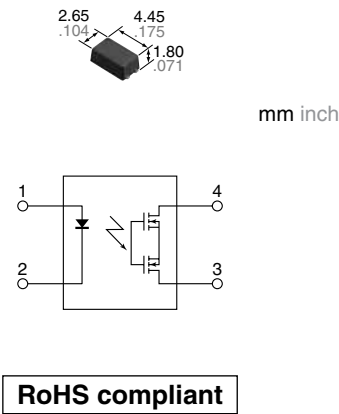
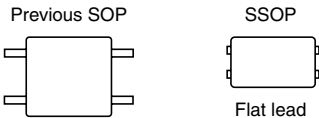




FEATURES

**1. Miniature package (SSOP) using a new flat lead terminal shape**  
Compared to previous models (SOP 4-pin), mounting area can be reduced by approximately 53%\*. This contributes to improved output signal transit characteristics.



\*Comparison of area of SSOP and SOP 4-pin (including leads).

**2. Both low on-resistance (R type) and low capacitance (C type) available at excellent characteristics of C×R10**

|              |                      | On resistance (Typical) | Output capacitance (Typical) |
|--------------|----------------------|-------------------------|------------------------------|
| C×R10 R type | <b>New</b> AQY221R6V | 0.18Ω                   | 37.5pF                       |
|              | AQY221R4V            | 0.55Ω                   | 24pF                         |
|              | AQY221R2V            | 0.75Ω                   | 12.5pF                       |
| C×R10 C type | AQY221N2V            | 9.5Ω                    | 1.0pF                        |
| C×R5         | AQY221N3V            | 5.5Ω                    | 1.0pF                        |

TYPICAL APPLICATIONS

- 1. Measuring and testing equipment**  
Semiconductor testing equipment, Probe cards, Datalogger, Board tester and other testing equipment
- 2. Telecommunication and 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) | 30 V            | 1,000 mA     | SSOP    | AQY221R6VY                       | AQY221R6VW                       | 3,500 pcs.                        |
|                |       |                            | 40 V            | 500 mA       |         | AQY221R4VY                       | AQY221R4VW                       |                                   |
|                |       |                            | 40 V            | 250 mA       |         | AQY221R2VY                       | AQY221R2VW                       |                                   |
|                |       | Low capacitance (C type)   | 40 V            | 120 mA       |         | AQY221N2VY                       | AQY221N2VW                       |                                   |
|                | C×R5  |                            | 25 V            | 150 mA       |         | AQY221N3VY                       | AQY221N3VW                       |                                   |

Notes: \*1. Indicate the peak AC and DC values.  
\*2. Tape and reel is the standard packing style for SSOP. Packing quantity of 1,000 pieces is possible. Please consult us.  
For space reasons, the three initial letters of the part number "AQY", the package (SSOP) indication "V", and the packaging style "Y" or "W" are not marked on the device. (Ex. the label for product number AQY221R4VY is 221R4)

RATING

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

| Item                    |                         | Symbol            | C×R10 R type                    |           |           | C×R10 C type | C×R5      | Remarks                            |
|-------------------------|-------------------------|-------------------|---------------------------------|-----------|-----------|--------------|-----------|------------------------------------|
|                         |                         |                   | AQY221R6V                       | AQY221R4V | AQY221R2V | AQY221N2V    | AQY221N3V |                                    |
| 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>    | 30V                             | 40V       |           |              | 25V       |                                    |
|                         | Continuous load current | I <sub>L</sub>    | 1A                              | 0.5A      | 0.25A     | 0.12A        | 0.15A     | Peak AC, DC                        |
|                         | Peak load current       | I <sub>peak</sub> | 1.5A                            | 1A        | 0.75A     | 0.3A         | 0.4A      | 100ms (1shot), V <sub>L</sub> =DC  |
|                         | Power dissipation       | P <sub>out</sub>  | 250mW                           |           |           |              |           |                                    |
| Total power dissipation |                         | P <sub>T</sub>    | 300mW                           |           |           |              |           |                                    |
| I/O isolation voltage   |                         | V <sub>iso</sub>  | 1,500V AC                       |           |           |              |           |                                    |
| Operating temperature   |                         | T <sub>opr</sub>  | −40°C to +85°C −40°F to +185°F  |           |           |              |           | Non-condensing at low temperatures |
| Storage temperature     |                         | T <sub>stg</sub>  | −40°C to +100°C −40°F to +212°F |           |           |              |           |                                    |

# RF SSOP 1 Form A C×R10/C×R5 (AQY221○○V)

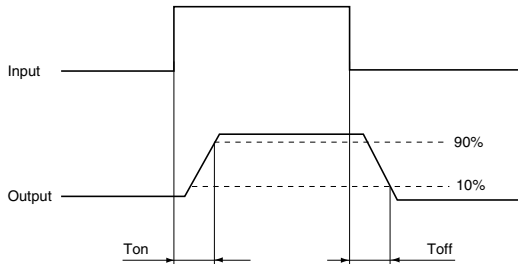
## 2. Electrical characteristics (Ambient temperature: 25°C 77°F)

| Item                     |                                  |         | Symbol            | C×R10 R type                             |           |           | C×R10 C type | C×R5      | Condition                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                        |
|--------------------------|----------------------------------|---------|-------------------|------------------------------------------|-----------|-----------|--------------|-----------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
|                          |                                  |         |                   | AQY221R6V                                | AQY221R4V | AQY221R2V | AQY221N2V    | AQY221N3V |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                        |
| Input                    | LED operate current              | Typical | I <sub>Fon</sub>  | 0.7 mA                                   | 0.9 mA    |           | 1.0 mA       |           | AQY221R6V: I <sub>L</sub> = 100 mA<br>AQY221R4V: I <sub>L</sub> = 500 mA<br>AQY221R2V: I <sub>L</sub> = 250 mA<br>AQY221N2V: I <sub>L</sub> = 80 mA<br>AQY221N3V: I <sub>L</sub> = 80 mA                                                                                                                                                                                                                                            |                                                        |
|                          |                                  | Maximum |                   | 3.0 mA                                   |           |           |              |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                        |
|                          | LED turn off current             | Minimum | I <sub>Foff</sub> | 0.1 mA                                   |           |           | 0.2 mA       |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                        |
|                          |                                  | Typical |                   | 0.6 mA                                   | 0.8 mA    |           | 0.9 mA       |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                        |
|                          | LED dropout voltage*1            | Typical | V <sub>F</sub>    | 1.35 V (1.14 V at I <sub>F</sub> = 5 mA) |           |           |              |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     | I <sub>F</sub> = 50 mA                                 |
| Maximum                  |                                  | 1.5 V   |                   |                                          |           |           |              |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                        |
| Output                   | On resistance                    | Typical | R <sub>on</sub>   | 0.18Ω                                    | 0.55Ω     | 0.75Ω     | 9.5Ω         | 5.5Ω      | AQY221R6V:<br>I <sub>F</sub> = 5 mA, I <sub>L</sub> = 1000 mA<br>AQY221R4V:<br>I <sub>F</sub> = 5 mA, I <sub>L</sub> = 500 mA<br>AQY221R2V:<br>I <sub>F</sub> = 5 mA, I <sub>L</sub> = 250 mA<br>AQY221N2V:<br>I <sub>F</sub> = 5 mA, I <sub>L</sub> = 80 mA<br>AQY221N3V:<br>I <sub>F</sub> = 5 mA, I <sub>L</sub> = 80 mA<br>Within 1 s on time                                                                                   |                                                        |
|                          |                                  | Maximum |                   | 0.35Ω                                    | 1Ω        | 1.25Ω     | 12.5Ω        | 7.5Ω      |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                        |
|                          | Output capacitance               | Typical | C <sub>out</sub>  | 37.5 pF                                  | 24 pF     | 12.5 pF   | 1.0 pF       |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     | I <sub>F</sub> = 0 mA, V <sub>B</sub> = 0 V, f = 1 MHz |
|                          |                                  | Maximum |                   | 100 pF                                   | 30 pF     | 18 pF     | 1.5 pF       |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                        |
|                          | Off state leakage current        | Typical | I <sub>Leak</sub> | —                                        | 0.02 nA   |           | 0.01 nA      |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     | I <sub>F</sub> = 0 mA, V <sub>L</sub> = Max.           |
|                          |                                  | Maximum |                   | 10 nA                                    |           |           |              |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                        |
| Transfer characteristics | Turn on time                     | Typical | T <sub>on</sub>   | 0.2 ms                                   | 0.25 ms   | 0.10 ms   | 0.02 ms      |           | AQY221R6V:<br>I <sub>F</sub> = 5 mA, V <sub>L</sub> = 10 V, R <sub>L</sub> = 100Ω<br>AQY221R4V:<br>I <sub>F</sub> = 5 mA, V <sub>L</sub> = 10 V, R <sub>L</sub> = 20Ω<br>AQY221R2V:<br>I <sub>F</sub> = 5 mA, V <sub>L</sub> = 10 V, R <sub>L</sub> = 40Ω<br>AQY221N2V:<br>I <sub>F</sub> = 5 mA, V <sub>L</sub> = 10 V, R <sub>L</sub> = 125Ω<br>AQY221N3V:<br>I <sub>F</sub> = 5 mA, V <sub>L</sub> = 10 V, R <sub>L</sub> = 125Ω |                                                        |
|                          |                                  | Maximum |                   | 0.5 ms                                   | 0.75 ms   | 0.5 ms    |              | 0.2 ms    |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                        |
|                          | Turn off time                    | Typical | T <sub>off</sub>  | 0.07 ms                                  | 0.08 ms   |           | 0.02 ms      |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                        |
|                          |                                  | Maximum |                   | 0.2 ms                                   | 0.2 ms    |           |              |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                        |
|                          | I/O capacitance                  | Typical | C <sub>iso</sub>  | 0.8 pF                                   |           |           |              |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     | f = 1 MHz, V <sub>B</sub> = 0 V                        |
|                          |                                  | Maximum |                   | 1.5 pF                                   |           |           |              |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                        |
|                          | Initial I/O isolation resistance | Minimum | R <sub>iso</sub>  | 1,000 MΩ                                 |           |           |              |           |                                                                                                                                                                                                                                                                                                                                                                                                                                     | 500 V DC                                               |

Notes: 1. Please refer to the "Schematic and Wiring Diagrams" 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 device operation and resetting.

| Item              | Symbol | Recommended value | Unit |
|-------------------|--------|-------------------|------|
| Input LED current | $I_F$  | 5                 | mA   |

■ For Dimensions.

■ For Schematic and Wiring Diagrams.

■ For Cautions for Use.

■ 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.

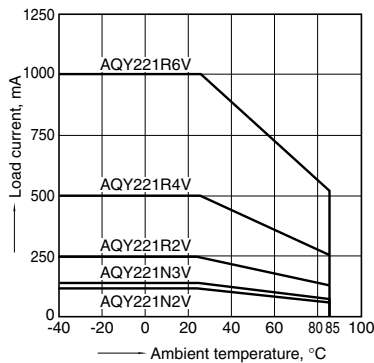
For more information.

# RF SSOP 1 Form A C×R10/C×R5 (AQY221○○V)

## REFERENCE DATA

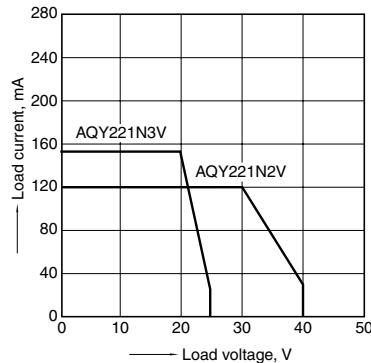
### 1. Load current vs. ambient temperature characteristics

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



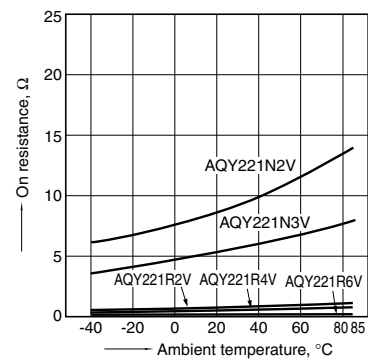
### 2. Load current vs. Load voltage characteristics

Ambient temperature: 25°C 77°F



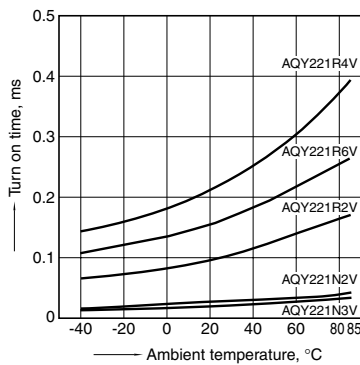
### 3. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4  
LED current: 5 mA; Load voltage: 10V (DC)  
Continuous load current: 100mA (DC) AQY221R6V, 500mA (DC) AQY221R4V, 250mA (DC) AQY221R2V, 80mA (DC) AQY221N2V, AQY221N3V



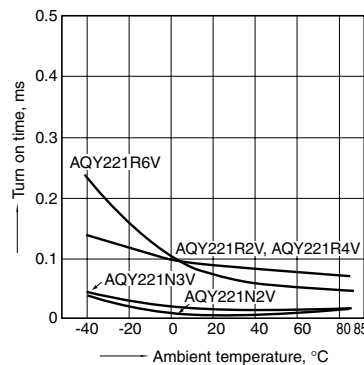
### 4. Turn on time vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4  
LED current: 5 mA; Load voltage: 10V (DC)  
Continuous load current: 100mA (DC) AQY221R6V, 500mA (DC) AQY221R4V, 250mA (DC) AQY221R2V, 80mA (DC) AQY221N2V, AQY221N3V



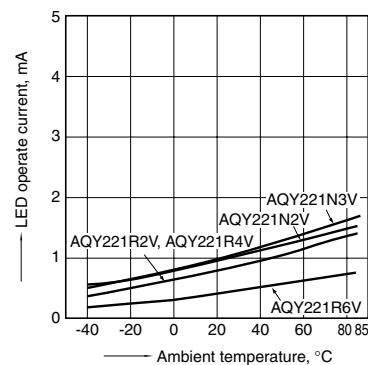
### 5. Turn off time vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4  
LED current: 5 mA; Load voltage: 10V (DC)  
Continuous load current: 100mA (DC) AQY221R6V, 500mA (DC) AQY221R4V, 250mA (DC) AQY221R2V, 80mA (DC) AQY221N2V, AQY221N3V



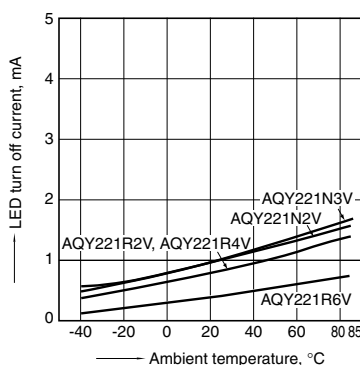
### 6. LED operate current vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4  
Load voltage: 10V (DC)  
Continuous load current: 100mA (DC) AQY221R6V, 500mA (DC) AQY221R4V, 250mA (DC) AQY221R2V, 80mA (DC) AQY221N2V, AQY221N3V



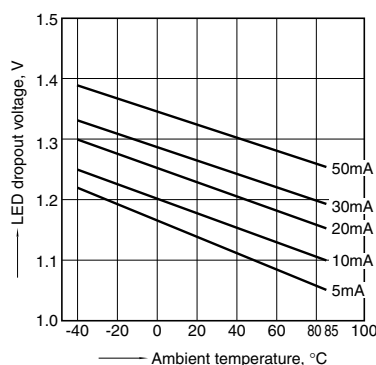
### 7. LED turn off current vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4  
Load voltage: 10V (DC)  
Continuous load current: 100mA (DC) AQY221R6V, 500mA (DC) AQY221R4V, 250mA (DC) AQY221R2V, 80mA (DC) AQY221N2V, AQY221N3V



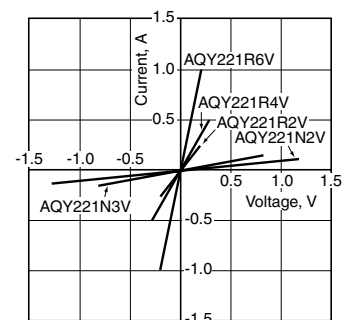
### 8. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



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

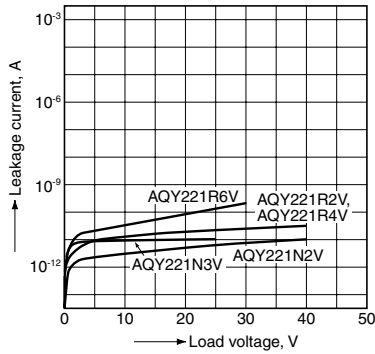
Measured portion: between terminals 3 and 4  
Ambient temperature: 25°C 77°F



# RF SSOP 1 Form A C×R10/C×R5 (AQY221○○V)

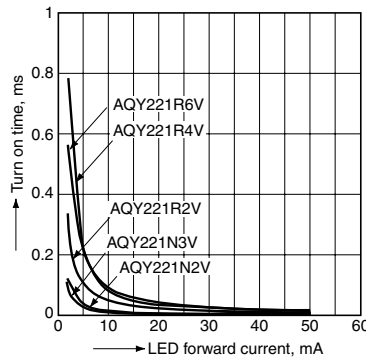
## 10. Off state leakage current vs. load voltage characteristics

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



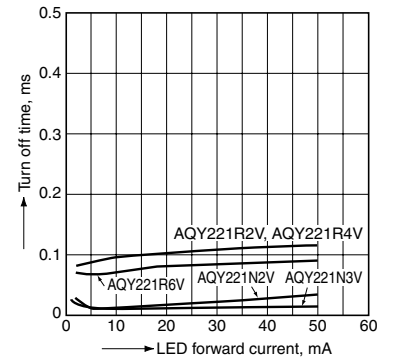
## 11. Turn on time vs. LED forward current characteristics

Measured portion: between terminals 3 and 4  
Load voltage: 10V (DC)  
Continuous load current: 100mA (DC) AQY221R6V, 500mA (DC) AQY221R4V, 250mA (DC) AQY221R2V, 80mA (DC) AQY221N2V, AQY221N3V  
Ambient temperature: 25°C 77°F



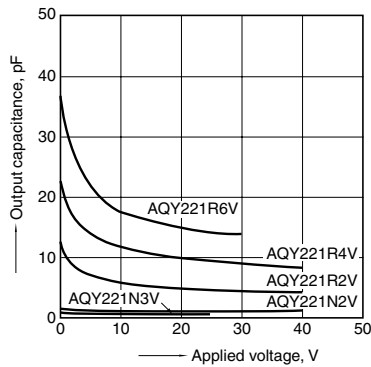
## 12. Turn off time vs. LED forward current characteristics

Measured portion: between terminals 3 and 4  
Load voltage: 10V (DC)  
Continuous load current: 100mA (DC) AQY221R6V, 500mA (DC) AQY221R4V, 250mA (DC) AQY221R2V, 80mA (DC) AQY221N2V, AQY221N3V  
Ambient temperature: 25°C 77°F



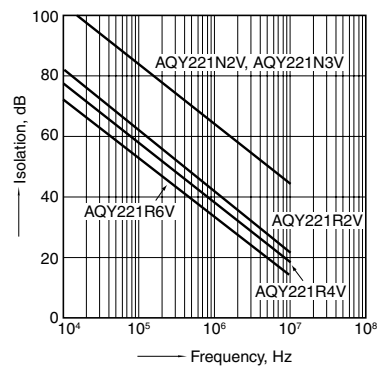
## 13. Output capacitance vs. applied voltage characteristics

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



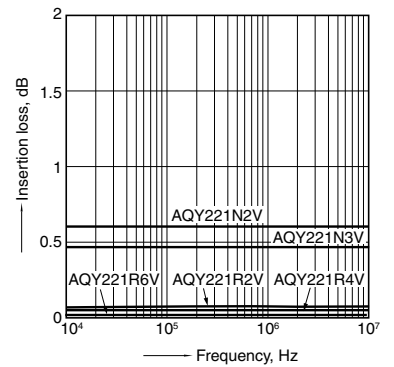
## 14. Isolation vs. frequency characteristics (50Ω impedance)

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



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