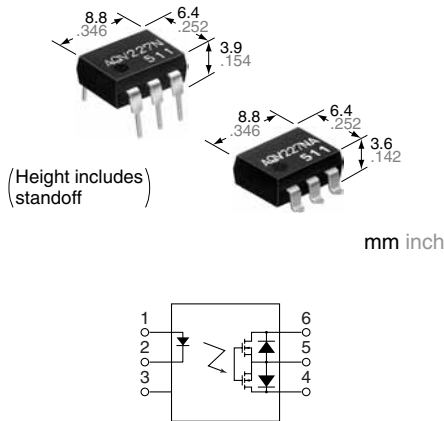


**DIP6-pin type featuring  
low on-resistance with  
200V/400V load voltage**

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



**RoHS compliant**

## 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

## 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 device.

## RATING

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

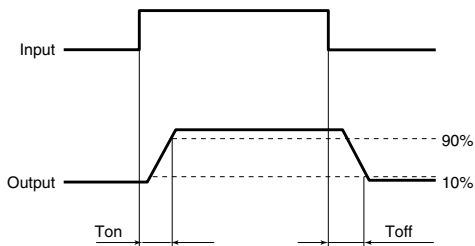
Item		Symbol	Type of connection	AQV227N(A)	AQV224N(A)	Remarks
Input	LED forward current	$I_F$		50 mA		
	LED reverse voltage	$V_R$		5 V		
	Peak forward current	$I_{FP}$		1 A		$f = 100$ Hz, Duty factor = 0.1%
	Power dissipation	$P_{in}$		75 mW		
Output	Load voltage (peak AC)	$V_L$		200 V	400 V	
	Continuous 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	
	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 device 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 Corporation technical representative.

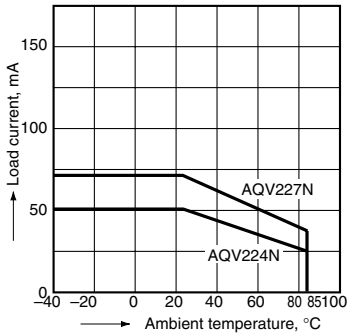
For more information.

## REFERENCE DATA

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

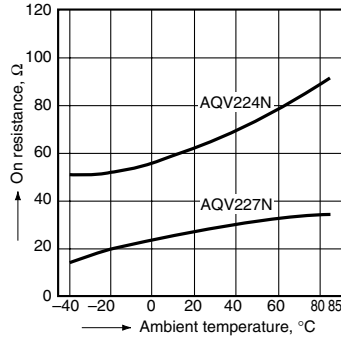
Allowable ambient temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 $-40^{\circ}\text{F}$  to  $+185^{\circ}\text{F}$

Type of connection: A



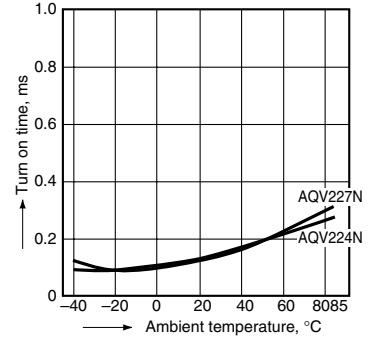
### 2. On resistance vs. ambient temperature characteristics

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



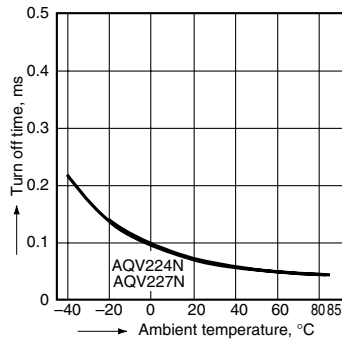
### 3. Turn on time vs. ambient temperature characteristics

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



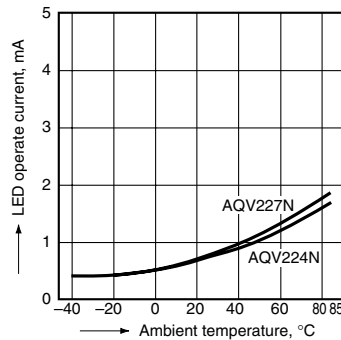
### 4. Turn off time vs. ambient temperature characteristics

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



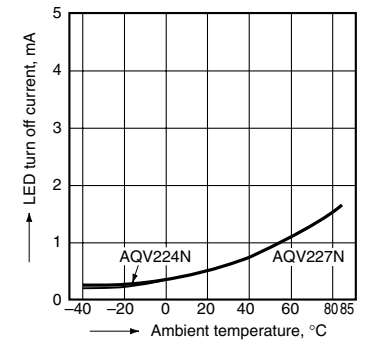
### 5. LED operate current vs. ambient temperature characteristics

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



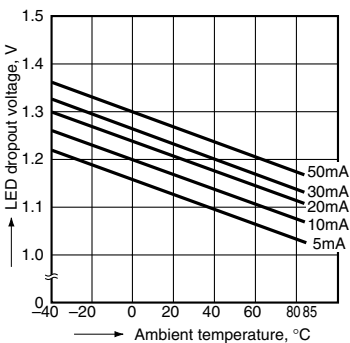
### 6. LED turn off current vs. ambient temperature characteristics

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



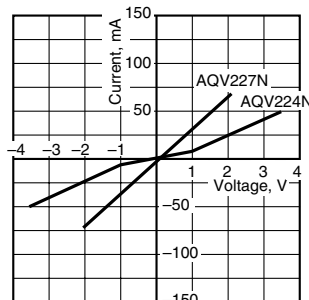
### 7. LED dropout voltage vs. ambient temperature characteristics

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



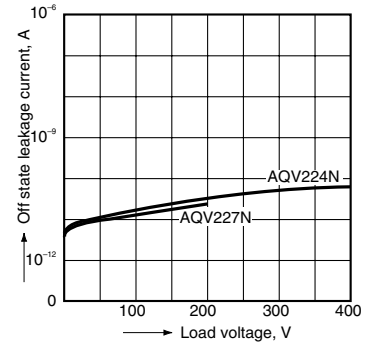
### 8. Current vs. voltage characteristics of output at MOS portion

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



### 9. Off state leakage current

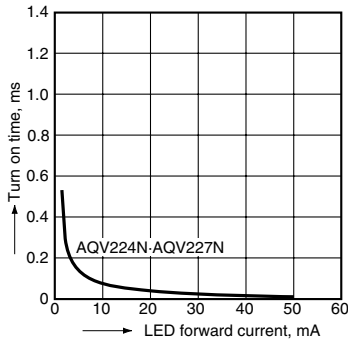
Sample: AQV227N, AQV224N;  
 Measured portion: between terminals 4 and 6;  
 Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



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

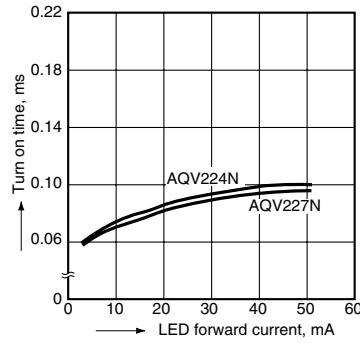
## 10. Turn on time vs. LED forward current characteristics

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



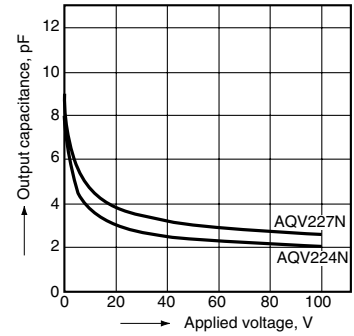
## 11. Turn off time vs. LED forward current characteristics

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



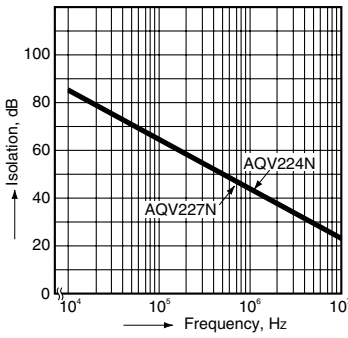
## 12. Output capacitance vs. applied voltage characteristics

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



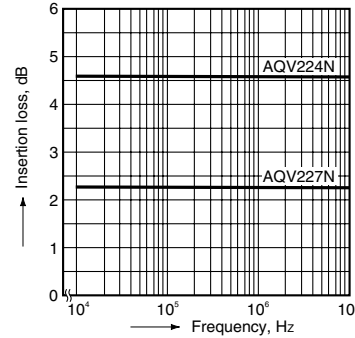
## 13. Isolation characteristics (50 Ω impedance)

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



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