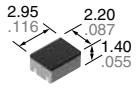
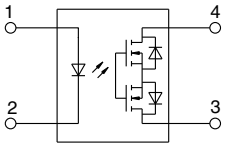
# Micro-miniature SON package CxR10: 40V load voltage CxR5: 25V load voltage

PhotoMOS®
RF SON 1 Form A CxR10/CxR5
(AQY22○○○M)




mm inch




**RoHS compliant**

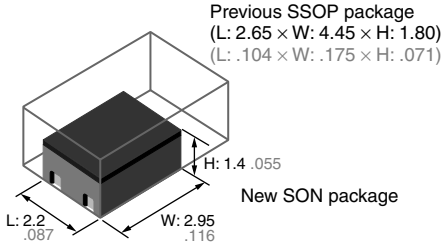
## FEATURES

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

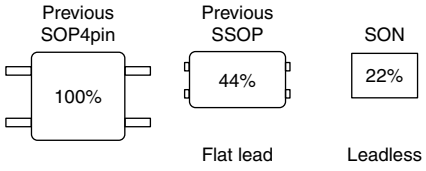
The SON type is a new PhotoMOS with approximately 43% the volume ratio of existing SSOP type. The super miniature leadless construction reduces the mounting area and enables high density mounting.

***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**

- **CxR10**
  R type: Output capacitance Typ. 14pF
  On resistance Typ. 0.8Ω
  C type: Output capacitance Typ. 1.1pF
  On resistance Typ. 9.5Ω
- **CxR5**
  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 | CxR10 | 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 | |
| | CxR5 | | 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.

# 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 | | | |

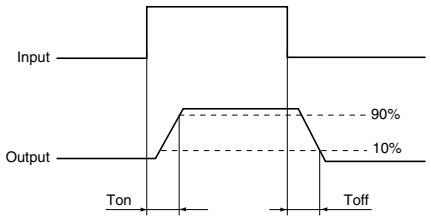
**2. Electrical characteristics** (Ambient temperature: 25°C 77°F)

| 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<br>AQY221N2M: $I_L$ = 80 mA<br>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<br>AQY221N2M: $I_F$ = 5 mA, $I_L$ = 80 mA<br>AQY221N3M: $I_F$ = 5 mA, $I_L$ = 80 mA<br>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<br>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<br>$V_L$ = 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<br>AQY221N2M: $I_F$ = 5 mA, $V_L$ = 10 V, $R_L$ = 125Ω<br>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<br>$V_B$ = 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.

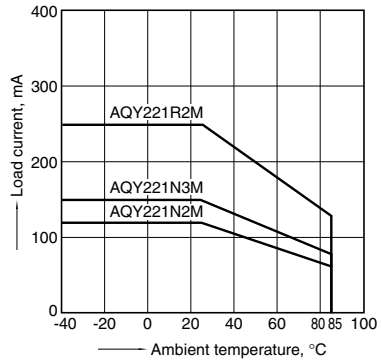
| Item | | Symbol | Min. | Max. | Unit |
|---|---|---|---|---|---|
| LED current | | $I_F$ | 5 | 30 | mA |
| AQY221R2M | Load voltage (Peak AC) | $V_L$ | — | 15 | V |
| | Continuous load current | $I_L$ | — | 0.25 | A |
| AQY221N2M | Load voltage (Peak AC) | $V_L$ | — | 15 | V |
| | Continuous load current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

# REFERENCE DATA

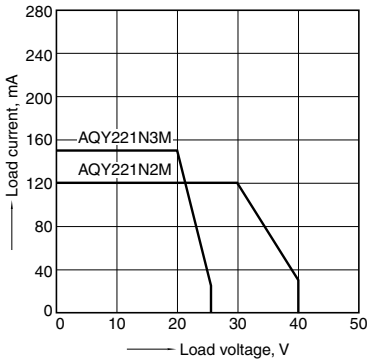
1. Load current vs. ambient temperature characteristics

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



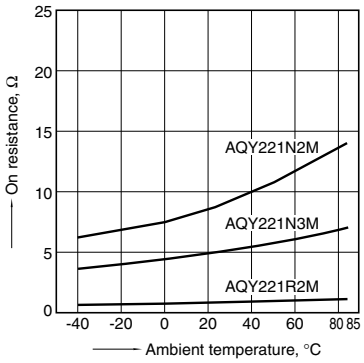

2. Load current vs. Load voltage characteristics

Ambient temperature: 25°C 77°F



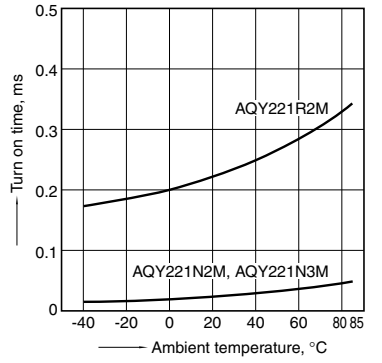

3. On resistance vs. ambient temperature characteristics

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



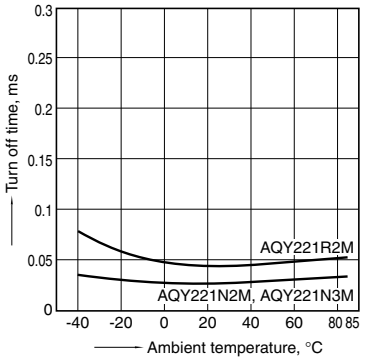

4. Turn on time vs. ambient temperature characteristics

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



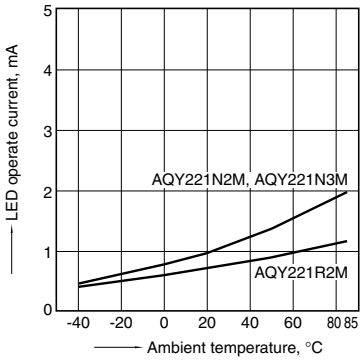

5. Turn off time vs. ambient temperature characteristics

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



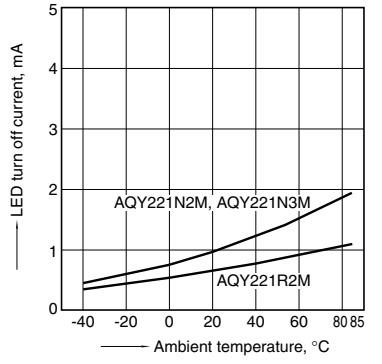

6. LED operate current vs. ambient temperature characteristics

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



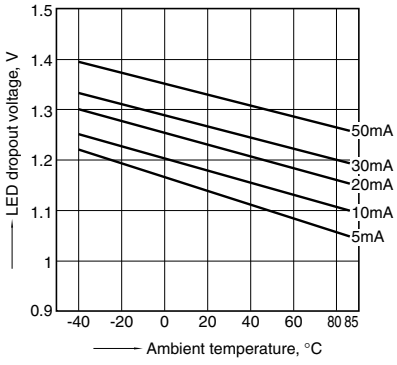

7. LED turn off current vs. ambient temperature characteristics

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



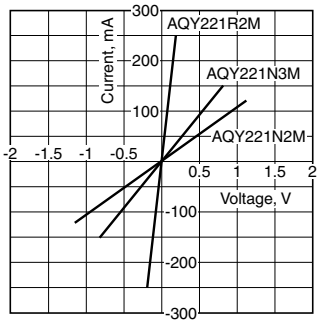

8. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



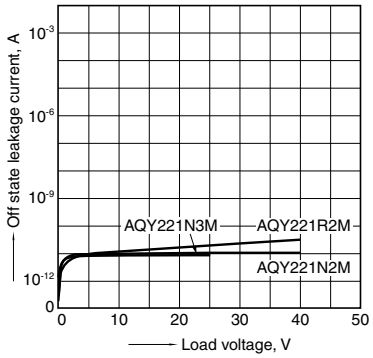

9. Current vs. voltage characteristics of output at MOS portion

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



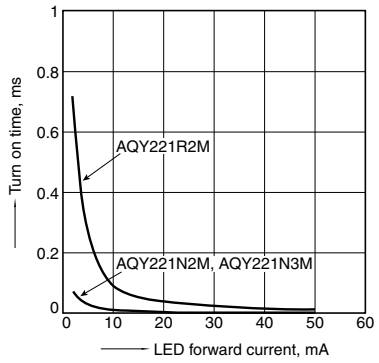
10. Off state leakage current vs. load voltage characteristics

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



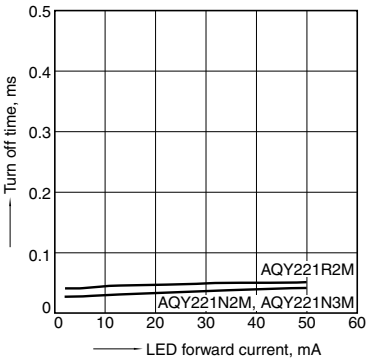

11. Turn on time vs. LED forward current characteristics

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



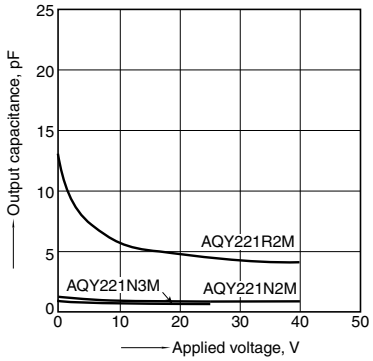

12. Turn off time vs. LED forward current characteristics

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



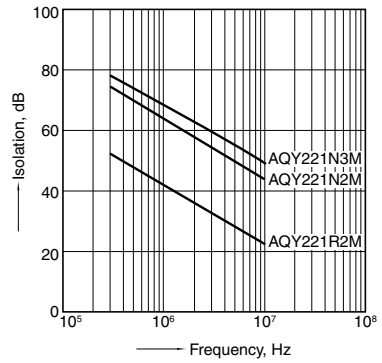

13. Output capacitance vs. applied voltage characteristics

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



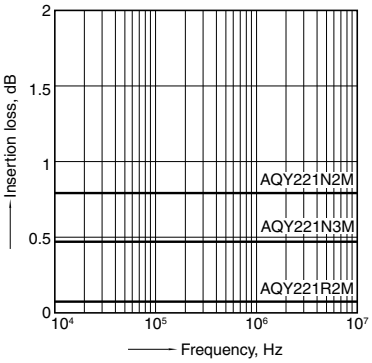

14. Isolation vs. frequency characteristics (50Ω impedance)

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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