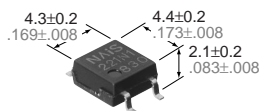


# NAIS

**RF (Radio Frequency)  
C × R 20 Type  
(by)**

# PhotoMOS RELAYS



mm inch

## FEATURES

### 1. Low output capacitance between output terminals and low ON-resistance

Output capacitance(C): 2.0pF (typ.)  
ON resistance(R): 9.8Ω (typ.)

### 2. High speed switching

Turn on time: 40ms  
Turn off time: 60ms

### 3. SO package 4-pin type in super miniature design

Size: (W)4.3 × (L)4.4 × (H)2.1 mm  
(W).169 × (L).173 × (H).083 inch

### 4. Low-level off state leakage current

The SSR has an off state leakage current of several milliamperes, where as this PhotoMOS relay has only 10pA (typical) even with the rated load voltage

### 5. Controls low-level analog signals

### 6. Low thermal electromotive force (Approx. 1 mV)

## TYPICAL APPLICATIONS

### Measuring and testing equipment

1. Testing equipment for semiconductor performance  
IC tester, Liquid crystal driver tester, semiconductor performance tester
2. Board tester  
Bear board tester, In-circuit tester, function tester
3. Medical equipment  
Ultrasonic wave diagnostic machine
4. Multi-point recorder (warping, thermo couple)

## TYPES

Type	Output rating*		Tape and reel packing style		Packing quantity	
	Load voltage	Load current	Picked from the 1/2-pin side	Picked from the 3/4-pin side	Tube	Tape and reel
AC/DC type	40V	120mA	AQY221N1SX	AQY221N1SZ	1,000 pcs	1,000 pcs

\* Indicate the peak AC and DC values.

Notes: (1) Tape package is the standard packing style. Also available in tube.

(Part No. suffix "X" or "Z" is not needed when ordering; Tube: 100 pcs.; Case: 2,000 pcs.)

(2) For space reasons, the initial letters of the product number "AQY and S", the package type indicator "X" and "Z" are omitted from the seal.

## RATING

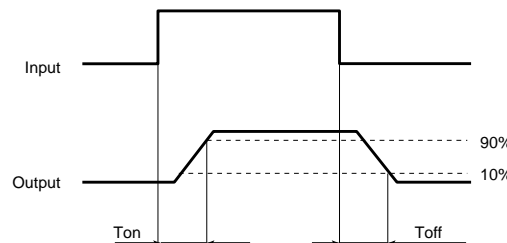
### 1. Absolute maximum ratings (Ambient temperature: 25°C 77°F)

Item		Symbol	AQY221N1S	Remarks
Input	LED forward current	I <sub>F</sub>	50mA	
	LED reverse voltage	V <sub>R</sub>	3V	
	Peak forward current	I <sub>FP</sub>	1A	f=100 Hz, Duty factor=0.1%
	Power dissipation	P <sub>in</sub>	75mW	
Output	Load voltage (peak AC)	V <sub>L</sub>	40V	
	Continuous load current	I <sub>L</sub>	0.12A	Peak AC,DC
	Peak load current	I <sub>peak</sub>	0.30A	100 ms (1 shot), V <sub>L</sub> = DC
	Power dissipation	P <sub>out</sub>	300mW	
Total power dissipation		P <sub>T</sub>	350mW	
I/O isolation voltage		V <sub>iso</sub>	1,500V 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	

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

Item			Symbol	AQY221N1S	Condition	
Input	LED operate current	Typical	$I_{Fon}$	0.9mA	$I_L=100\text{ mA}$	
		Maximum		3.0mA		
	LED turn off current	Minimum	$I_{Foff}$	0.4mA	$I_L=100\text{ mA}$	
		Typical		0.85mA		
LED dropout voltage	Typical	$V_F$	1.14 (1.25 V at $I_F=50\text{mA}$ )	$I_F=5\text{mA}$		
	Maximum		1.5V			
Output	On resistance #	Typical	$R_{on}$	9.8Ω	$I_F=5\text{mA}$ $I_L=100\text{ mA}$ Within 1 s on time	
		Maximum		12.5Ω		
	Output capacitance #	Typical	$C_{out}$	2.0pF	$I_F=0$ $V_B=0\text{ V}$ $f=1\text{ MHz}$	
		Maximum		2.5pF		
	Off state leakage current	Typical	$I_{Leak}$	0.01nA	$I_F=0$ $V_L=Max.$	
		Maximum		10nA		
Transfer characteristics	Switching speed	Turn on time*	$T_{on}$	Typical	0.04ms	$I_F=5\text{mA}$ $V_L=10\text{V}$ $R_L=100\Omega$
				Maximum	0.5ms	
		Turn off time*	$T_{off}$	Typical	0.06ms	$I_F=5\text{mA}$ $V_L=10\text{V}$ $R_L=100\Omega$
				Maximum	0.2ms	
	I/O capacitance	Typical	$C_{iso}$	0.8pF	$f=1\text{MHz}$ $V_B=0$	
		Maximum		1.5pF		
	Initial I/O isolation resistance	Minimum	$R_{iso}$	1,000MΩ	500V DC	

\*Turn on/Turn off time



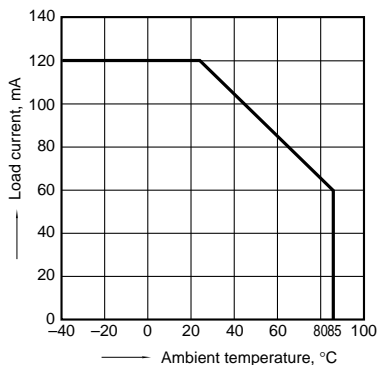
# Other types of products than the  $C_{out}$  (typ. 2.0pF) and  $R_{on}$  (A connection typ. 9.8 ohm) combinations carried in this catalog are also available. (There is a trade-off between  $R_{on}$  and  $C_{out}$  both cannot be reduced at the same time.) For more information, please contact our sales office in your area.

- For Dimensions, see Page 441.
- For Schematic and Wiring Diagrams, see Page 444.
- For Cautions for Use, see Page 449.

## REFERENCE DATA

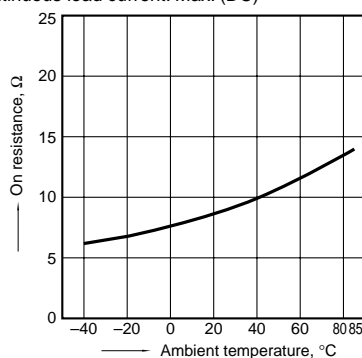
### 1. Load current vs. ambient temperature characteristics

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



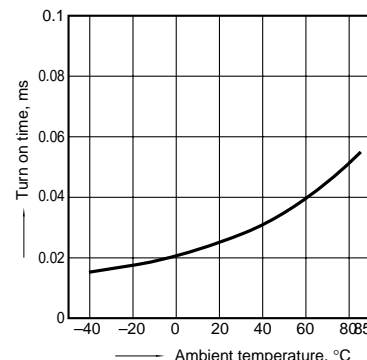
### 2. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4  
LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



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

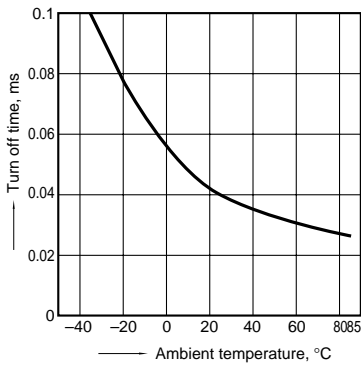
LED current: 5 mA; Load voltage: Max. (DC);  
Continuous load current: Max. (DC)



# AQY221N1S

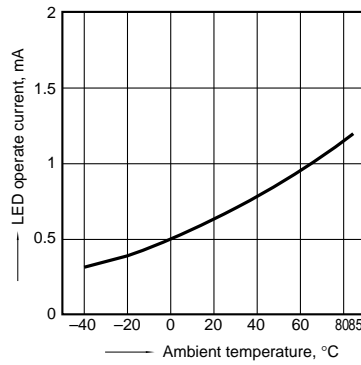
## 4. Turn off time vs. ambient temperature characteristics

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



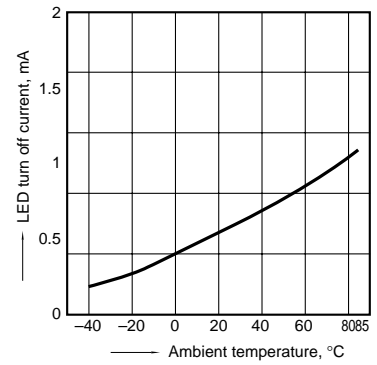
## 5. LED operate current vs. ambient temperature characteristics

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



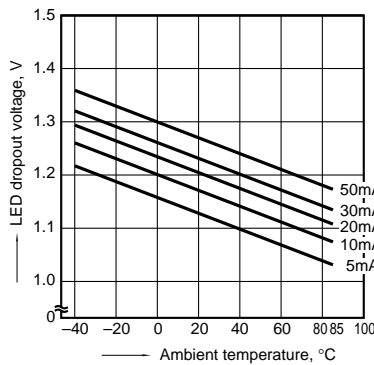
## 6. LED turn off current vs. ambient temperature characteristics

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



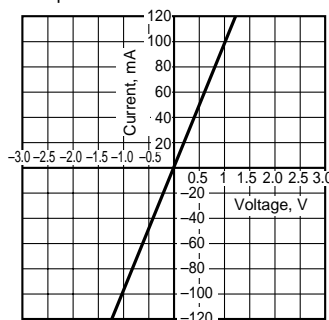
## 7. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



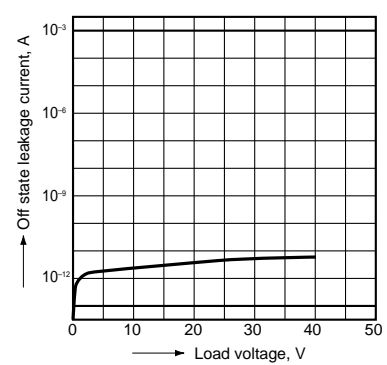
## 8. Voltage vs. current characteristics of output at MOS portion

Measured portion: between terminals 3 and 4  
Ambient temperature: 25°C 77°F



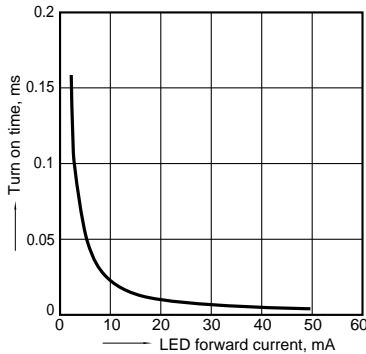
## 9. Off state leakage current

Measured portion: between terminals 3 and 4  
Ambient temperature: 25°C 77°F



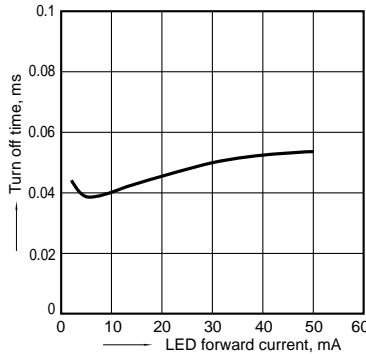
## 10. LED forward current vs. turn on time characteristics

Measured portion: between terminals 3 and 4  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



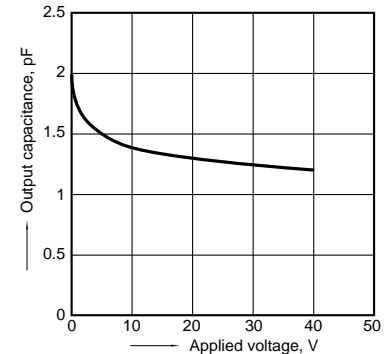
## 11. LED forward current vs. turn off time characteristics

Measured portion: between terminals 3 and 4  
Load voltage: Max. (DC); Continuous load current: Max. (DC); Ambient temperature: 25°C 77°F



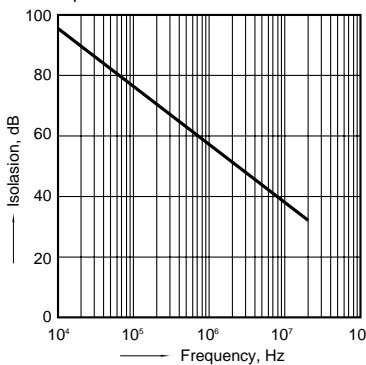
## 12. Applied voltage vs. output capacitance characteristics

Measured portion: between terminals 3 and 4  
Frequency: 1 MHz, 30m Vrms;  
Ambient temperature: 25°C 77°F



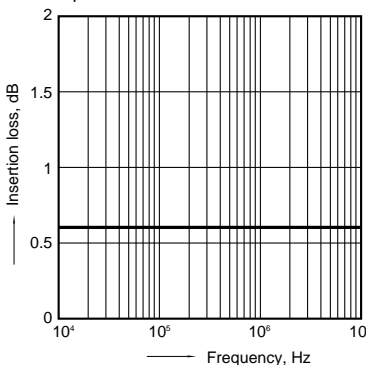
## 13. Isolation characteristics (50Ω impedance)

Measured portion: between terminals 3 and 4  
Ambient temperature: 25°C 77°F



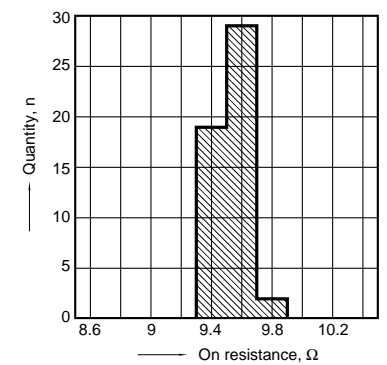
## 14. Insertion loss characteristics (50Ω impedance)

Measured portion: between terminals 3 and 4  
Ambient temperature: 25°C 77°F



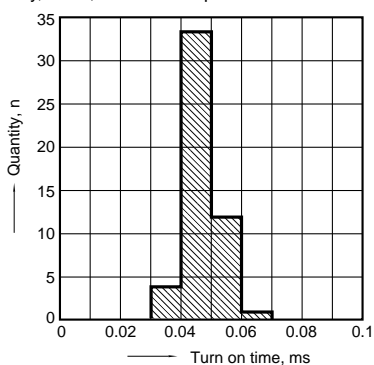
## 15. On resistance distribution

Measured portion: between terminals 3 and 4  
Continuous load current: 120mA(DC)  
Quantity, n=50; Ambient temperature: 25°C 77°F



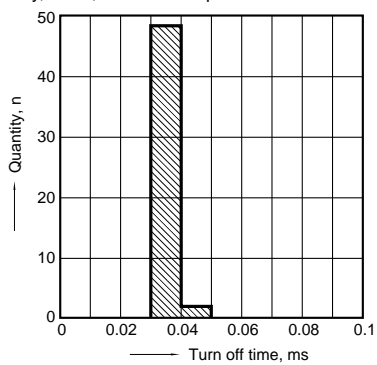
16. Turn on time distribution

Load voltage: 40V(DC)  
 Continuous load current: 120mA(DC)  
 Quantity, n=50; Ambient temperature: 25°C 77°F



17. Turn off time distribution

Load voltage: 40V(DC)  
 Continuous load current: 120mA(DC)  
 Quantity, n=50; Ambient temperature: 25°C 77°F



18. LED operate current distribution

Load voltage: 40V(DC)  
 Continuous load current: 120mA(DC)  
 Quantity, n=50; Ambient temperature: 25°C 77°F

