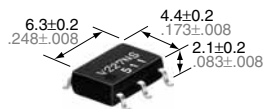
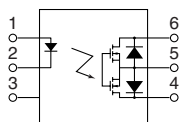


**Miniature SOP6-pin type  
featuring low on-resistance  
with 200V/400V  
load voltage**

**PhotoMOS<sup>®</sup>  
RF SOP 1 Form A**  
Low on-resistance (AQV220NS)



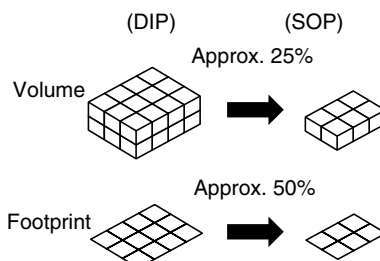
mm inch



**RoHS compliant**

## FEATURES

**1. Miniature SOP4-pin package**  
(W) 4.4 × (L) 6.3 × (H) 2.1 mm (W) .173 × (L) .248 × (H) .083 inch —approx. 25% of the volume and 50% of the footprint size of DIP type PhotoMOS.



**2. Low output capacitance and high response speed**

The capacitance between output terminals is small; typ. 10pF. This enables a fast operation speed of typ. 0.1ms (AQY224NS).

**3. Low-level off state leakage current**  
**4. Controls low-level analog signals**

## TYPICAL APPLICATIONS

- Telephones
- Measuring instruments
- Computers
- Industrial robots
- High-speed inspection machines

## TYPES

	Output rating*		Package	Part No.			Packing quantity	
	Load voltage	Load current		Tube packing style	Tape and reel packing style		Tube	Tape and reel
					Picked from the 1/2/3-pin side	Picked from the 4/5/6-pin side		
AC/DC dual use	200 V	50 mA	SOP6-pin	AQV227NS	AQV227NSX	AQV227NSZ	1 tube contains: 75 pcs. 1 batch contains: 1,000 pcs.	1,000 pcs.
	400 V	40 mA		AQV224NS	AQV224NSX	AQV224NSZ		

\*Indicate the peak AC and DC values.

Note: For space reasons, the two initial letters of the part number "AQ" and the packing style indicator "X" or "Z" are not marked on the device.  
(Ex. the label for product number AQV227NS is V227NS)

## RATING

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

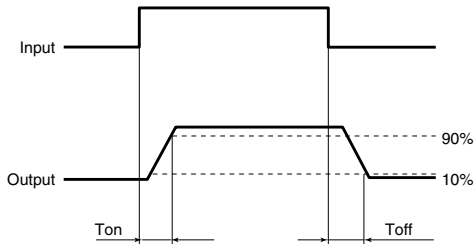
Item		Symbol	Type of connection	AQV227NS	AQV224NS	Remarks
Input	LED forward current	I <sub>F</sub>		50 mA		
	LED reverse voltage	V <sub>R</sub>		5 V		
	Peak forward current	I <sub>FP</sub>		1 A		f = 100 Hz, Duty factor = 0.1%
	Power dissipation	P <sub>in</sub>		75 mW		
Output	Load voltage (peak AC)	V <sub>L</sub>		200 V	400 V	
	Continuous load current	I <sub>L</sub>	A	0.05 A	0.04 A	A connection: Peak AC, DC B, C connection: DC
			B	0.06 A	0.05 A	
			C	0.08 A	0.06 A	
	Peak load current	I <sub>peak</sub>		0.15 A	0.12 A	A connection: 100 ms (1 shot), V <sub>L</sub> = DC
Power dissipation	P <sub>out</sub>		450 mW			
Total power dissipation		P <sub>T</sub>		500 mW		
I/O isolation voltage		V <sub>iso</sub>		1,500 V AC		
Temperature limits	Operating	T <sub>opr</sub>		-40°C to +85°C -40°F to +185°F		Non-condensing at low temperatures
	Storage	T <sub>stg</sub>		-40°C to +100°C -40°F to +212°F		

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

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

Item		Symbol	Type of connection	AQV227NS	AQV224NS	Remarks	
Input	LED operate current	Typical	I <sub>Fon</sub>	—	0.7 mA		I <sub>L</sub> = Max.
		Maximum			3 mA		
	LED turn off current	Minimum	I <sub>Foff</sub>	—	0.4 mA		I <sub>L</sub> = Max.
		Typical			0.65 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	
	On resistance	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	Maximum	I <sub>leak</sub>	—	10 nA		I <sub>F</sub> = 0 V <sub>L</sub> = Max.	
Transfer characteristics	Turn on time*	Typical	T <sub>on</sub>	—	0.12 ms	0.1 ms	I <sub>F</sub> = 5 mA I <sub>L</sub> = Max.
		Maximum			0.5 ms		
	Turn off time*	Typical	T <sub>off</sub>	—	0.05 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.

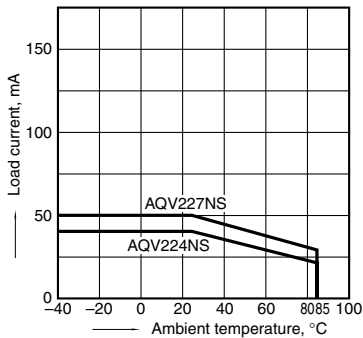
For more information.

## REFERENCE DATA

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

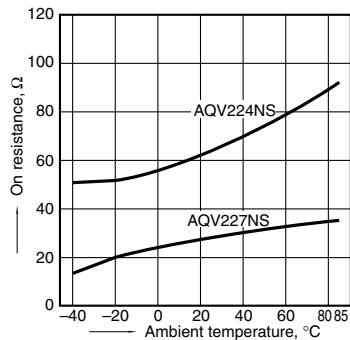
Allowable ambient temperature:  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$   
 $-40^{\circ}\text{F}$  to  $+185^{\circ}\text{F}$

Type of connection: A



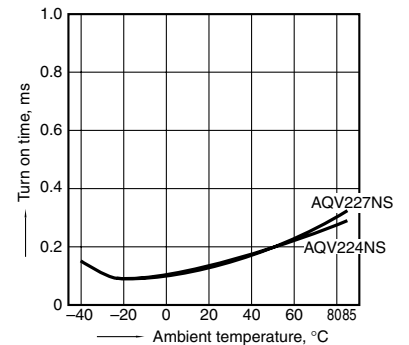
### 2. On resistance vs. ambient temperature characteristics

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



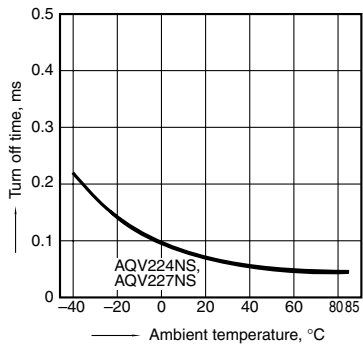
### 3. Turn on time vs. ambient temperature characteristics

LED current: 5 mA;  
 Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



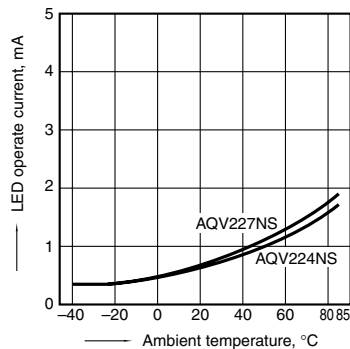
### 4. Turn off time vs. ambient temperature characteristics

LED current: 5 mA;  
 Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



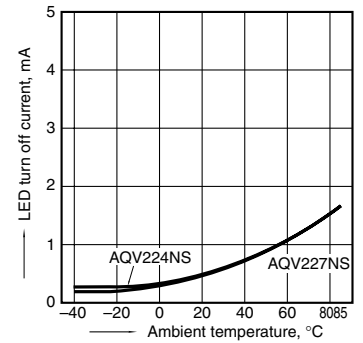
### 5. LED operate current vs. ambient temperature characteristics

Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



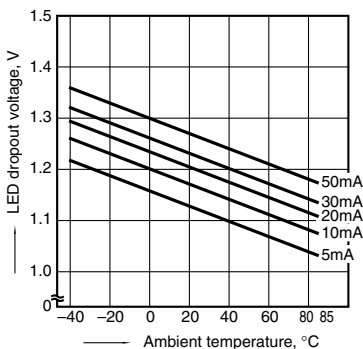
### 6. LED turn off current vs. ambient temperature characteristics

Load voltage: Max. (DC);  
 Continuous load current: Max. (DC)



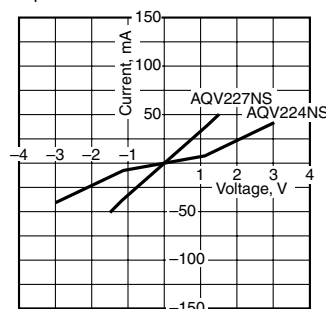
### 7. LED dropout voltage vs. ambient temperature characteristics

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



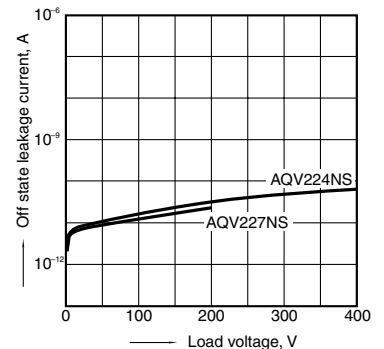
### 8. Voltage vs. current characteristics of output at MOS portion

Measured portion: between terminals 5 and 6,  
 7 and 8;  
 Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



### 9. Off state leakage current

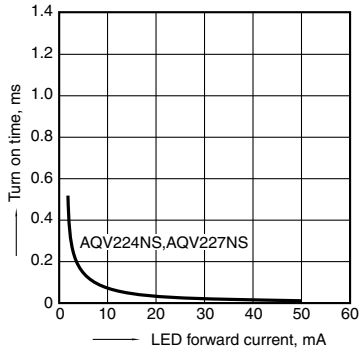
Measured portion: between terminals 4 and 6;  
 Ambient temperature:  $25^{\circ}\text{C}$   $77^{\circ}\text{F}$



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

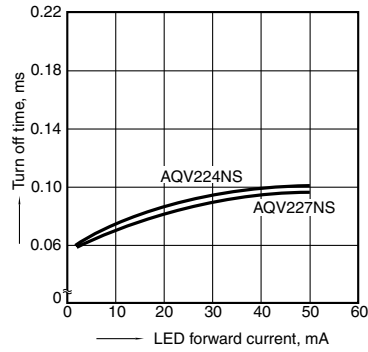
## 10. LED forward current vs. turn on time characteristics

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



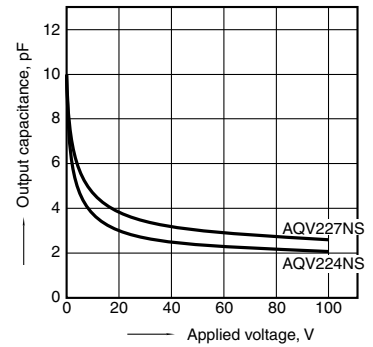
## 11. LED forward current vs. turn off time characteristics

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



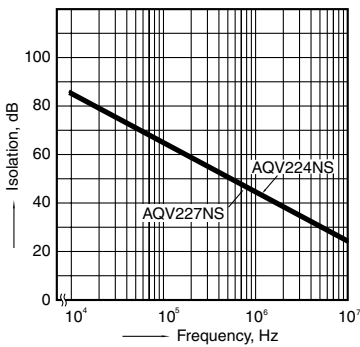
## 12. Applied voltage vs. output capacitance characteristics

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



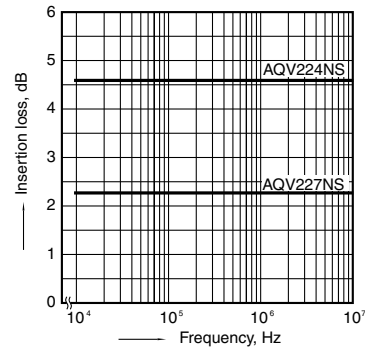
## 13. Isolation characteristics (50 Ω impedance)

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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