

NAIS

HS (High Sensitivity) Type [1-Channel (Form A) Type]

PhotoMOS RELAYS

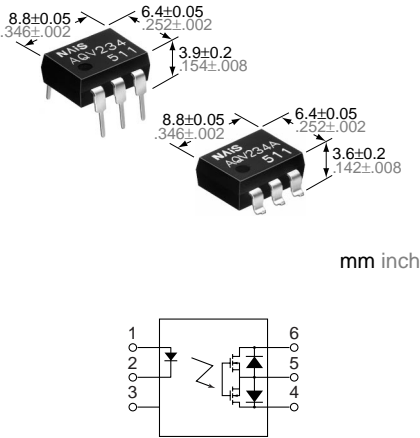
FEATURES

- High sensitivity type**
LED operate current: typical 0.31 mA
- Low-level off state leakage current (Typical 1 μ A at 400 V load voltage)**
- Eliminates the need for a power supply to drive the power MOSFET**
- Low thermal electromotive force (Approx. 1 μ V)**
- Extremely low closed-circuit offset voltages to enable control of small analog signals without distortion**
- Eliminates the need for a counter electromotive force protection diode in the drive circuits on the input side**

- Stable on resistance to help simplify circuit design**
- Surface-mount model available**

TYPICAL APPLICATIONS

- High-speed inspection machines**
 - Scanner
 - IC checker
 - Board tester
- Telephone and data communication equipment**



TYPES

Type	Output rating*		Part No.				Packing quantity	
			Through hole terminal	Surface-mount terminal		Tube	Tape and reel	
	Load voltage	Load current		Tube packing style				Tape and reel packing style
					Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side		
AC/DC type	400 V	120 mA	AQV234	AQV234A	AQV234AX	AQV234AZ	1 tube contains 50 pcs. 1 batch contains 500 pcs.	1,000 pcs.

*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	AQV234(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		400 V		
	Continuous load current	I_L		A	0.12 A	A connection: Peak AC, DC B, C connection: DC
				B	0.13 A	
				C	0.15 A	
	Peak load current	I_{peak}			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		
Temperature limits	Operating	T_{opr}		-40°C to +85°C -40°F to +185°F	Non-condensing at low temperature	
	Storage	T_{stg}		-40°C to +100°C -40°F to +212°F		

AQV234

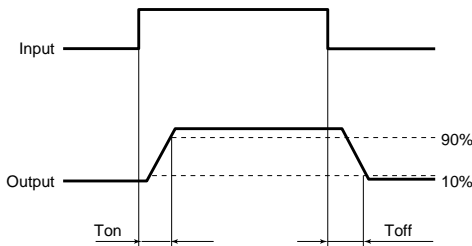
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item			Symbol	Type of connection	AQV234(A)	Remarks	
Input	LED operate current	Typical	I_{Fon}	—	0.31 mA	$\Delta I_F/\Delta t \geq \text{Min. } 100 \mu\text{A/s}$ $I_L = 120 \text{ mA}$	
		Maximum			0.5 mA		
	LED turn off current	Minimum	I_{Foff}	—	0.1 mA	$\Delta I_F/\Delta t \geq \text{Min. } 100 \mu\text{A/s}$ $I_L = 120 \text{ mA}$	
		Typical			0.29 mA		
	LED dropout voltage	Typical	V_F	—	1.1 V (1.25 V at $I_F = 50 \text{ mA}$)	$I_F = 2 \text{ mA}$	
		Maximum			1.5 V		
Output	On resistance	Typical	R_{on}	A	30 Ω	$I_F = 2 \text{ mA}$ $I_L = 120 \text{ mA}$ Within 1 s on time	
		Maximum			50 Ω		
		Typical	R_{on}	B	22.5 Ω	$I_F = 2 \text{ mA}$ $I_L = 120 \text{ mA}$ Within 1 s on time	
		Maximum			25 Ω		
		Typical	R_{on}	C	11.3 Ω	$I_F = 2 \text{ mA}$ $I_L = 120 \text{ mA}$ Within 1 s on time	
		Maximum			12.5 Ω		
	Off state leakage current		Maximum	—	—	1 μA	$I_F = 0$ $V_L = 400 \text{ V}$
	Transistor characteristics	Switching speed	Turn on time*	Typical	T_{on}	—	0.89 ms
Maximum				2 ms			
Turn off time*			Typical	T_{off}	—	0.22 ms	$I_F = 2 \text{ mA}$ $I_L = 120 \text{ mA}$
			Maximum			1 ms	
I/O capacitance		Typical	C_{iso}	—	0.8 pF	$f = 1 \text{ MHz}$ $V_B = 0$	
		Maximum			1.5 pF		
Initial I/O isolation resistance		Minimum	R_{iso}	—	1,000 M Ω	500 V DC	

Note: Recommendable LED forward current $I_F = 2 \text{ mA}$.

For type of connection, see Page 31.

*Turn on/Turn off time



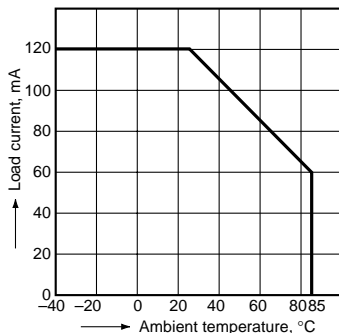
- For Dimensions, see Page 27.
- For Schematic and Wiring Diagrams, see Page 31.
- For Cautions for Use, see Page 36.

REFERENCE DATA

1. Load current vs. ambient temperature characteristics

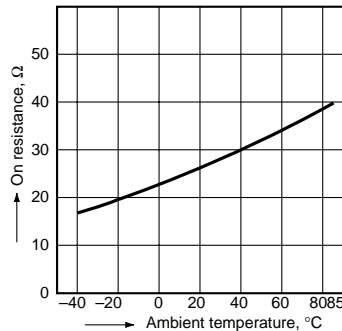
Allowable ambient temperature: -40°C to $+85^\circ\text{C}$
 -40°F to $+185^\circ\text{F}$

Type of connection: A



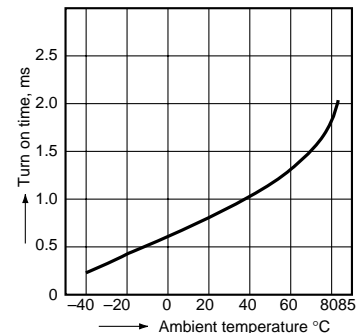
2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;
LED current: 2 mA; Load voltage: 400 V (DC);
Continuous load current: 120 mA (DC)



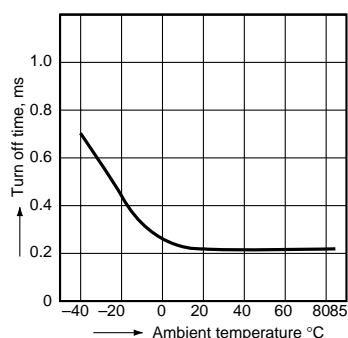
3. Turn on time vs. ambient temperature characteristics

LED current: 2 mA;
Load voltage: 400 V (DC);
Continuous load current: 120 mA (DC)



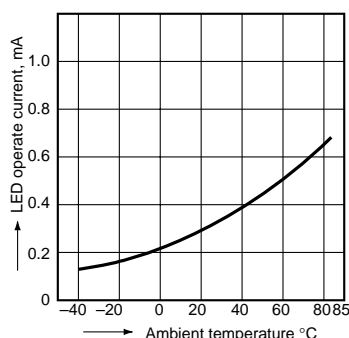
4. Turn off time vs. ambient temperature characteristics

LED current: 2 mA; Load voltage: 400 V (DC);
Continuous load current: 120 mA (DC)



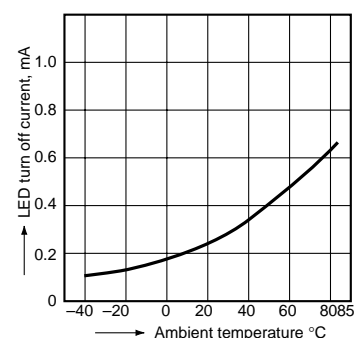
5. LED operate current vs. ambient temperature characteristics

Load voltage: 400 V (DC);
Continuous load current: 120 mA (DC)



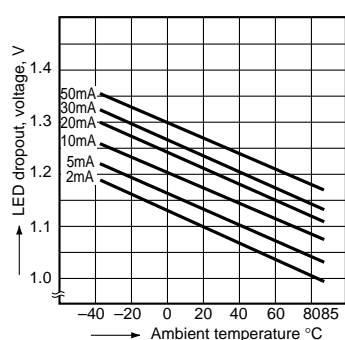
6. LED turn off current vs. ambient temperature characteristics

Load voltage: 400 V (DC);
Continuous load current: 120 mA (DC)



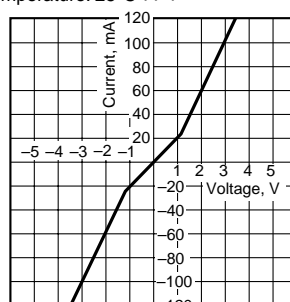
7. LED dropout voltage vs. ambient temperature characteristics

LED current: 2 to 50 mA



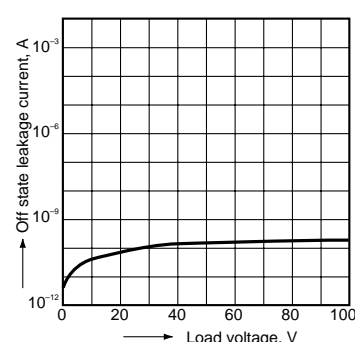
8. Voltage vs. current characteristics of output at MOS portion

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



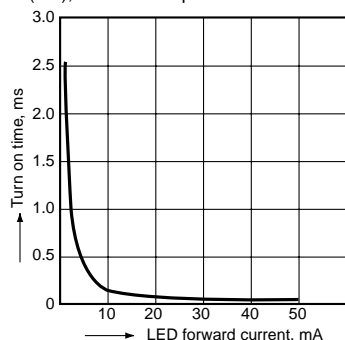
9. Off state leakage current

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



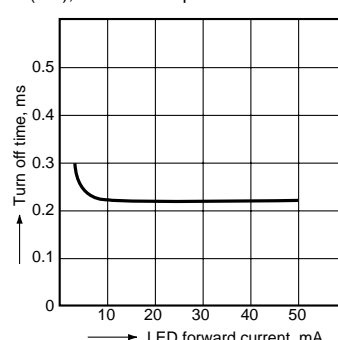
10. LED forward current vs. turn on time characteristics

Measured portion: between terminals 4 and 6;
Load voltage: 400 V (DC); Continuous load current:
120 mA (DC); Ambient temperature: 25°C 77°F



11. LED forward current vs. turn off time characteristics

Measured portion: between terminals 4 and 6;
Load voltage: 400 V (DC); Continuous load current:
120 mA (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

