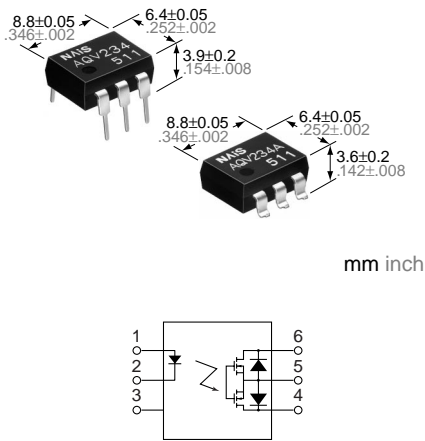


# NAIS

## 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  $\mu$ A at 400 V load voltage)**
- Eliminates the need for a power supply to drive the power MOSFET**
- Low thermal electromotive force (Approx. 1  $\mu$ 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		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

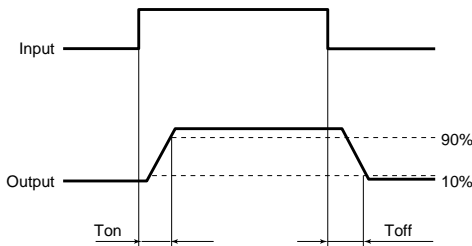
## 2. Electrical characteristics (Ambient temperature: 25°C 77°F)

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 $\Omega$	$I_F = 2 \text{ mA}$ $I_L = 120 \text{ mA}$ Within 1 s on time
		Maximum			50 $\Omega$	
		Typical	$R_{on}$	B	22.5 $\Omega$	$I_F = 2 \text{ mA}$ $I_L = 120 \text{ mA}$ Within 1 s on time
		Maximum			25 $\Omega$	
		Typical	$R_{on}$	C	11.3 $\Omega$	$I_F = 2 \text{ mA}$ $I_L = 120 \text{ mA}$ Within 1 s on time
		Maximum			12.5 $\Omega$	
	Off state leakage current	Maximum	—	—	1 $\mu\text{A}$	$I_F = 0$ $V_L = 400 \text{ V}$
Transistor characteristics	Switching speed	Turn on time*	$T_{on}$	—	0.89 ms	$I_F = 2 \text{ mA}$ $I_L = 120 \text{ mA}$
					Maximum	
		Turn off time*	$T_{off}$	—	0.22 ms	$I_F = 2 \text{ mA}$ $I_L = 120 \text{ mA}$
					Maximum	
	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 $\Omega$	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



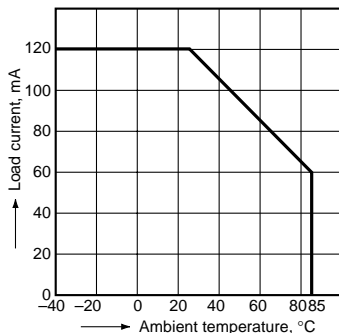
- For Dimensions, see Page 27.
- For Schematic and Wiring Diagrams, see Page 31.
- For Cautions for Use, see Page 36.

## REFERENCE DATA

### 1. Load current vs. ambient temperature characteristics

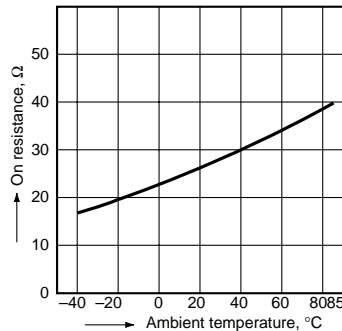
Allowable ambient temperature:  $-40^\circ\text{C}$  to  $+85^\circ\text{C}$   
 $-40^\circ\text{F}$  to  $+185^\circ\text{F}$

Type of connection: A



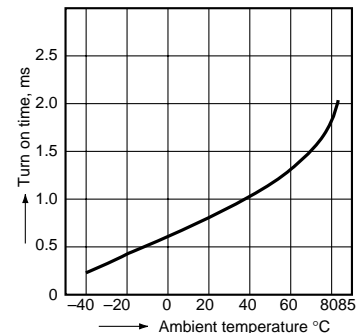
### 2. On resistance vs. ambient temperature characteristics

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



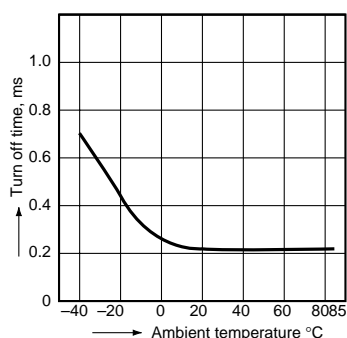
### 3. Turn on time vs. ambient temperature characteristics

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



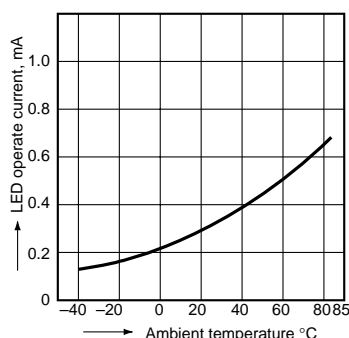
## 4. Turn off time vs. ambient temperature characteristics

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



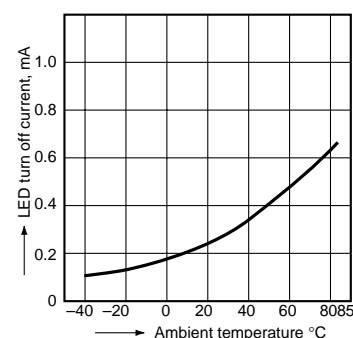
## 5. LED operate current vs. ambient temperature characteristics

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



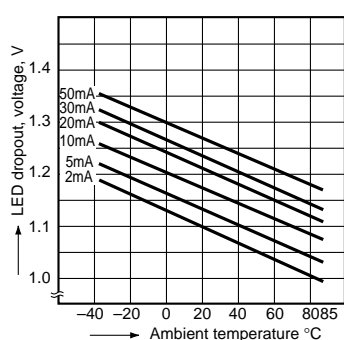
## 6. LED turn off current vs. ambient temperature characteristics

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



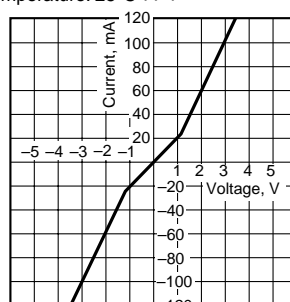
## 7. LED dropout voltage vs. ambient temperature characteristics

LED current: 2 to 50 mA



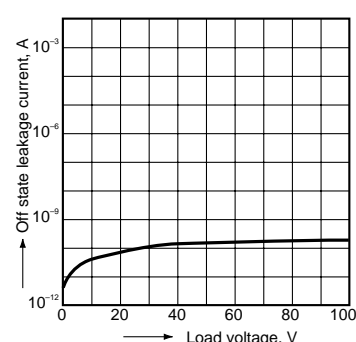
## 8. Voltage vs. current characteristics of output at MOS portion

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



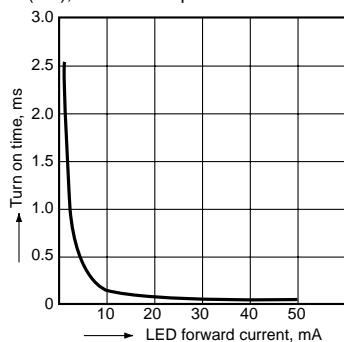
## 9. Off state leakage current

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



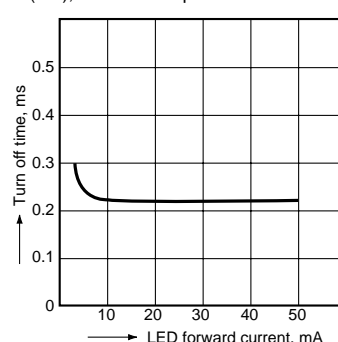
## 10. LED forward current vs. turn on time characteristics

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

