

**Panasonic**  
ideas for life

**Lower output capacitance (C type) and on resistance (R type). (C × R10)**  
**High speed switching.**  
**(C type: Turn on time: 0.03ms, Turn off time: 0.03ms).**

**RF PhotoMOS**  
**(AQY221○2S)**

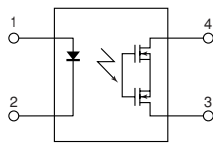


<R type>



<C type>

mm inch



## FEATURES

### 1. Two option package available.

R type offers greatly reduced on-resistance.

C type offers lower output capacitance.

	AQY221R2S (R type)	AQY221N2S (C type)
Output capacitance: C	13pF	1pF
On resistance: R	0.8Ω	9.5Ω

### 2. High speed switching

Turn on time: 30μs (AQY221N2S)

Turn off time: 30μs (AQY221N2S)

### 3. Super miniature design

SOP 4-pin type.

### 4. Low-level off state leakage current of 10pA

The SSR has an off state leakage current of several milliamperes, where as this PhotoMOS relay has typ. 10pA (typical) even with the rated load voltage (AQY221N2S)

## TYPICAL APPLICATIONS

### Measuring and testing equipment

#### 1. Testing equipment for semiconductor performance

IC tester, Liquid crystal driver tester, semiconductor performance tester

#### 2. Board tester

Bare board tester, In-circuit tester, function tester

#### 3. Medical equipment

Ultrasonic wave diagnostic machine

#### 4. Multi-point recorder

Warping, thermo couple

## TYPES

Circuit arrangement	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	
1 Form A	R type	40 V	250 mA	AQY221R2SX	AQY221R2SZ	Tape and reel: 1,000 pcs.
	C type	40 V	120 mA	AQY221N2SX	AQY221N2SZ	

\* 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	AQY221R2S (R type)	AQY221N2S (C type)	Remarks	
Input	LED forward current	I <sub>F</sub>	50mA		
	LED reverse voltage	V <sub>R</sub>	5V		
	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>	0.25A	0.12A	Peak AC,DC
	Peak load current	I <sub>peak</sub>	0.75A	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>	500V AC	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		

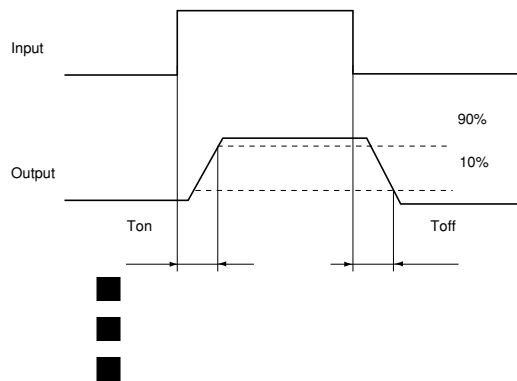
# RF PhotoMOS (AQY221○2S)

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

Item			Symbol	AQY221R2S	AQY221N2S	Condition	
				(R type)	(C type)		
Input	LED operate current	Typical	$I_{Fon}$	0.5 mA	0.9 mA	$I_L = 250$ mA (R type) $I_L = 80$ mA (C type)	
		Maximum		3.0 mA			
		Minimum					
	LED turn off current	Typical	$I_{Foff}$	0.1 mA	0.2 mA	$I_L = 250$ mA (R type) $I_L = 80$ mA (C type)	
		Maximum		0.4 mA			
		Minimum		0.85 mA			
LED dropout voltage	Typical	$V_F$	1.25 V (1.14 V at $I_F = 5$ mA)		$I_F = 50$ mA		
	Maximum		1.5 V				
	Typical		0.8Ω	9.5Ω		$I_F = 5$ mA	
Output	On resistance	Maximum	$R_{on}$	1.25Ω	12.5Ω	$I_L = 250$ mA (R type), $I_L = 80$ mA (C type) Within 1 s on time	
		Typical		13 pF	1.0 pF		
		Maximum		18 pF	1.5 pF		$I_F = 0$ mA $V_B = 0$ V $f = 1$ MHz
	Off state leakage current	Typical	$I_{Leak}$	0.03 nA	0.01 nA	$I_F = 0$ mA $V_L = \text{Max.}$	
		Maximum		10 nA			
		Typical		0.1 ms	0.03 ms		$I_F = 5$ mA
Transfer characteristics	Switching speed	Turn on time*	$T_{on}$	0.5ms		$V_L = 10$ V $R_L = 40\Omega$ (R type), 125Ω (C type)	
				Maximum			
				Typical	0.06 ms		0.03 ms
	Turn off time*	$T_{off}$	0.2 ms		$V_L = 10$ V $R_L = 40\Omega$ (R type), 125Ω (C type)		
			Maximum				
			Typical	0.8 pF			$f = 1$ MHz
I/O capacitance	Maximum	$C_{iso}$	1.5 pF		$V_B = 0$ V		
	Typical		1,000MΩ			500 V DC	
Initial I/O isolation resistance	Minimum	$R_{iso}$					

Note: Recommendable LED forward current  $I_F = 5$  mA.

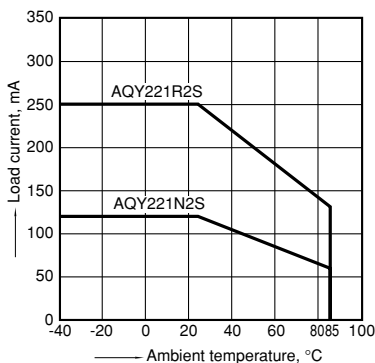
\*Turn on/Turn off time



## REFERENCE DATA

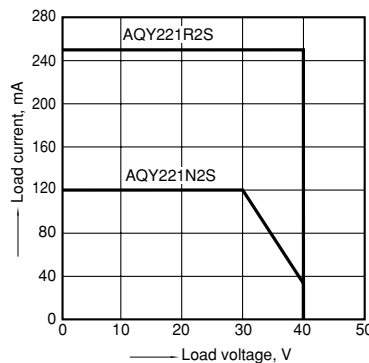
### 1. Load current vs. ambient temperature characteristics

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



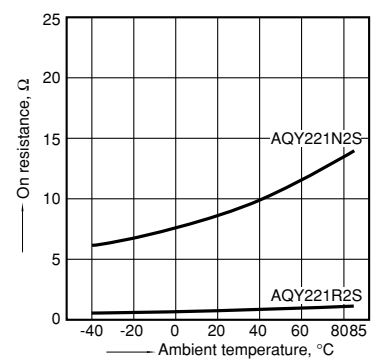
### 2. Load current vs. Load voltage characteristics

Ambient temperature: 25°C 77°F



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

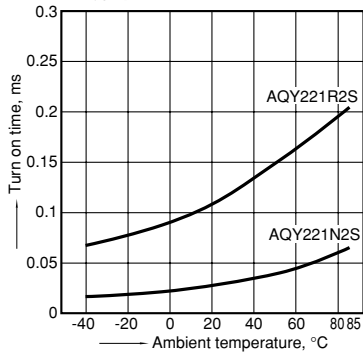
Measured portion: between terminals 3 and 4  
LED current: 5 mA; Load voltage: Max. (DC);  
Load current: 250mA (DC) [R type], 80mA (DC) [C type];



# RF PhotoMOS (AQY221○2S)

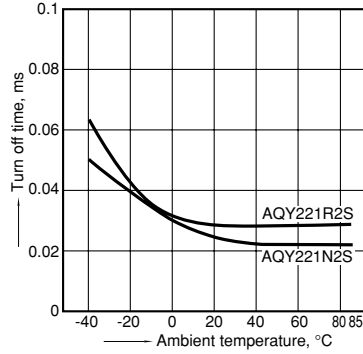
## 4. Turn on time vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4  
LED current: 5 mA; Load voltage: 10V (DC);  
Continuous load current: 250mA (DC) [R type],  
80mA (DC) [C type];



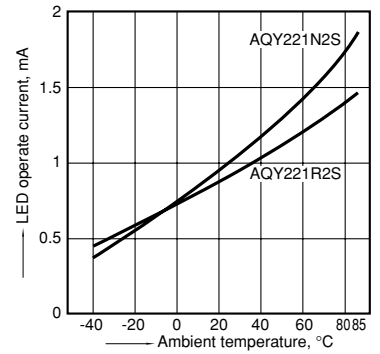
## 5. Turn off time vs. ambient temperature characteristics

LED current: 5 mA; Load voltage: 10V (DC);  
Continuous load current: 250mA (DC) [R type],  
80mA (DC) [C type];



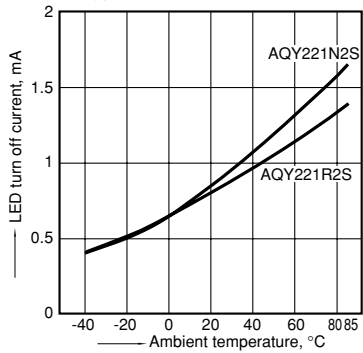
## 6. LED operate current vs. ambient temperature characteristics

Load voltage: Max. (DC);  
Continuous load current: 250mA (DC) [R type],  
80mA (DC) [C type];



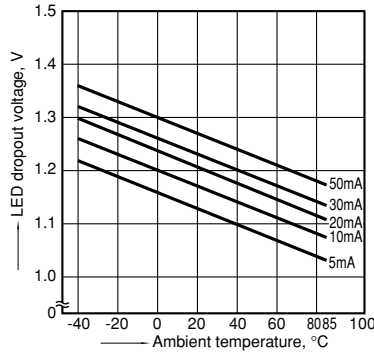
## 7. LED turn off current vs. ambient temperature characteristics

Load voltage: Max. (DC);  
Continuous load current: 250mA (DC) [R type],  
80mA (DC) [C type];



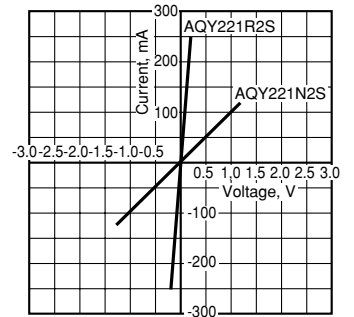
## 8. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



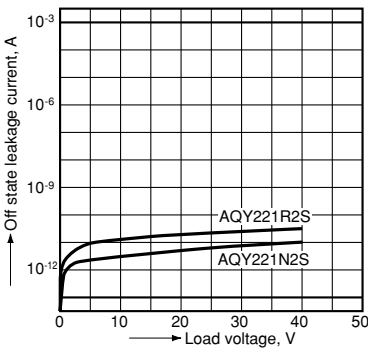
## 9. Current vs. voltage characteristics of output at MOS portion

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



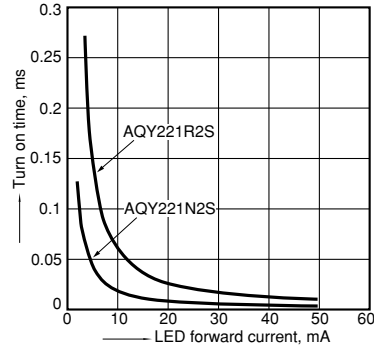
## 10. Off state leakage current vs. load voltage characteristics

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



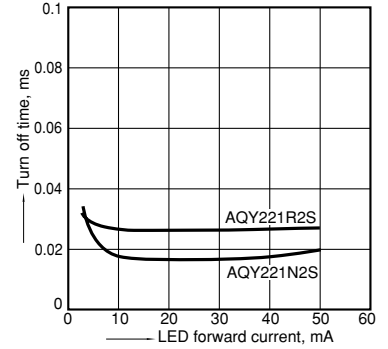
## 11. Turn on time vs. LED forward current characteristics

Measured portion: between terminals 3 and 4  
Load voltage: 10V (DC);  
Continuous load current: 250mA (DC) [R type], 80mA  
(DC) [C type];  
Ambient temperature: 25°C 77°F



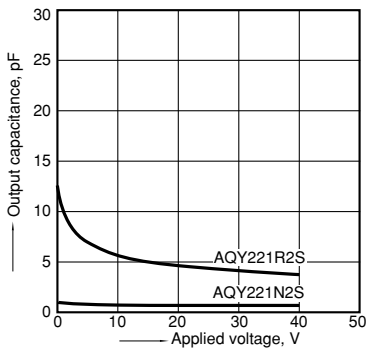
## 12. Turn off time vs. LED forward current characteristics

Measured portion: between terminals 3 and 4  
Load voltage: 10V (DC);  
Continuous load current: 250mA (DC) [R type], 80mA  
(DC) [C type];  
Ambient temperature: 25°C 77°F



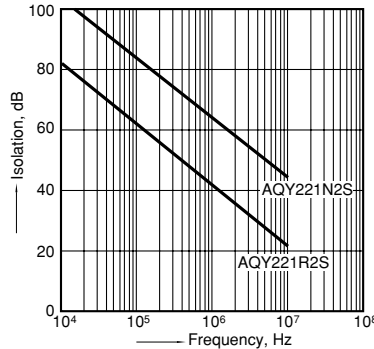
## 13. Output capacitance vs. applied voltage characteristics

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



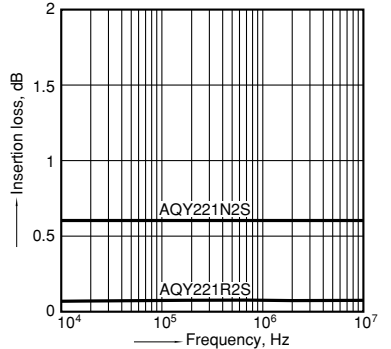
## 14. Isolation vs. frequency characteristics (50Ω impedance)

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



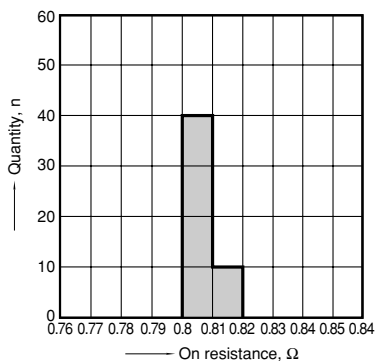
## 15. Insertion loss vs. frequency characteristics (50Ω impedance)

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

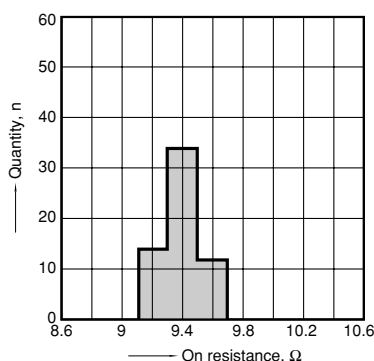


# RF PhotoMOS (AQY221O2S)

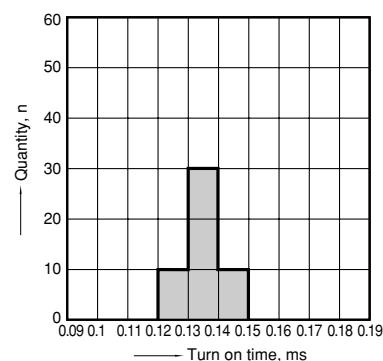
16-(1). On resistance distribution (R type)  
 Measured portion: between terminals 3 and 4  
 Continuous load current: 250mA (DC)  
 Ambient temperature: 25°C 77°F



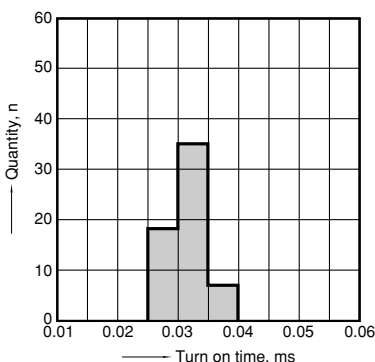
16-(2). On resistance distribution (C type)  
 Measured portion: between terminals 3 and 4  
 Continuous load current: 80mA (DC)  
 Ambient temperature: 25°C 77°F



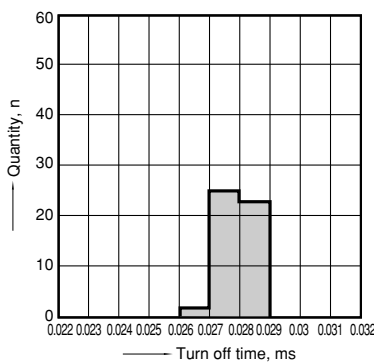
17-(1). Turn on time distribution (R type)  
 Load voltage: 10V (DC)  
 Continuous load current: 250mA (DC)  
 Ambient temperature: 25°C 77°F



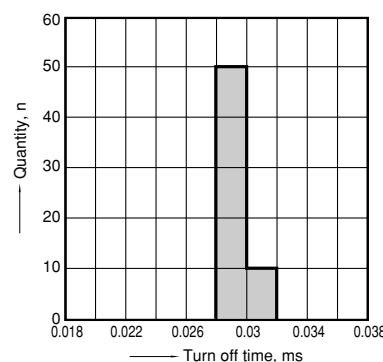
17-(2). Turn on time distribution (C type)  
 Load voltage: 10V (DC)  
 Continuous load current: 80mA (DC)  
 Ambient temperature: 25°C 77°F



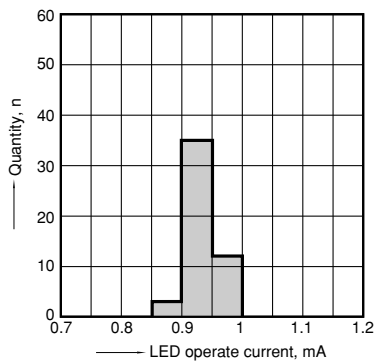
18-(1). Turn off time distribution (R type)  
 Load voltage: 10V (DC)  
 Continuous load current: 250mA (DC)  
 Ambient temperature: 25°C 77°F



18-(2). Turn off time distribution (C type)  
 Load voltage: 10V (DC)  
 Continuous load current: 80mA (DC)  
 Ambient temperature: 25°C 77°F



19-(1). LED operate current distribution (R type)  
 Load voltage: 10V (DC)  
 Continuous load current: 250mA (DC)  
 Ambient temperature: 25°C 77°F



19-(2). LED operate current distribution (C type)  
 Load voltage: 10V (DC)  
 Continuous load current: 80mA (DC)  
 Ambient temperature: 25°C 77°F

