

# NAIS

**HE (High-function Economy)  
Type  
[1-Channel (Form A) Type]  
—Soft-ON/OFF Operation—**

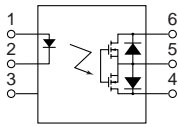
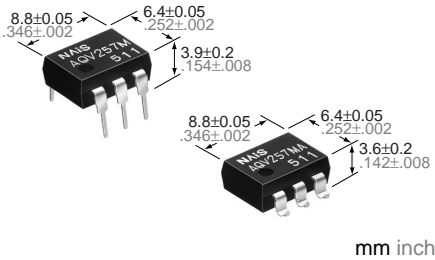
# PhotoMOS RELAYS

## FEATURES

- 1. Reducing switching-noise**  
Smooth switching realized by Soft-ON/OFF operation.
- 2. Reducing inrush current generated in the circuit by Soft-ON operating function**
- 3. Reducing counter electromotive force by Soft-OFF operating function**
- 4. Controls low-level analog signals**

## TYPICAL APPLICATIONS

- OCU (Official Channel Unit) line switching
- Need to eliminate inrush and counter electromotive force



## TYPES

	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			
AC/DC type	200 V	250 mA	AQV257M	AQV257MA	Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side	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	AQV257M(A)	Remarks	
Input	LED forward current	$I_F$		50 mA		
	LED reverse voltage	$V_R$		3 V		
	Peak forward current	$I_{FP}$		1 A	$f = 100 \text{ Hz}$ , Duty factor = 0.1%	
	Power dissipation	$P_{in}$		75 mW		
Output	Load voltage (peak AC)	$V_L$		200 V		
	Continuous load current	$I_L$		A	0.25 A	A connection: Peak AC, DC
				B	0.35 A	B, C connection: DC
				C	0.5 A	
	Peak load current	$I_{peak}$		0.75 A	A connection: 100 ms (1 shot), $V_L = \text{DC}$	
Power dissipation	$P_{out}$	360 mW				
Total power dissipation		$P_T$		410 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 temperatures	
	Storage	$T_{stg}$		-40°C to +100°C -40°F to +212°F		

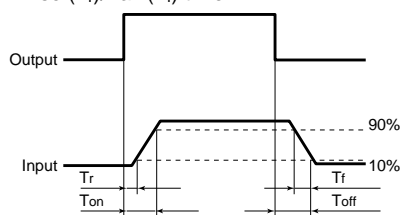
2. Electrical characteristics (Ambient temperature: 25°C 77°F )

Item			Symbol	Type of connection	AQV257M(A)	Condition		
Input	LED operate current	Typical	$I_{Fon}$	—	0.6 mA	$I_L = \text{Max.}$		
		Maximum			2.0 mA			
	LED turn off current	Minimum	$I_{Foff}$	—	0.2 mA	$I_L = \text{Max.}$		
		Typical			0.5 mA			
	LED dropout voltage	Typical	$V_F$	—	1.14 V (1.25 V at $I_F = 50 \text{ mA}$ )	$I_F = 5 \text{ mA}$		
		Maximum			1.5 V			
Output	On resistance	Typical	$R_{on}$	A	2.6 $\Omega$	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time		
		Maximum			4 $\Omega$			
		Typical	$R_{on}$	B	1.4 $\Omega$	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time		
		Maximum			2 $\Omega$			
		Typical	$R_{on}$	C	0.7 $\Omega$	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time		
		Maximum			1 $\Omega$			
	Off state leakage current	Maximum	$I_{Leak}$	—	1 $\mu\text{A}$	$I_F = 0$ $V_L = \text{Max.}$		
	Transfer characteristics	Switching speed	Turn on time*	Typical	$T_{on}$	—	5.1 ms	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ $V_L = \text{Max.}$
				Maximum			15.0 ms	
Rise time*			Minimum	$T_r$	—	1.0 ms	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ $V_L = \text{Max.}$	
			Typical			2.2 ms		
Turn off time*			Typical	$T_{off}$	—	3.2 ms	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ $V_L = \text{Max.}$	
			Maximum			10.0 ms		
Fall time*			Minimum	$T_f$	—	0.6 ms	$I_F = 5 \text{ mA}$ $I_L = \text{Max.}$ $V_L = \text{Max.}$	
			Typical			1.3 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 $\Omega$	500 V DC			

Note: Recommendable LED forward current  $I_F = 5 \text{ mA}$ .

For type of connection, see Page 31.

\* Turn on ( $T_{on}$ )/Turn off ( $T_{off}$ ) time  
Rise ( $T_r$ )/Fall ( $T_f$ ) time



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

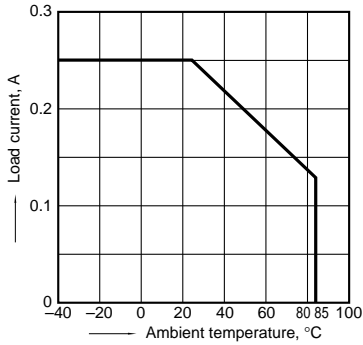
# AQV257M

## REFERENCE DATA

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

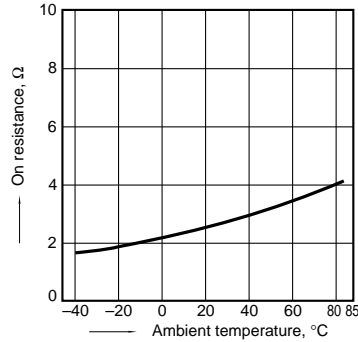
Allowable ambient temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 $-40^{\circ}\text{F}$  to  $+185^{\circ}\text{F}$ ;

Type of connection: A



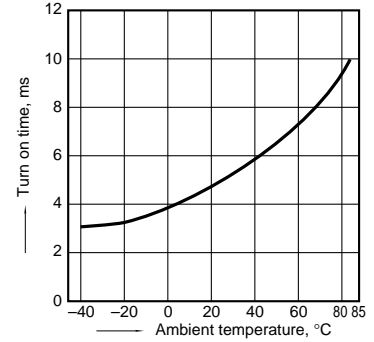
### 2. On resistance vs. ambient temperature characteristics

Sample: AQV257M; Measured portion: between terminals 4 and 6; LED current: 5 mA; Continuous load current: 250 mA (DC)



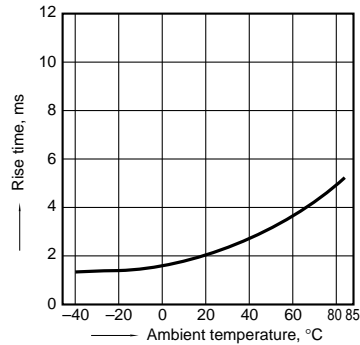
### 3. Turn on time vs. ambient temperature characteristics

Sample: AQV257M; LED current: 5 mA; Load voltage: 200 V (DC); Continuous load current: 250 mA (DC)



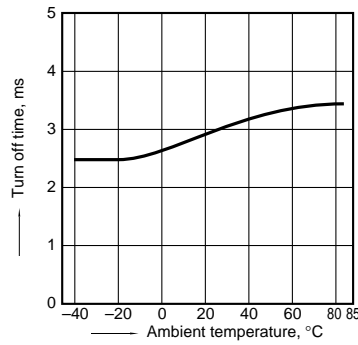
### 4. Rise time vs. ambient temperature characteristics

Sample: AQV257M; LED current: 5 mA; Load voltage: 200 V (DC); Continuous load current: 250 mA (DC)



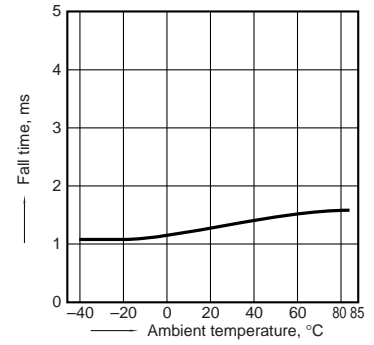
### 5. Turn off time vs. ambient temperature characteristics

Sample: AQV257M; LED current: 5 mA; Load voltage: 200 V (DC); Continuous load current: 250 mA (DC)



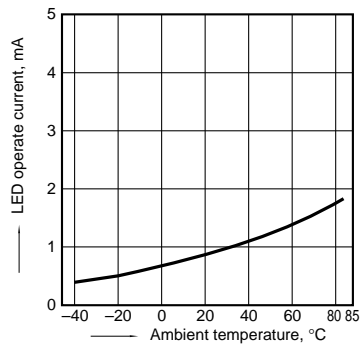
### 6. Fall time vs. ambient temperature characteristics

Sample: AQV257M; LED current: 5 mA; Load voltage: 200 V (DC); Continuous load current: 250 mA (DC)



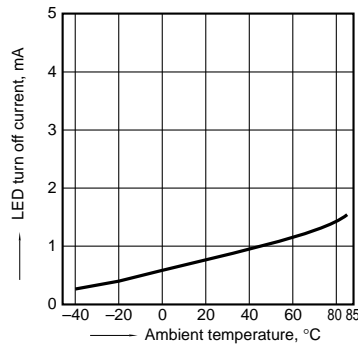
### 7. LED operate current vs. ambient temperature characteristics

Sample: AQV257M; Load voltage: 200 V (DC); Continuous load current: 250 mA (DC)



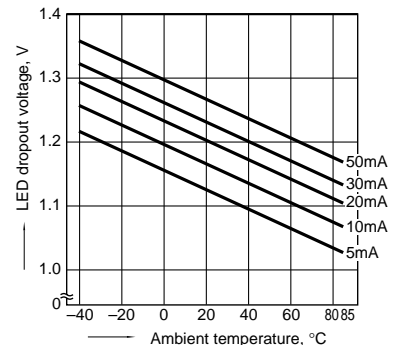
### 8. LED turn off current vs. ambient temperature characteristics

Sample: AQV257M; Load voltage: 200 V (DC); Continuous load current: 250 mA (DC)



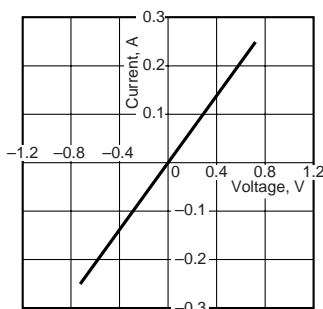
### 9. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



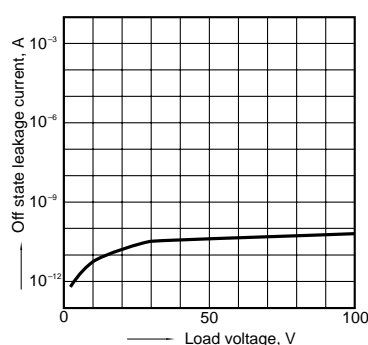
### 10. Voltage vs. current characteristics of output at MOS portion

Measured portion: between terminals 4 and 6; Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



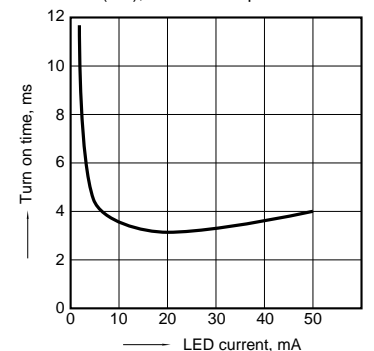
### 11. Off state leakage current

Sample: AQV257M; Measured portion: between terminals 4 and 6; Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



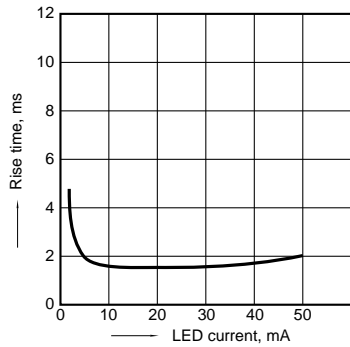
### 12. LED forward current vs. turn off time characteristics

Sample: AQV257M; Measured portion: between terminals 4 and 6; Load voltage: 200 V (DC); Continuous load current: 250 mA (DC); Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



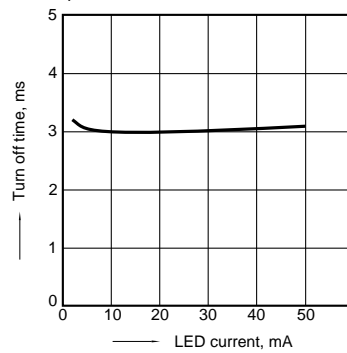
### 13. LED current vs. rise time characteristics

Sample: AQV257M;  
 Measured portion: between terminals 4 and 6;  
 Load voltage: 200 V (DC);  
 Continuous load current: 250 mA (DC);  
 Ambient temperature: 25°C 77°F



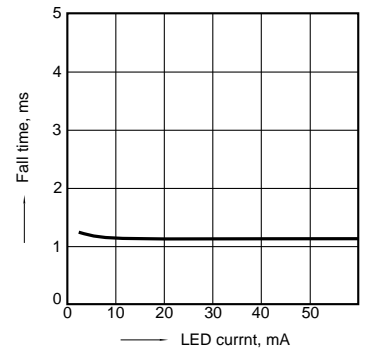
### 14. LED forward current vs. turn off time characteristics

Sample: AQV257M;  
 Measured portion: between terminals 4 and 6;  
 Load voltage: 200 V (DC);  
 Continuous load current: 250 mA (DC);  
 Ambient temperature: 25°C 77°F



### 15. LED current vs. fall time characteristics

Sample: AQV257M;  
 Measured portion: between terminals 4 and 6;  
 Load voltage: 200 V (DC);  
 Continuous load current: 250 mA (DC);  
 Ambient temperature: 25°C 77°F



### 16. Applied voltage vs. output capacitance characteristics

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

