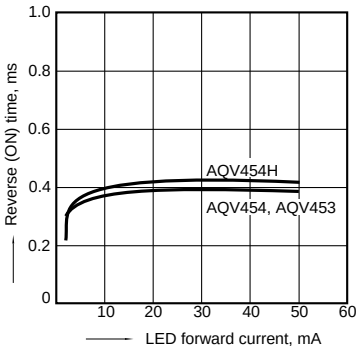
10. LED forward current vs. operate (OFF) time characteristics

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



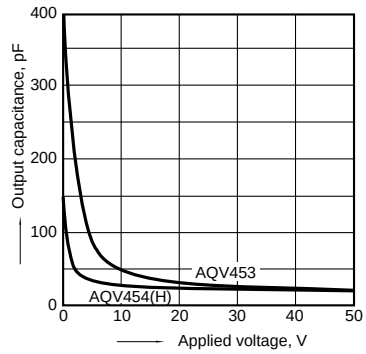
11. LED forward current vs. reverse (ON) time characteristics

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



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