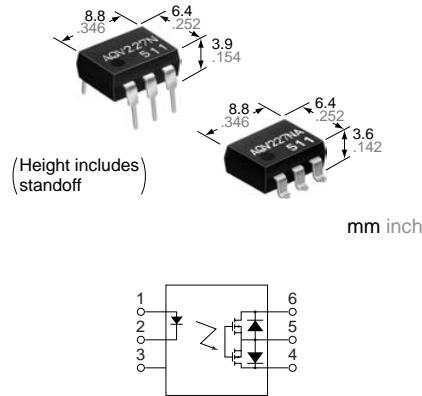


# Panasonic

ideas for life

DIP6-pin type featuring  
low on-resistance with  
200V/400V load voltage

PhotoMOS Relays  
**RF 1 Form A**  
Low on-resistance (AQV22○N)



## FEATURES

### 1. Low output capacitance and high response speed

The capacitance between output terminals is small; typ. 10pF. This enables a fast operation speed of typ. 0.2ms.

### 2. High sensitivity and low on-resistance

Max. 0.1 A of load current can be controlled with input current of 5 mA. The on resistance is less than our conventional models.

### 3. Low-level off state leakage current of typ. 0.03nA (AQV227N)

### 4. Controls low-level analog signals

## TYPICAL APPLICATIONS

- Measuring instruments
- Communication equipment
- Computers
- Robots

Compliance with RoHS Directive

## TYPES

	Output rating*		Package	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 dual use	200 V	70 mA	DIP6-pin	AQV227N	AQV227NA	AQV227NAX	AQV227NAZ	1 tube contains: 50 pcs. 1 batch contains: 500 pcs.	1,000 pcs.
	400 V	50 mA		AQV224N	AQV224NA	AQV224NAX	AQV224NAZ		

\*Indicate the peak AC and DC values.

Note: The surface mount terminal indicator "A" and the packing style indicator "X" or "Z" are not marked on the relay.

## RATING

### 1. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

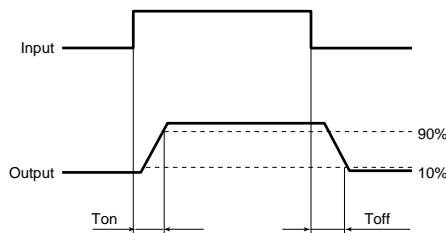
Item	Symbol	Type of connection	AQV227N(A)		AQV224N(A)		Remarks
Input	LED forward current	$I_F$	50 mA				
	LED reverse voltage	$V_R$	5 V				
	Peak forward current	$I_{FP}$	1 A				f = 100 Hz, Duty factor = 0.1%
	Power dissipation	$P_{in}$	75 mW				
Output	Load voltage (peak AC)	$V_L$	200 V		400 V		
	Continuous load current	$I_L$	A	0.07 A		0.05 A	A connection: Peak AC, DC B, C connection: DC
			B	0.08 A		0.06 A	
			C	0.10 A		0.08 A	
	Peak load current	$I_{peak}$	0.21 A		0.15 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					
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				

# RF 1 Form A Low on-resistance (AQV22○N)

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

Item		Symbol	Type of connection	AQV227N(A)	AQV224N(A)	Remarks		
Input	LED operate current	Typical	I <sub>Fon</sub>	—	0.9 mA		I <sub>L</sub> = Max.	
		Maximum			3.0 mA			
	LED turn off current	Minimum	I <sub>Foff</sub>	—	0.4 mA		I <sub>L</sub> = Max.	
		Typical			0.85 mA			
	LED dropout voltage	Typical	V <sub>F</sub>	—	1.25 V (1.14 V at I <sub>F</sub> = 5 mA)		I <sub>F</sub> = 50 mA	
		Maximum			1.5 V			
Output	On resistance	Typical	R <sub>on</sub>	A	30 Ω	70 Ω	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max. Within 1 s on time	
		Maximum			50 Ω	100 Ω		
		Typical	R <sub>on</sub>	B	16 Ω	55 Ω	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max. Within 1 s on time	
		Maximum			25 Ω	70 Ω		
		Typical	R <sub>on</sub>	C	8 Ω	28 Ω	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max. Within 1 s on time	
		Maximum			12.5 Ω	35 Ω		
	Output capacitance	Typical	C <sub>out</sub>	—	10 pF		I <sub>F</sub> = 0 V <sub>B</sub> = 0 f = 1 MHz	
		Maximum			15 pF			
	Off state leakage current	Typical	I <sub>Leak</sub>	—	0.03 nA	0.09 nA	I <sub>F</sub> = 0 V <sub>L</sub> = Max.	
		Maximum			10 nA			
	Transfer characteristics	Turn on time*	Typical	T <sub>on</sub>	—	0.2 ms		I <sub>F</sub> = 5 mA I <sub>L</sub> = Max.
			Maximum			0.5 ms		
Turn off time*		Typical	T <sub>off</sub>	—	0.08 ms		I <sub>F</sub> = 5 mA I <sub>L</sub> = Max.	
		Maximum			0.2 ms			
I/O capacitance		Typical	C <sub>iso</sub>	—	0.8 pF		f = 1 MHz V <sub>B</sub> = 0	
		Maximum			1.5 pF			
Initial I/O isolation resistance	Minimum	R <sub>iso</sub>	—	1,000 MΩ		500 V DC		

\*Turn on/Turn off time



## RECOMMENDED OPERATING CONDITIONS

Please obey the following conditions to ensure proper relay operation and resetting.

Item	Symbol	Recommended value	Unit
Input LED current	I <sub>F</sub>	5	mA

- For Dimensions
- For Schematic and Wiring Diagrams
- For Cautions for Use

■ These products are not designed for automotive use.

If you are considering to use these products for automotive applications, please contact your local Panasonic Electric Works technical representative.

For more information

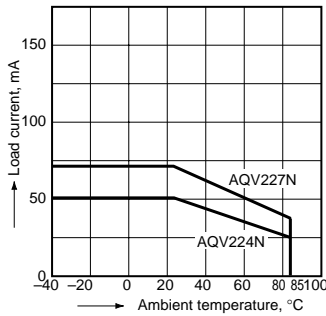
# RF 1 Form A Low on-resistance (AQV220N)

## REFERENCE DATA

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

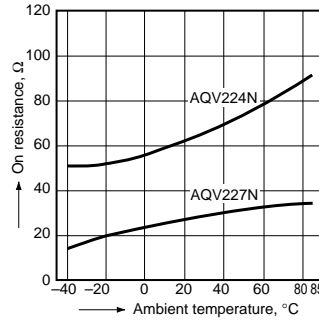
Allowable ambient temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 $-40^{\circ}\text{F}$  to  $+185^{\circ}\text{F}$

Type of connection: A



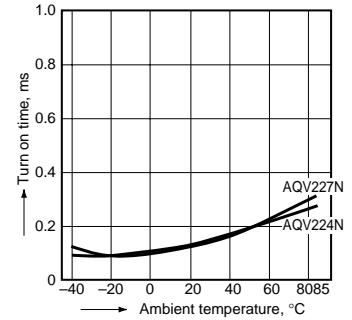
### 2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 4 and 6;  
 LED current: 5 mA; Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



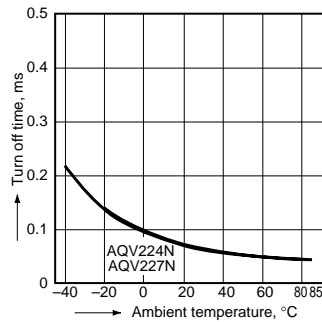
### 3. Turn on time vs. ambient temperature characteristics

Sample: AQV227N, AQV224N;  
 LED current: 5 mA; Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



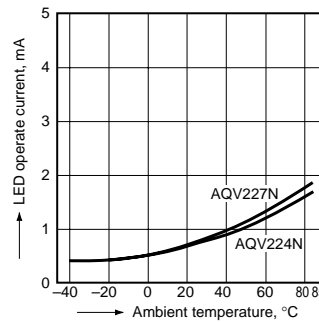
### 4. Turn off time vs. ambient temperature characteristics

Sample: AQV227N, AQV224N;  
 LED current: 5 mA; Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



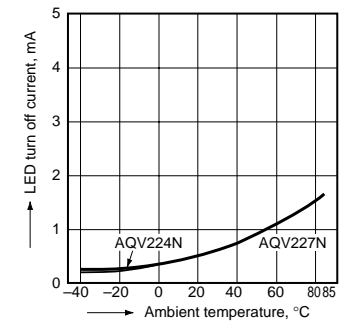
### 5. LED operate current vs. ambient temperature characteristics

Sample: AQV227N, AQV224N;  
 Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



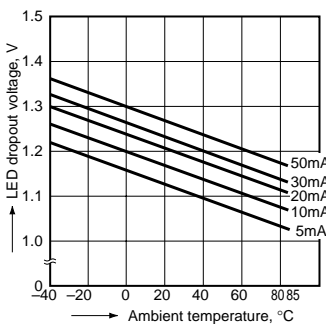
### 6. LED turn off current vs. ambient temperature characteristics

Sample: AQV227N, AQV224N;  
 Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



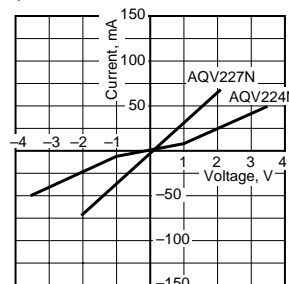
### 7. LED dropout voltage vs. ambient temperature characteristics

Sample: All types;  
 LED current: 5 to 50 mA



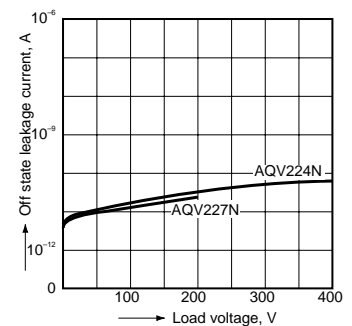
### 8. Current vs. voltage characteristics of output at MOS portion

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



### 9. Off state leakage current

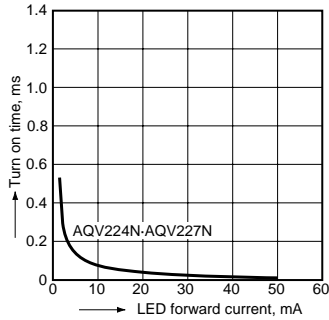
Sample: AQV227N, AQV224N;  
 Measured portion: between terminals 4 and 6;  
 Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



# RF 1 Form A Low on-resistance (AQV220N)

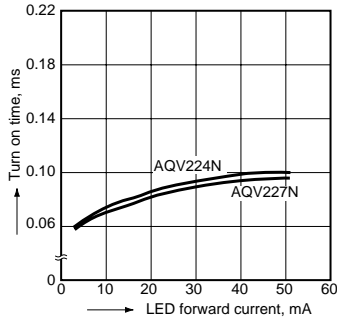
## 10. Turn on time vs. LED forward current characteristics

Sample: AQV227N, AQV224N;  
 Measured portion: between terminals 4 and 6;  
 Load voltage: Max. (DC);  
 Continuous load current: Max. (DC);  
 Ambient temperature: 25°C 77°F



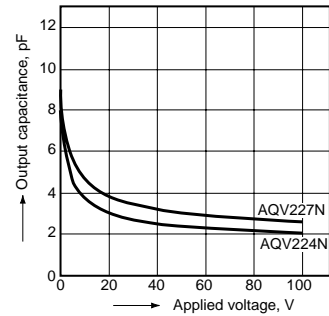
## 11. Turn off time vs. LED forward current characteristics

Sample: AQV227N, AQV224N;  
 Measured portion: between terminals 4 and 6;  
 Load voltage: Max. (DC);  
 Continuous load current: Max. (DC);  
 Ambient temperature: 25°C 77°F



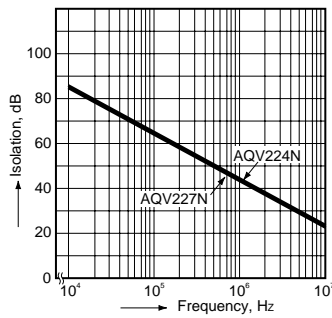
## 12. Output capacitance vs. applied voltage characteristics

Measured portion: between terminals 4 and 6;  
 Frequency: 1 MHz, 30 mVrms;  
 Ambient temperature: 25°C 77°F



## 13. Isolation characteristics (50 Ω impedance)

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



## 14. Insertion loss characteristics (50 Ω impedance)

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

