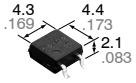
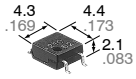
Panasonic
ideas for life

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)

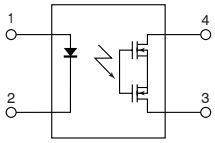


<R type>



<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

Type	Output rating*		Package size	Part No.			Packing quantity	
	Load voltage	Load current		Tube packing style	Tape and reel packing style		Tube	Tape and reel
R type	40V	250mA	SOP4pin	AQY221R2S	AQY221R2SX (Picked from the 1/2-pin side)	AQY221R2SZ (Picked from the 3/4-pin side)	1 tube contains: 100 pcs. 1 batch contains: 2,000 pcs.	1,000 pcs.
C type	40V	120mA		AQY221N2S	AQY221N2SX (Picked from the 1/2-pin side)	AQY221N2SZ (Picked from the 3/4-pin side)		

* Indicate the peak AC and DC values.
Note: For space reasons, the initial letters of the part number “AQY”, the SMD terminal shape indicator “S” and the packaging style indicator “X” or “Z” are not marked on the relay.

RATING

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

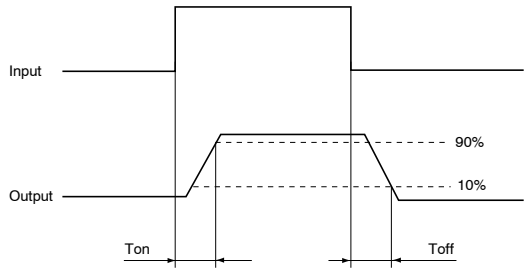
Item		Symbol	AQY221R2S (R type)	AQY221N2S (C type)	Remarks
Input	LED forward current	I_F	50mA		
	LED reverse voltage	V_R	5V		
	Peak forward current	I_{FP}	1A		f=100 Hz, Duty factor=0.1%
	Power dissipation	P_{in}	75mW		
Output	Load voltage (peak AC)	V_L	40V		
	Continuous load current	I_L	0.25A	0.12A	Peak AC,DC
	Peak load current	I_{peak}	0.75A	0.30A	100 ms (1 shot), V_L= DC
	Power dissipation	P_{out}	300mW		
Total power dissipation		P_T	350mW		
I/O isolation voltage		V_{iso}	500V AC	1,500V 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		

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

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

Note: Recommendable LED forward current I_F = 5 mA. Type of connection

*Turn on/Turn off time

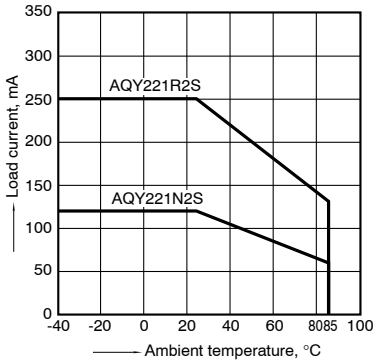


- **Dimensions**
- **Schematic and Wiring Diagrams**
- **Cautions for Use**

REFERENCE DATA

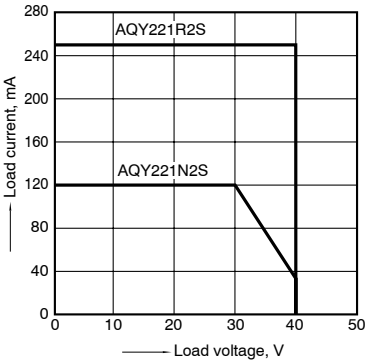
1. Load current vs. ambient temperature characteristics

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



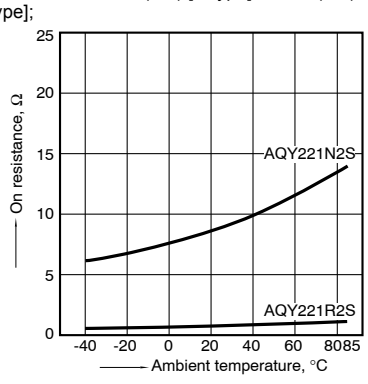
2. Load current vs. Load voltage characteristics

Ambient temperature: 25°C 77°F

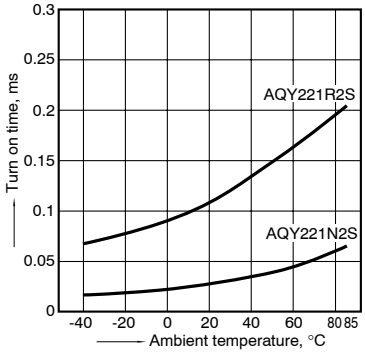


3. On resistance vs. ambient temperature characteristics

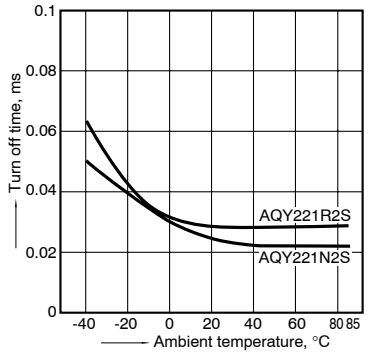
Measured portion: between terminals 3 and 4
LED current: 5 mA; Load voltage: Max. (DC);
Load current: 250mA (DC) [R type], 80mA (DC) [C type];



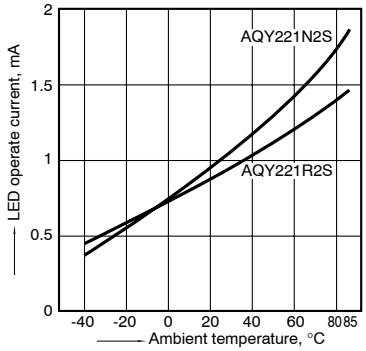
4. Turn on time vs. ambient temperature characteristics
Measured portion: between terminals 3 and 4
LED current: 5 mA; Load voltage: 10V (DC);
Continuous load current: 250mA (DC) [R type], 80mA (DC) [C type];



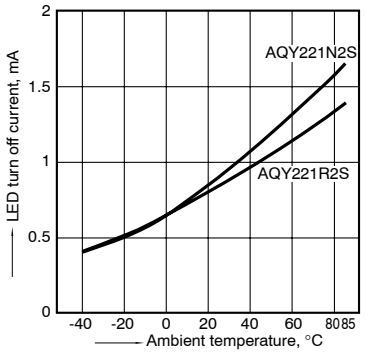
5. Turn off time vs. ambient temperature characteristics
LED current: 5 mA; Load voltage: 10V (DC);
Continuous load current: 250mA (DC) [R type], 80mA (DC) [C type];



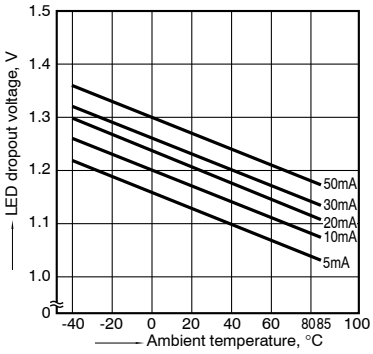
6. LED operate current vs. ambient temperature characteristics
Load voltage: Max. (DC);
Continuous load current: 250mA (DC) [R type], 80mA (DC) [C type];



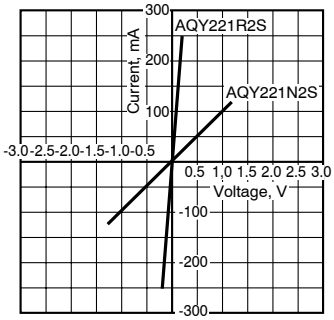
7. LED turn off current vs. ambient temperature characteristics
Load voltage: Max. (DC); Continuous load current: 250mA (DC) [R type], 80mA (DC) [C type];



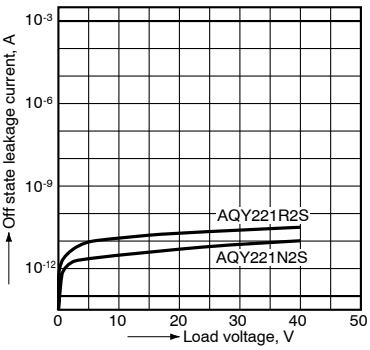
8. LED dropout voltage vs. ambient temperature characteristics
LED current: 5 to 50 mA



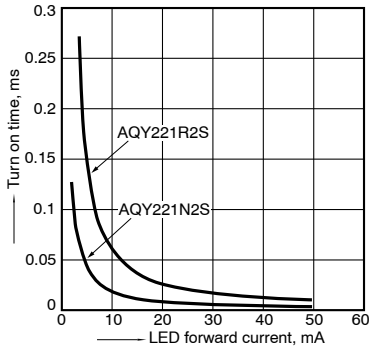
9. Current vs. voltage characteristics of output at MOS portion
Measured portion: between terminals 3 and 4
Ambient temperature: 25°C 77°F



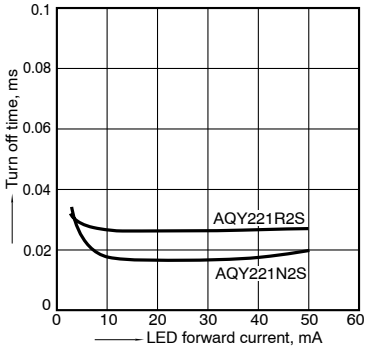
10. Off state leakage current vs. load voltage characteristics
Measured portion: between terminals 3 and 4
Ambient temperature: 25°C 77°F



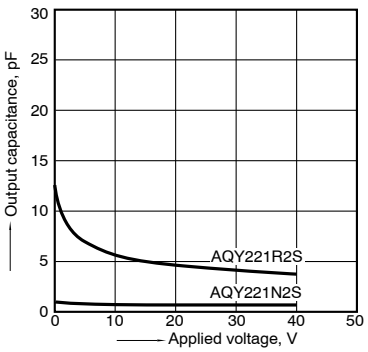
11. Turn on time vs. LED forward current characteristics
Measured portion: between terminals 3 and 4
Load voltage: 10V (DC); Continuous load current: 250mA (DC) [R type], 80mA (DC) [C type];
Ambient temperature: 25°C 77°F



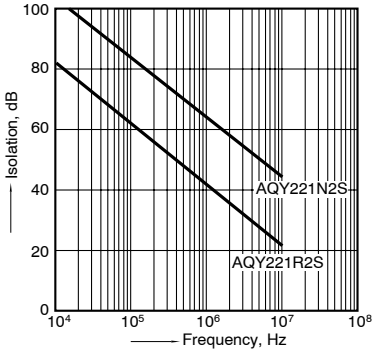
12. Turn off time vs. LED forward current characteristics
Measured portion: between terminals 3 and 4
Load voltage: 10V (DC); Continuous load current: 250mA (DC) [R type], 80mA (DC) [C type];
Ambient temperature: 25°C 77°F



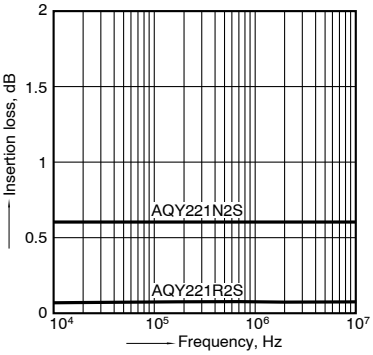
13. Output capacitance vs. applied voltage characteristics
Measured portion: between terminals 3 and 4
Frequency: 1 MHz, 30m Vrms; Ambient temperature: 25°C 77°F



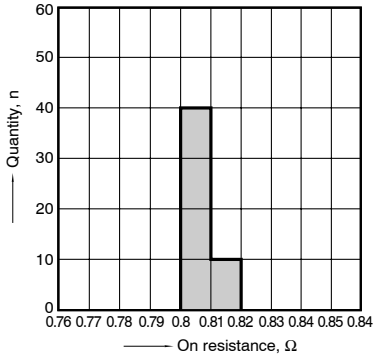
14. Isolation vs. frequency characteristics (50Ω impedance)
Measured portion: between terminals 3 and 4
Ambient temperature: 25°C 77°F



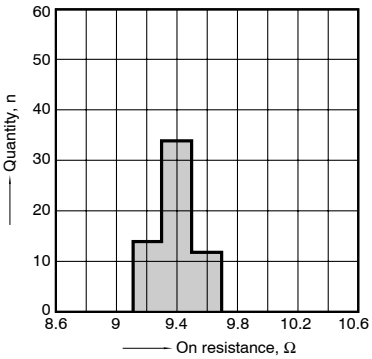
15. Insertion loss vs. frequency characteristics (50Ω impedance)
Measured portion: between terminals 3 and 4
Ambient temperature: 25°C 77°F



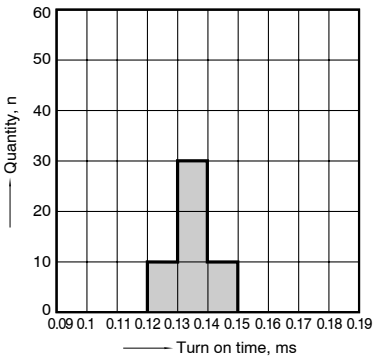
16-(1). On resistance distribution (R type)
Measured portion: between terminals 3 and 4
Continuous load current: 250mA (DC)
Ambient temperature: 25°C 77°F



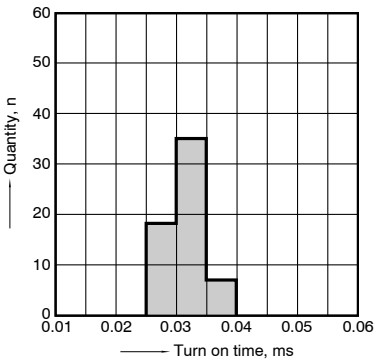
16-(2). On resistance distribution (C type)
Measured portion: between terminals 3 and 4
Continuous load current: 80mA (DC)
Ambient temperature: 25°C 77°F



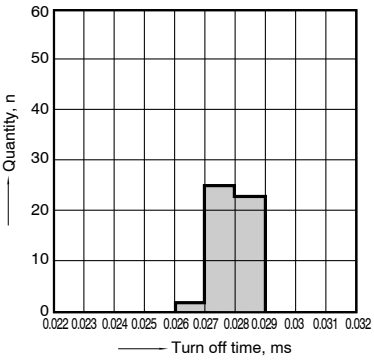
17-(1). Turn on time distribution (R type)
Load voltage: 10V (DC)
Continuous load current: 250mA (DC)
Ambient temperature: 25°C 77°F



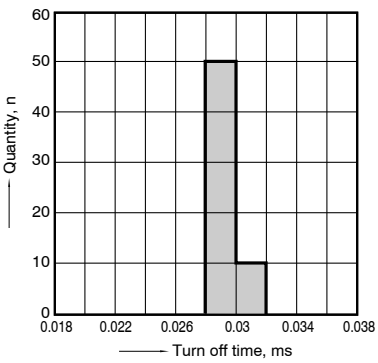
17-(2). Turn on time distribution (C type)
Load voltage: 10V (DC)
Continuous load current: 80mA (DC)
Ambient temperature: 25°C 77°F



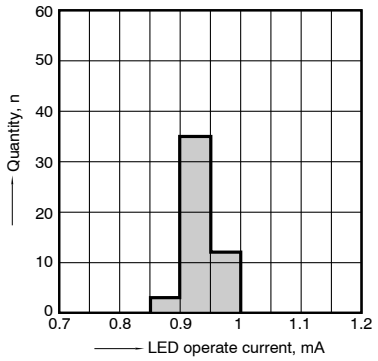
18-(1). Turn off time distribution (R type)
Load voltage: 10V (DC)
Continuous load current: 250mA (DC)
Ambient temperature: 25°C 77°F



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