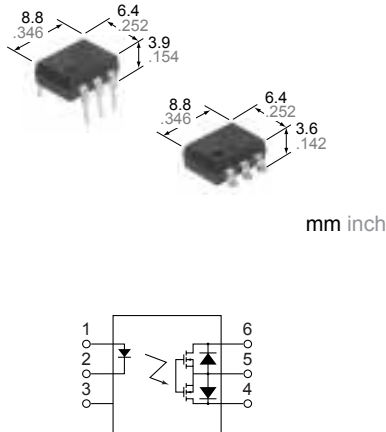


**Panasonic**  
ideas for life

**Lower output capacitance  
and on resistance.  
High speed switching.  
(Turn on time: 0.2ms,  
Turn off time: 0.08ms).**

**RF PhotoMOS  
(AQV221N)**



## FEATURES

- 1. Low output capacitance between output terminals and low ON-resistance**
- 2. High speed switching (Turn on time: typ. 200 $\mu$ s)**
- 3. High sensitivity**  
Control loads up to 250mA with input current 5mA
- 4. Low-level off state leakage current**  
The SSR has an off state leakage current of several milliamperes, where as this PhotoMOS relay has typ. 20pA even with the rated load voltage
- 5. Controls low-level analog signals**  
PhotoMOS relays features extremely low-closed-circuit offset voltage to enable control of low-level analog signals without distortion
- 6. Low thermal electromotive force (Approx. 1  $\mu$ V)**

## TYPICAL APPLICATIONS

- Measuring and testing equipment**
- Testing equipment for semiconductor performance  
IC tester, Liquid crystal driver tester, semiconductor performance tester
  - Board tester  
Bear board tester, In-circuit tester, function tester
  - Medical equipment  
Ultrasonic wave diagnostic machine
  - Multi-point recorder  
(warping, thermo couple)

## TYPES

Type	Output rating*		Part No.				Packing quantity	
			Through hole terminal	Surface-mount terminal				
	Load voltage	Load current	Tube packing style	Tape and reel packing style		Tube	Tape and reel	
AC/DC type	40 V	150 mA	AQV221N	AQV221NA	Picked from the 1/2/3-pin side			Picked from the 4/5/6-pin side

\*Indicate the peak AC and DC values.

Note: For space reasons, the SMD terminal shape indicator "A" and 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	AQV221N(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)	$V_L$		40 V		
	Continuous load current	$I_L$		A	0.15 A	A connection: Peak AC, DC B, C connection: DC
				B	0.18 A	
				C	0.25 A	
	Peak load current	$I_{peak}$		0.45 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 PhotoMOS (AQV221N)

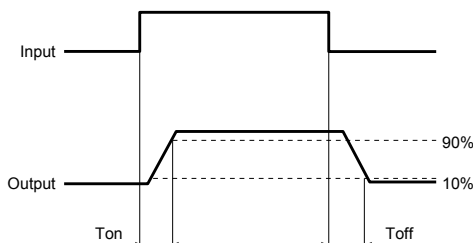
## 2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item		Symbol	Type of connection**	AQV221N(A)	Remarks	
Input	LED operate current	Typical	I <sub>Fon</sub>	—	0.90 mA	
		Maximum			3.0 mA	
	LED turn off current	Minimum	I <sub>Foff</sub>	—	0.4 mA	
		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)	
Maximum		1.5 V				
Output	On resistance #	Typical	R <sub>on</sub>	A	9.8 Ω	
		Maximum			15 Ω	
		Typical	R <sub>on</sub>	B	5 Ω	
		Maximum			7.5 Ω	
	Typical	R <sub>on</sub>	C	2.5 Ω		
	Maximum			3.8 Ω		
	Output capacitance #	Typical	C <sub>out</sub>	A	3.9 pF	
		Maximum			5 pF	
	Off state leakage current	Typical	I <sub>Leak</sub>	—	20 pA	
		Maximum			10 nA	
Transfer characteristics	Switching speed	Turn on time*	Typical	T <sub>on</sub>	—	0.2 ms
			Maximum			0.5 ms
		Turn off time*	Typical	T <sub>off</sub>	—	0.08 ms
			Maximum			0.2 ms
	I/O capacitance	Typical	C <sub>iso</sub>	—	0.8 pF	
		Maximum			1.5 pF	
Initial I/O isolation resistance	Minimum	R <sub>iso</sub>	—	1,000 MΩ	500 V DC	

Note: Recommendable LED forward current I<sub>F</sub> = 5 mA

\*\*For type of connection

\*Turn on/Turn off time



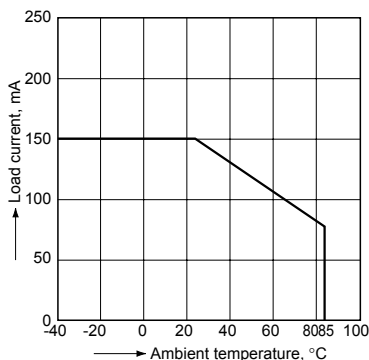
# Other types of products than the C<sub>out</sub> (typ. 3.9pF) and R<sub>on</sub> (A connection typ. 9.8Ω) combinations carried in this catalog are also available.  
(There is a trade-off between R<sub>on</sub> and C<sub>out</sub> both cannot be reduced at the same time.)  
For more information, please contact our sales of ce in y our area.

## REFERENCE DATA

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

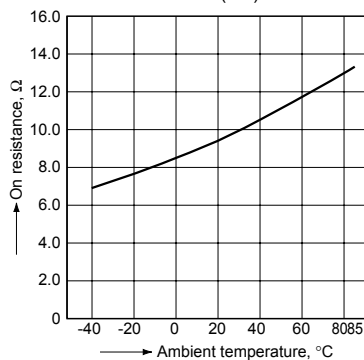
Allowable ambient temperature: -40°C to +85°C  
-40°F to +185°F

Type of connection: A



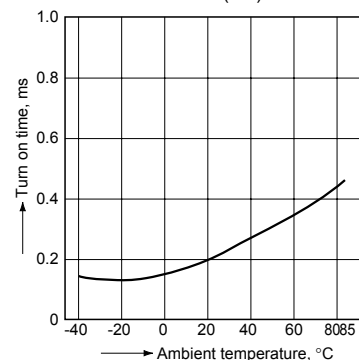
### 2. On resistance vs. ambient temperature characteristics

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



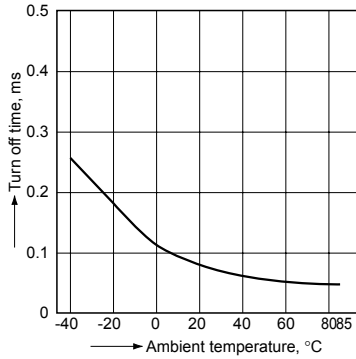
### 3. Turn on time vs. ambient temperature characteristics

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



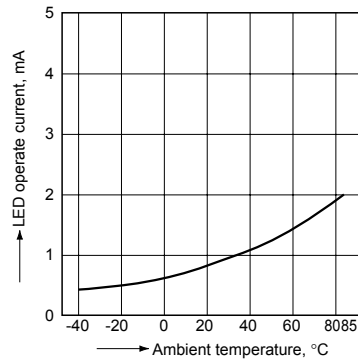
## 4. Turn off time vs. ambient temperature characteristics

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



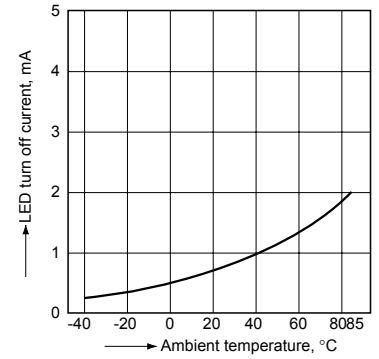
## 5. LED operate current vs. ambient temperature characteristics

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



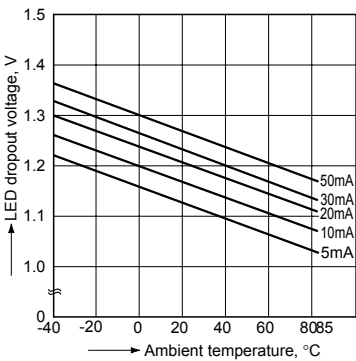
## 6. LED turn off current vs. ambient temperature characteristics

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



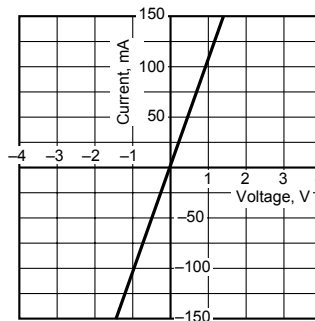
## 7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



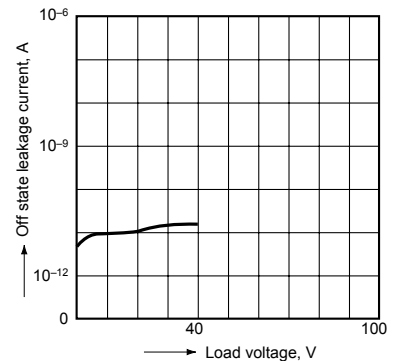
## 8. Current vs. voltage characteristics of output at MOS portion

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



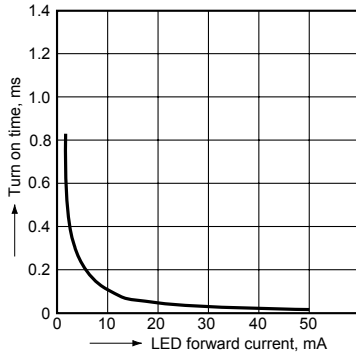
## 9. Off state leakage current vs. load voltage characteristics

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



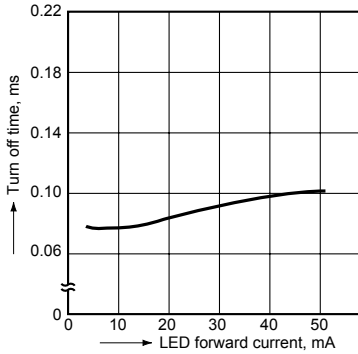
## 10. Turn on time vs. LED forward current characteristics

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



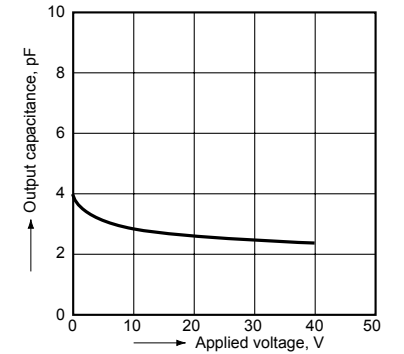
## 11. Turn off time vs. LED forward current characteristics

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



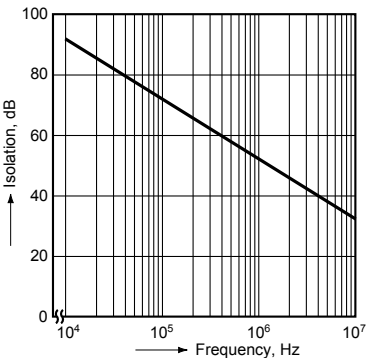
## 12. Output capacitance vs. applied voltage characteristics

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



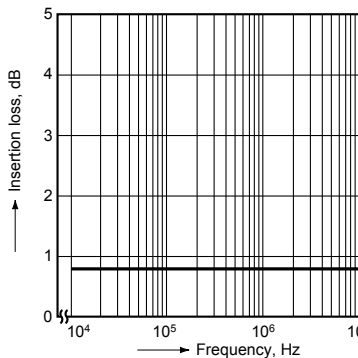
## 13. Isolation vs. frequency characteristics (50 Ω impedance)

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



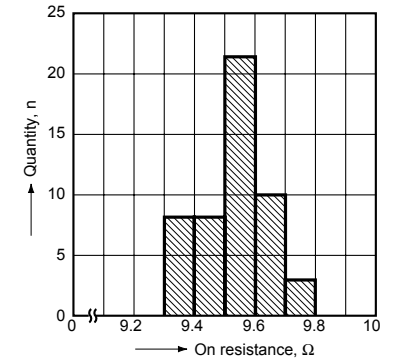
## 14. Insertion loss vs. frequency characteristics (50 Ω impedance)

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



## 15. On resistance distribution

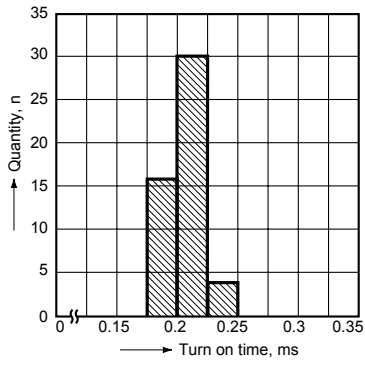
Measured portion: between terminals 4 and 6; Continuous load current: 150mA(DC); Quantity, n=50; Ambient temperature: 25°C 77°F



# RF PhotoMOS (AQV221N)

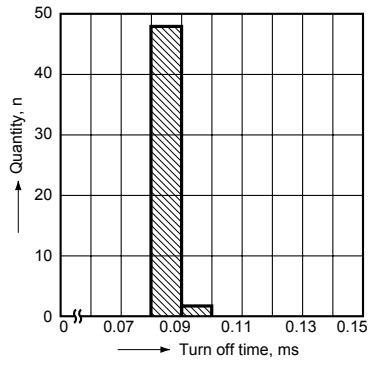
## 16. Turn on time distribution

Load voltage: 40V(DC)  
Continuous load current: 150mA(DC)  
Quantity, n=50; Ambient temperature: 25°C 77°F



## 17. Turn off time distribution

Load voltage: 40V(DC)  
Continuous load current: 150mA(DC)  
Quantity, n=50; Ambient temperature: 25°C 77°F



## 18. LED operate current distribution

Load voltage: 40V(DC)  
Continuous load current: 150mA(DC)  
Quantity, n=50; Ambient temperature: 25°C 77°F

