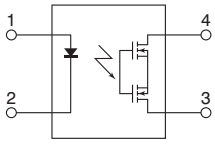
Panasonic
ideas for life

Micro-miniature SON package type
Lower output capacitance and on resistance (C× R5)
25 V load voltage.

RF PhotoMOS (AQY221N3M)

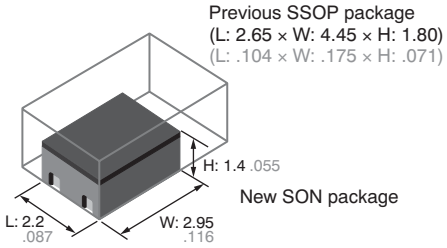
L 2.20mm .087inch
W 2.95mm .116inch
H 1.40mm .055inch



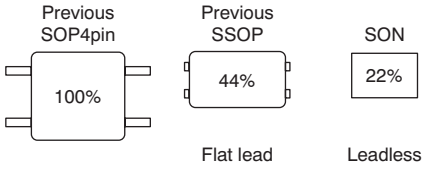
FEATURES

1. This is a new PhotoMOS relay with a SON package* volume ratio approximately 43% that of previous SSOP. Featuring a micro-miniature leadless construction, it makes possible even greater miniaturization and higher density mounting for measuring equipment.

***Small Outline No lead package**
Reduced to approximately 43% volume ratio



Area comparison (including leads)



2. Size reduction plus low output capacitance and on resistance (C5R) electrical performance achieved at the same time.
Output capacitance (Cout): 1.1pF (typ.)
On resistance (Ron): 5.5Ω (typ.)

3. High-speed operation at 0.02 ms for both turn on time and turn off time.

TYPICAL APPLICATIONS

Measuring and testing equipment

1. Test equipment
IC tester, Semiconductor performance tester, Probe cards, etc.

2. Board tester
Bare board tester, In-circuit tester, Function tester, etc.

TYPES

Type	Output rating*		Tape and reel packing style	
	Load voltage	Load current	Picked from the 1 and 4-pin side	Picked from the 2 and 3-pin side
AC/DC type	25 V	150 mA	AQY221N3MY	AQY221N3MW

Packing quantity: Carton: 3,500 pcs.; Case: 3,500 pcs.
Note: Only tape and reel package is available.
For space reasons, only "1N3" is marked on the product as the part number.
* Indicate the peak AC and DC values.

RATING

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

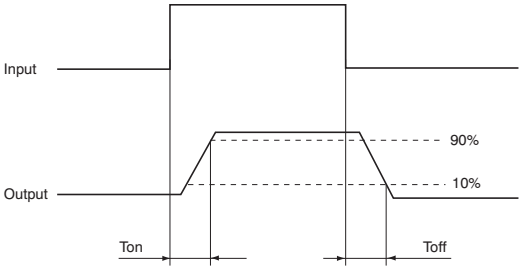
Item		Symbol	AQY221N3M	Remarks
Input	LED forward current	I_F	50mA	
	LED reverse voltage	V_R	5V	
	Peak forward current	I_{FP}	1A	f=100 Hz, Duty factor=0.1%
	Power dissipation	P_{in}	75mW	
Output	Load voltage (peak AC)	V_L	25V	
	Continuous load current (peak AC)	I_L	0.15A	Peak AC,DC
	Power dissipation	P_{out}	250mW	
Total power dissipation		P_T	300mW	
I/O isolation voltage		V_{iso}	200V AC	
Operating temperature		T_{opr}	–40°C to +85°C –40°F to +185°F	Non-condensing at low temperatures
Storage temperature		T_{stg}	–40°C to +100°C –40°F to +212°F	

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

Item			Symbol	AQY221N3M	Condition
Input	LED operate current	Typical	I_{Fon}	1.0 mA	I_L = 80 mA
		Maximum		3.0 mA	
	LED turn off current	Minimum	I_{Foff}	0.2 mA	I_L = 80 mA
		Typical		0.9 mA	
	LED dropout voltage	Typical	V_F	1.35 V (1.14 V at I_F = 5 mA)	I_F = 50 mA
		Maximum		1.5 V	
Output	On resistance	Typical	R_{on}	5.5Ω	I_F = 5 mA I_L = 80 mA Within 1 s on time
		Maximum		7.5Ω	
	Output capacitance	Typical	C_{out}	1.1 pF	I_F = 0 mA V_B = 0 V f = 1 MHz
		Maximum		1.5 pF	
	Off state leakage current	Typical	I_{Leak}	0.01 nA	I_F = 0 mA V_L = Max.
		Maximum		10 nA	
Transfer characteristics	Turn on time*	Typical	T_{on}	0.02 ms	I_F = 5 mA V_L = 10 V R_L = 125Ω
		Maximum		0.2 ms	
	Turn off time*	Typical	T_{off}	0.02 ms	I_F = 5 mA V_L = 10 V R_L = 125Ω
		Maximum		0.2 ms	
	I/O capacitance	Typical	C_{iso}	0.8 pF	f = 1 MHz V_B = 0 V
		Maximum		1.5 pF	

Notes: 1. Please refer to the schematic and wiring diagram for connection method.
2. Variation possible through combinations of output capacitance and On resistance. For more information, please contact our sales office in your area.

*Turn on/Turn off time



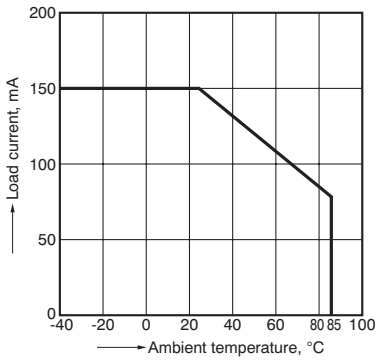
RECOMMENDED OPERATING CONDITIONS

Please obey the following conditions to ensure proper relay operation (turn on) and resetting (turn off).

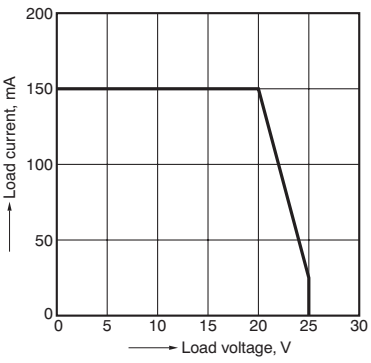
Item	Symbol	Recommended value	Unit
Input LED current	I_F	5	mA

REFERENCE DATA

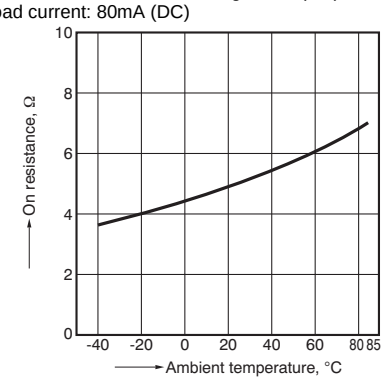
1. Load current vs. ambient temperature characteristics
Allowable ambient temperature: –40°C to +85°C
–40°F to +185°F



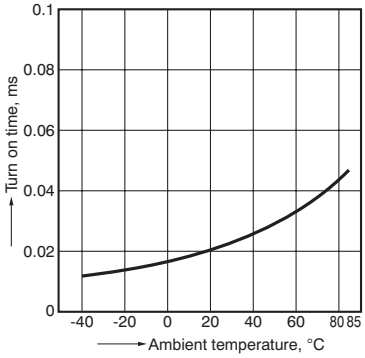
2. Load current vs. Load voltage characteristics
Ambient temperature: 25°C 77°F



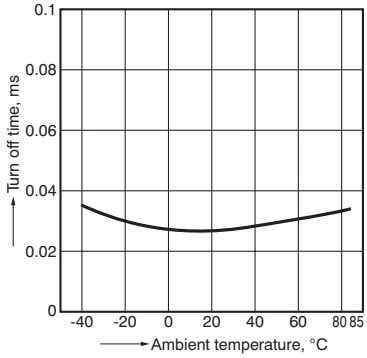
3. On resistance vs. ambient temperature characteristics
Measured portion: between terminals 3 and 4
LED current: 5 mA; Load voltage: 10V (DC);
Load current: 80mA (DC)



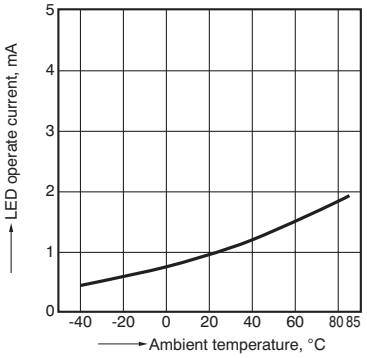
4. Turn on time vs. ambient temperature characteristics
Measured portion: between terminals 3 and 4
LED current: 5 mA; Load voltage: 10V (DC);
Continuous load current: 80mA (DC)



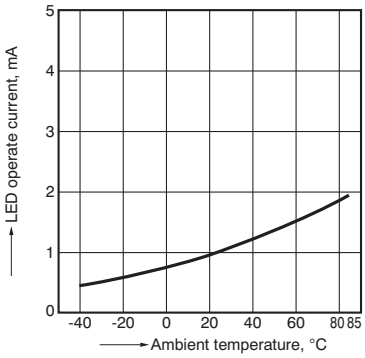
5. Turn off time vs. ambient temperature characteristics
Measured portion: between terminals 3 and 4
LED current: 5 mA; Load voltage: 10V (DC);
Continuous load current: 80mA (DC)



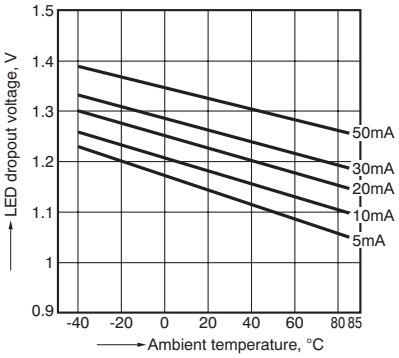
6. LED operate current vs. ambient temperature characteristics
Measured portion: between terminals 3 and 4
Load voltage: 10V (DC);
Continuous load current: 80mA (DC)



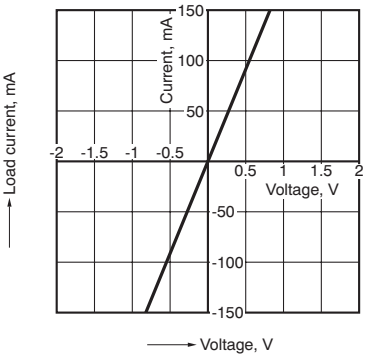
7. LED turn off current vs. ambient temperature characteristics
Measured portion: between terminals 3 and 4
Load voltage: 10V (DC);
Continuous load current: 80mA (DC)



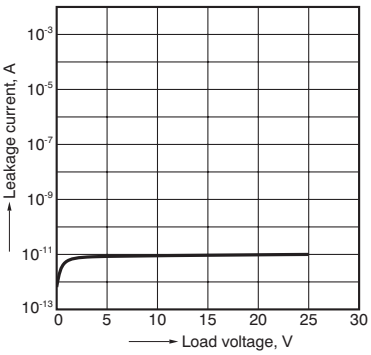
8. LED dropout voltage vs. ambient temperature characteristics
LED current: 5 to 50 mA



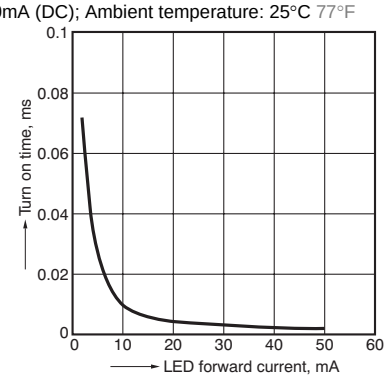
9. Current vs. voltage characteristics of output at MOS portion
Measured portion: between terminals 3 and 4
Ambient temperature: 25°C 77°F



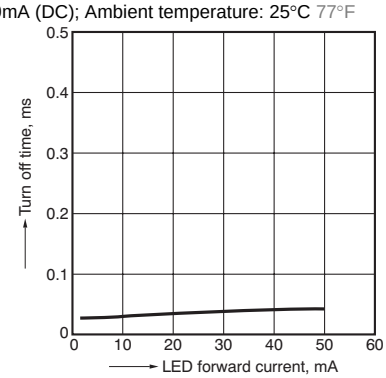
10. Off state leakage current vs. load voltage characteristics
Measured portion: between terminals 3 and 4
Ambient temperature: 25°C 77°F



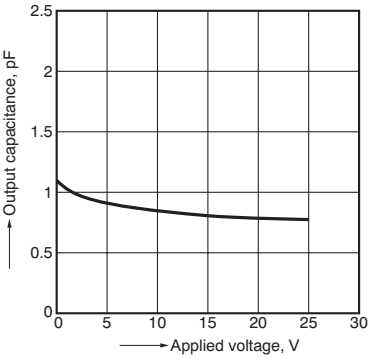
11. Turn on time vs. LED forward current characteristics
Measured portion: between terminals 3 and 4
Load voltage: 10V (DC); Continuous load current: 80mA (DC); Ambient temperature: 25°C 77°F



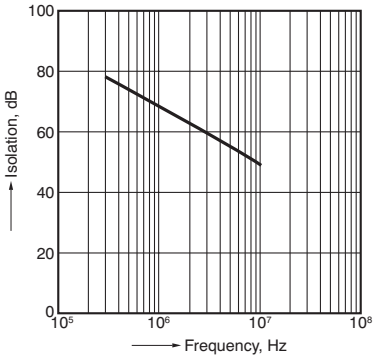
12. Turn off time vs. LED forward current characteristics
Measured portion: between terminals 3 and 4
Load voltage: 10V (DC); Continuous load current: 80mA (DC); Ambient temperature: 25°C 77°F



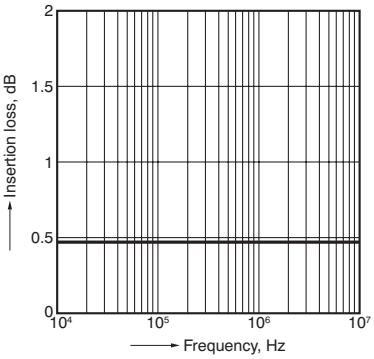
13. Output capacitance vs. applied voltage characteristics
Measured portion: between terminals 3 and 4
Frequency: 1 MHz, 30m Vrms; Ambient temperature: 25°C 77°F



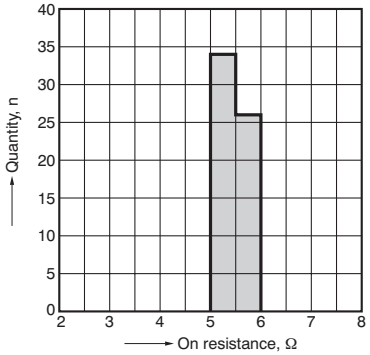
14. Isolation vs. frequency characteristics (50Ω impedance)
Measured portion: between terminals 3 and 4
Ambient temperature: 25°C 77°F



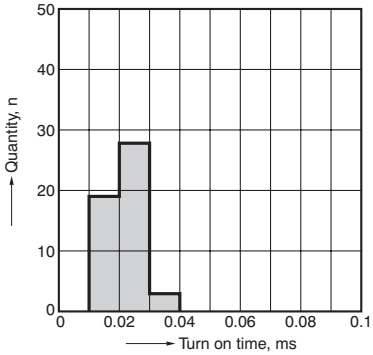
15. Insertion loss vs. frequency characteristics (50Ω impedance)
Measured portion: between terminals 3 and 4
Ambient temperature: 25°C 77°F



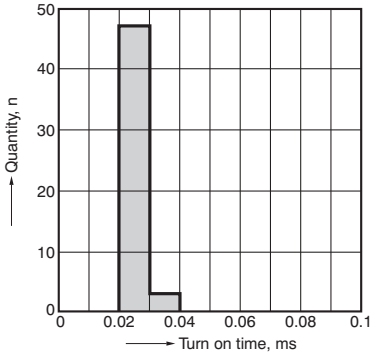
16. On resistance distribution
Measured portion: between terminals 3 and 4
Continuous load current: 80mA (DC), n: 50pcs.
Ambient temperature: 25°C 77°F



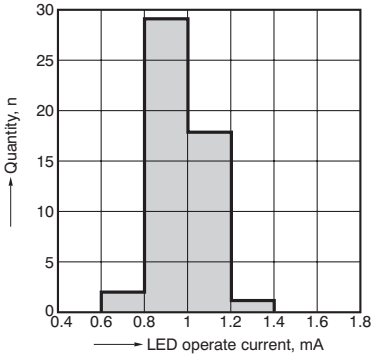
17. Turn on time distribution
Load voltage: 10V (DC)
Continuous load current: 80mA (DC), n: 50pcs.
Ambient temperature: 25°C 77°F



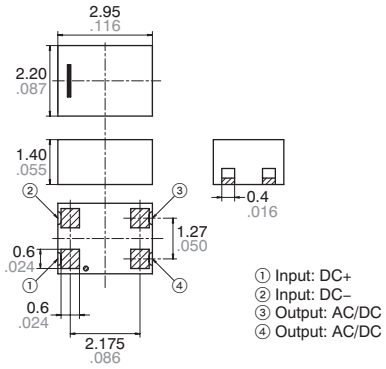
18. Turn off time distribution
Load voltage: 10V (DC)
Continuous load current: 80mA (DC), n: 50pcs.
Ambient temperature: 25°C 77°F



19. LED operate current distribution
Load voltage: 10V (DC)
Continuous load current: 80mA (DC), n: 50pcs.
Ambient temperature: 25°C 77°F

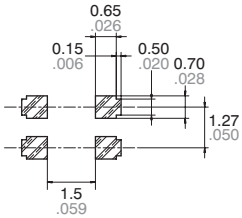


DIMENSIONS (Unit: mm inch)



General Tolerance: ±0.2 ±.008

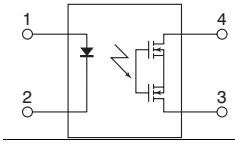
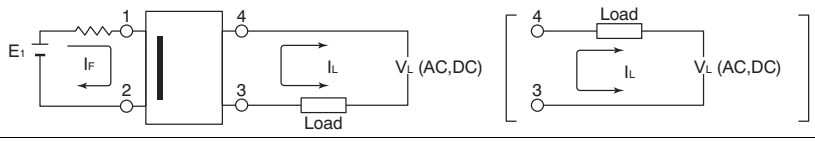
Recommended mounting pad
(Top view)



Tolerance: ±0.1 ±.004

SCHEMATIC AND WIRING DIAGRAMS

E_1: Power source at input side; I_F: LED forward current; V_L: Load voltage; I_L: Load current

Schematic	Output configu-ration	Load	Con-nection	Wiring diagram
	1a	AC/DC	—	

Cautions for Use

1. Derated designs

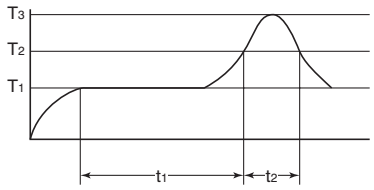
Consideration of reliability is absolutely imperative for derated designs because of its importance to the working lifetime of the product.

Please be sure to derate sufficiently from the maximum rating of the relay when designing a system. Be sure to conduct real-life testing of the product; and, if necessary, provide extra leeway against the maximum rating by taking sufficiently safety measures.

2. Soldering

• Example of recommended soldering conditions

IR (Infrared reflow) soldering method



T1 = 150 to 180°C 302 to 356°F
T2 = 230°C 446°F
T3 = 245°C 473°F or less
t1 = 60 to 120 s or less
t2 = 30 s or less

• When using lead-free solder, we recommend a type with an alloy composition of Sn 3.0 Ag 0.5 Cu. Please inquire about soldering conditions and other details.

• The temperature profile indicates the temperature of the soldered terminal on the surface of the PC board. The ambient temperature may increase excessively. Check the temperature under mounting conditions.

3. Transportation and storage

1) Extreme vibration during transport will damage the relay. Handle the outer and inner boxes with care.

2) PhotoMOS relays implemented in SON type are sensitive to moisture and come in sealed moisture-proof packages. Observe the following cautions on storage.

• After the moisture-proof package is unsealed, take the devices out of storage as soon as possible (within 1 month, less than 45°C 113°F/70% R.H.).

• If the devices are to be left in storage for a considerable period after the moisture-proof package has been unsealed, it is recommended to keep them in another moisture-proof bag containing silica gel (within 3 months at the most).

3) Storage under extreme conditions will cause soldering degradation, external appearance defects, and deterioration of the characteristics. The following storage conditions are recommended:

• Temperature: 0 to 45°C 32 to 113°F

• Humidity: Less than 70% R.H.

• Atmosphere: No harmful gasses such as sulfurous acid gas, minimal dust.