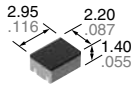
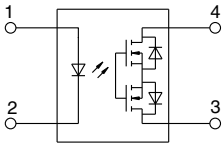
Micro-miniature SON package C×R10: 40V load voltage C×R5: 25V load voltage

PhotoMOS®
RF SON 1 Form A C×R10/C×R5
(AQY22○○○M)



mm inch



RoHS compliant

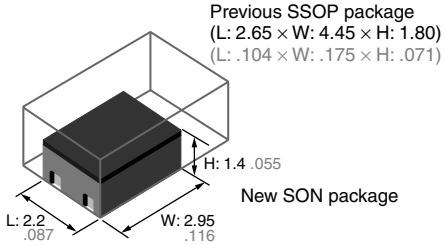
FEATURES

1. Super miniature SON* package contributes to space savings and high density mounting.

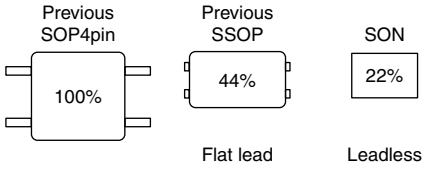
The SON type is a new PhotoMOS with approximately 43% the volume ratio of existing SSOP type. The super miniature leadless construction reduces the mounting area and enables high density mounting.

***Small Outline No-lead package**

Reduced to approximately 43% volume ratio



Area comparison (including leads)



2. Both low on-resistance (R type) and low capacitance (C type) available at

- **C×R10**
  R type: Output capacitance Typ. 14pF
  On resistance Typ. 0.8Ω
  C type: Output capacitance Typ. 1.1pF
  On resistance Typ. 9.5Ω
- **C×R5**
  Output capacitance Typ. 1.1pF
  On resistance Typ. 5.5Ω

TYPICAL APPLICATIONS

1. Measuring equipment

IC tester, Probe cards, board tester and other testing equipment

2. Telecommunication or broadcasting equipment

3. Medical equipment

TYPES

Type			Output rating*1		Package	Tape and reel packing style*2		Packing quantity in tape and reel
			Load voltage	Load current		Picked from the 1 and 4-pin side	Picked from the 2 and 3-pin side	
AC/DC dual use	C×R10	Low on-resistance (R type)	40 V	250 mA	SON	AQY221R2MY	AQY221R2MW	3,500 pcs.
		Low capacitance (C type)	40 V	120 mA		AQY221N2MY	AQY221N2MW	
	C×R5		25 V	150 mA		AQY221N3MY	AQY221N3MW	

Notes: *1 Indicate the peak AC and DC values.
*2 Only tape and reel package is available. Packing quantity of 1,000 pieces is possible. Please consult us.
For space reasons, only “1R2”, “1N2” or “1N3” is marked on the product as the part number.

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RATING

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

Item		Symbol	C×R10 R type	C×R10 C type	C×R5	Remarks
			AQY221R2M	AQY221N2M	AQY221N3M	
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	40V	25V	
	Continuous load current	I_L	0.25A	0.12A	0.15A	Peak AC, DC
	Peak load current	I_{peak}	0.75A	–	–	100ms (1shot), V_L=DC
	Power dissipation	P_{out}	250mW			
Total power dissipation		P_T	300mW			
I/O isolation voltage		V_{iso}	200Vrms			
Ambient temperature	Operating	T_{opr}	–40 to +85°C –40 to +185°F			(Non-icing at low temperatures)
	Storage	T_{stg}	–40 to +100°C –40 to +212°F			

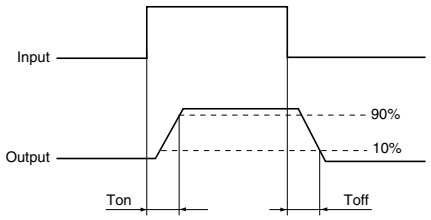
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

Item			Symbol	C×R10 R type	C×R10 C type	C×R5	Condition
				AQY221R2M	AQY221N2M	AQY221N3M	
Input	LED operate current	Typical	I_{Fon}	0.8 mA	1.0 mA		AQY221R2M: I_L = 250 mA AQY221N2M: I_L = 80 mA AQY221N3M: I_L = 80 mA
		Maximum		3.0 mA			
	LED turn off current	Minimum	I_{Foff}	0.1 mA	0.2 mA		
		Typical		0.7 mA	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}	0.8Ω	9.5Ω	5.5Ω	AQY221R2M: I_F = 5 mA, I_L = 250 mA AQY221N2M: I_F = 5 mA, I_L = 80 mA AQY221N3M: I_F = 5 mA, I_L = 80 mA Within 1 s
		Maximum		1.25Ω	12.5Ω	7.5Ω	
	Output capacitance	Typical	C_{out}	14 pF	1.1 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}	0.02 nA	0.01 nA		I_F = 0 mA V_L = Max.
		Maximum		*10 nA			
Transfer characteristics	Turn on time**	Typical	T_{on}	0.2 ms	0.02 ms		AQY221R2M: I_F = 5 mA, V_L = 10 V, R_L = 40Ω AQY221N2M: I_F = 5 mA, V_L = 10 V, R_L = 125Ω AQY221N3M: I_F = 5 mA, V_L = 10 V, R_L = 125Ω
		Maximum		0.5 ms	0.2 ms		
	Turn off time**	Typical	T_{off}	0.04 ms	0.02 ms		
		Maximum		0.2 ms			
	I/O capacitance	Typical	C_{iso}	0.8 pF			f = 1 MHz V_B = 0 V
		Maximum		1.5 pF			

Note: Variation possible through combinations of output capacitance and on resistance. For more information, please contact our sales office in your area.

*Available as custom orders (1 nA or less)

**Turn on/Turn off time



3. Recommended operating conditions (Ambient temperature: 25°C 77°F)

Please use under recommended operating conditions to obtain expected characteristics.

Item		Symbol	Min.	Max.	Unit
LED current		I_F	5	30	mA
AQY221R2M	Load voltage (Peak AC)	V_L	—	15	V
	Continuous load current	I_L	—	0.25	A
AQY221N2M	Load voltage (Peak AC)	V_L	—	15	V
	Continuous load current	I_L	—	0.12	A
AQY221N3M	Load voltage (Peak AC)	V_L	—	15	V
	Continuous load current	I_L	—	0.15	A

■ **These products are not designed for automotive use.**
If you are considering to use these products for automotive applications, please contact your local Panasonic Corporation technical representative.

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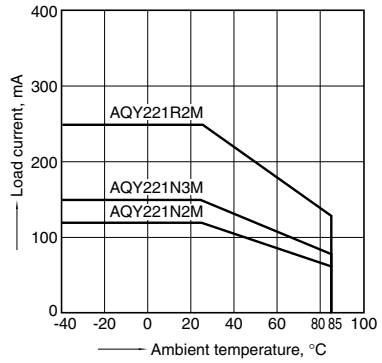
REFERENCE DATA

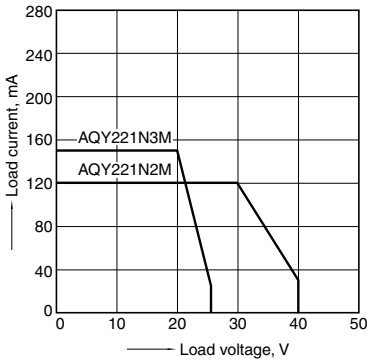
1. Load current vs. ambient temperature characteristics

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



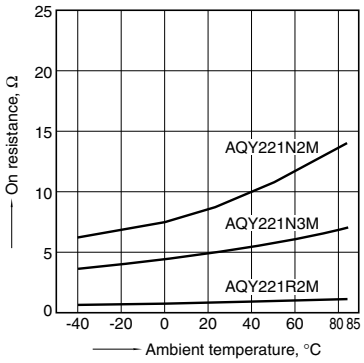
2. Load current vs. Load voltage characteristics

Ambient temperature: 25°C 77°F



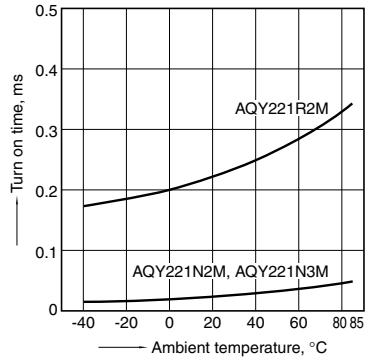
3. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4; LED current: 5 mA; Load voltage: 10V (DC); Load current: 250mA (DC) AQY221R2M, 80mA (DC) AQY221N2M, AQY221N3M



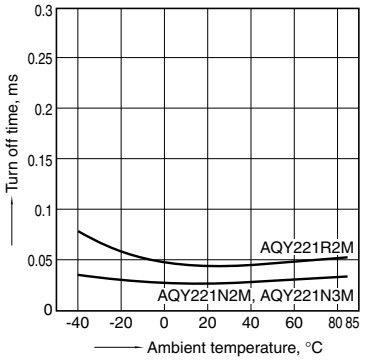
4. Turn on time vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4; LED current: 5 mA; Load voltage: 10V (DC); Continuous load current: 250mA (DC) AQY221R2M, 80mA (DC) AQY221N2M, AQY221N3M



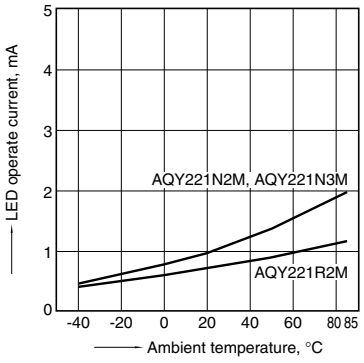
5. Turn off time vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4; LED current: 5 mA; Load voltage: 10V (DC); Continuous load current: 250mA (DC) AQY221R2M, 80mA (DC) AQY221N2M, AQY221N3M



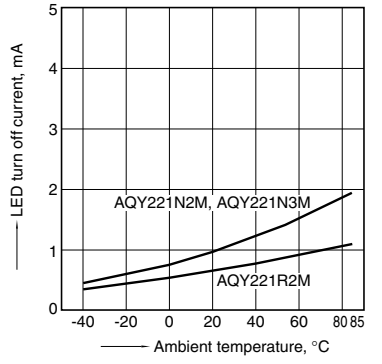
6. LED operate current vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4; Load voltage: 10V (DC); Continuous load current: 250mA (DC) AQY221R2M, 80mA (DC) AQY221N2M, AQY221N3M



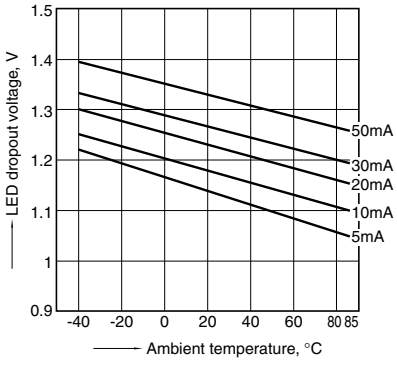
7. LED turn off current vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4; Load voltage: 10V (DC); Continuous load current: 250mA (DC) AQY221R2M, 80mA (DC) AQY221N2M, AQY221N3M



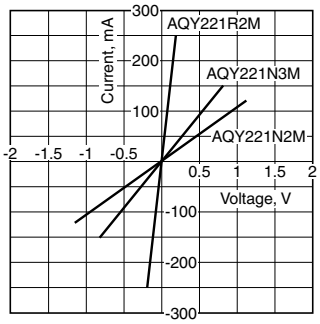
8. LED dropout voltage vs. ambient temperature characteristics

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



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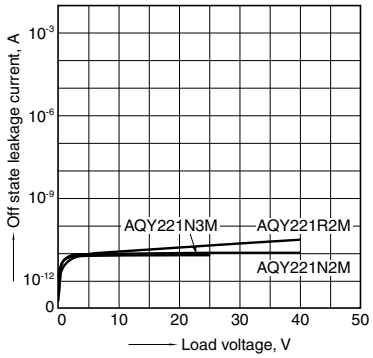
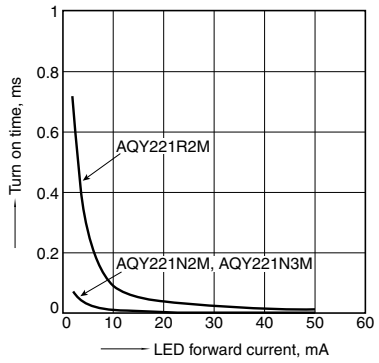
10. Off state leakage current vs. load voltage characteristics

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



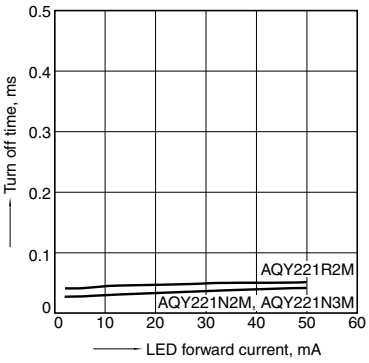
11. Turn on time vs. LED forward current characteristics

Measured portion: between terminals 3 and 4; Load voltage: 10V (DC); Continuous load current: 250mA (DC) AQY221R2M, 80mA (DC) AQY221N2M, AQY221N3M; Ambient temperature: 25°C 77°F



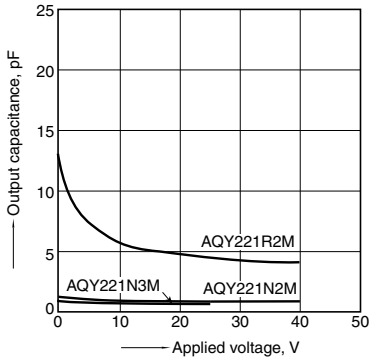
12. Turn off time vs. LED forward current characteristics

Measured portion: between terminals 3 and 4; Load voltage: 10V (DC); Continuous load current: 250mA (DC) AQY221R2M, 80mA (DC) AQY221N2M, AQY221N3M; Ambient temperature: 25°C 77°F



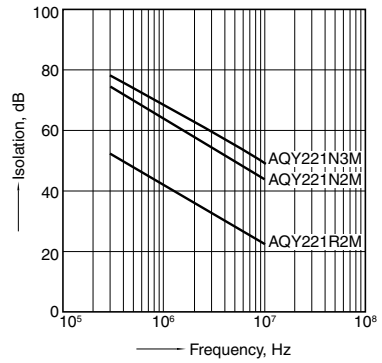
13. Output capacitance vs. applied voltage characteristics

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



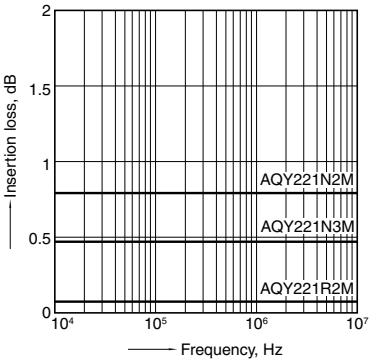
14. Isolation vs. frequency characteristics (50Ω impedance)

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



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