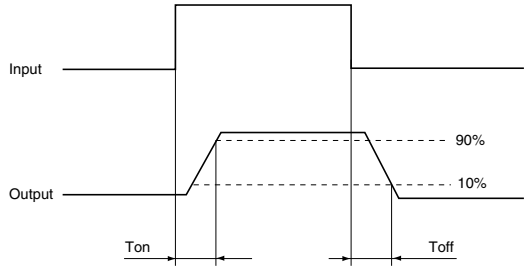
2. Electrical characteristics (Ambient temperature: 25°C 77°F)

| Item | | | Symbol | C×R10 R type | | | C×R10 C type | C×R5 | Condition |
|---|---|---|---|---|---|---|---|---|---|
| | | | | AQY221R6V | AQY221R4V | AQY221R2V | AQY221N2V | AQY221N3V | |
| Input | LED operate current | Typical | $I_{Fon}$ | 0.7 mA | 0.9 mA | | 1.0 mA | | AQY221R6V: $I_L$ = 100 mA<br>AQY221R4V: $I_L$ = 500 mA<br>AQY221R2V: $I_L$ = 250 mA<br>AQY221N2V: $I_L$ = 80 mA<br>AQY221N3V: $I_L$ = 80 mA |
| | | Maximum | | 3.0 mA | | | | | |
| | LED turn off current | Minimum | $I_{Foff}$ | 0.1 mA | | | 0.2 mA | | |
| | | Typical | | 0.6 mA | 0.8 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 | $R_{on}$ | 0.18Ω | 0.55Ω | 0.75Ω | 9.5Ω | 5.5Ω | AQY221R6V:<br>$I_F$ = 5 mA, $I_L$ = 1000 mA<br>AQY221R4V:<br>$I_F$ = 5 mA, $I_L$ = 500 mA<br>AQY221R2V:<br>$I_F$ = 5 mA, $I_L$ = 250 mA<br>AQY221N2V:<br>$I_F$ = 5 mA, $I_L$ = 80 mA<br>AQY221N3V:<br>$I_F$ = 5 mA, $I_L$ = 80 mA<br>Within 1 s on time |
| | | Maximum | | 0.35Ω | 1Ω | 1.25Ω | 12.5Ω | 7.5Ω | |
| | Output capacitance | Typical | $C_{out}$ | 37.5 pF | 24 pF | 12.5 pF | 1.0 pF | | $I_F$ = 0 mA, $V_B$ = 0 V, f = 1 MHz |
| | | Maximum | | 100 pF | 30 pF | 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 (1 nA or less)* | | | | | |
| Transfer characteristics | Turn on time** | Typical | $T_{on}$ | 0.2 ms | 0.25 ms | 0.10 ms | 0.02 ms | | AQY221R6V:<br>$I_F$ = 5 mA, $V_L$ = 10 V, $R_L$ = 100Ω<br>AQY221R4V:<br>$I_F$ = 5 mA, $V_L$ = 10 V, $R_L$ = 20Ω<br>AQY221R2V:<br>$I_F$ = 5 mA, $V_L$ = 10 V, $R_L$ = 40Ω<br>AQY221N2V:<br>$I_F$ = 5 mA, $V_L$ = 10 V, $R_L$ = 125Ω<br>AQY221N3V:<br>$I_F$ = 5 mA, $V_L$ = 10 V, $R_L$ = 125Ω |
| | | Maximum | | 0.5 ms | 0.75 ms | 0.5 ms | | 0.2 ms | |
| | Turn off time** | Typical | $T_{off}$ | 0.07 ms | 0.08 ms | | 0.02 ms | | |
| | | Maximum | | 0.2 ms | 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 | $R_{iso}$ | 1,000 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.

*Available as custom orders (1 nA or less)
**Turn on/Turn off time




## RECOMMENDED OPERATING CONDITIONS

Please obey the following conditions to ensure proper device operation and resetting.

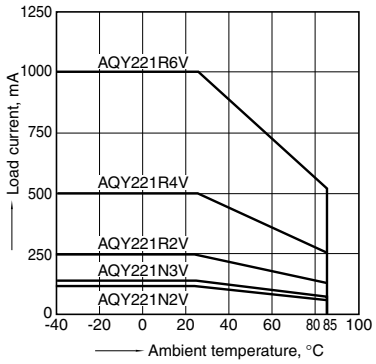
| Item | Symbol | Recommended value | Unit |
|---|---|---|---|
| Input LED current | $I_F$ | 5 | mA |

**■ 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

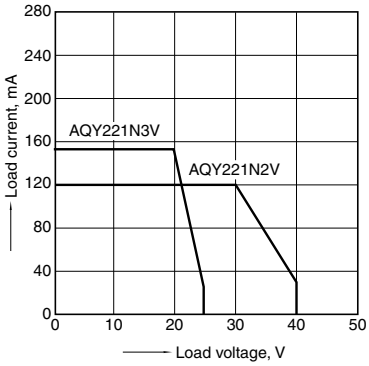
1. Load current vs. ambient temperature characteristics

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



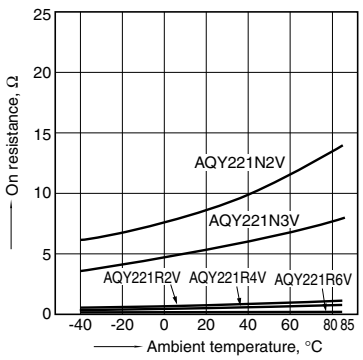

2. Load current vs. Load voltage characteristics

Ambient temperature: 25°C 77°F



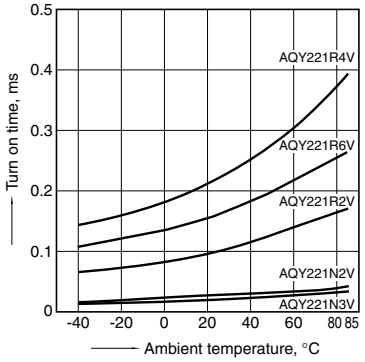

3. On resistance vs. ambient temperature characteristics

Measured portion: between terminals 3 and 4
LED current: 5 mA; Load voltage: 10V (DC)
Continuous load current: 1000mA (DC) AQY221R6V, 500mA (DC) AQY221R4V, 250mA (DC) AQY221R2V, 80mA (DC) AQY221N2V, AQY221N3V



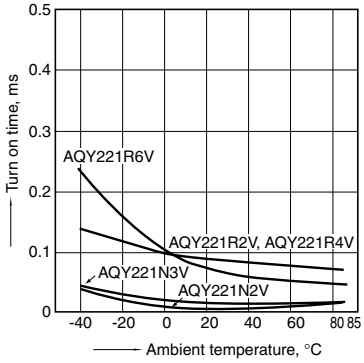

4. Turn on time vs. ambient temperature characteristics

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



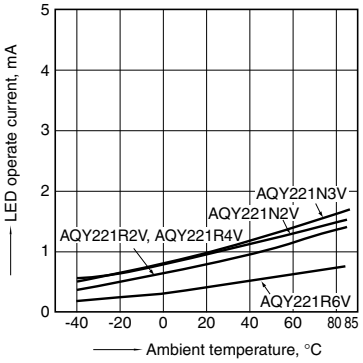

5. Turn off time vs. ambient temperature characteristics

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



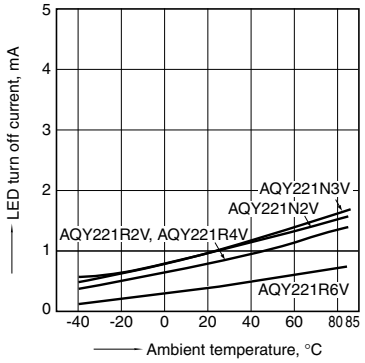

6. LED operate current vs. ambient temperature characteristics

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



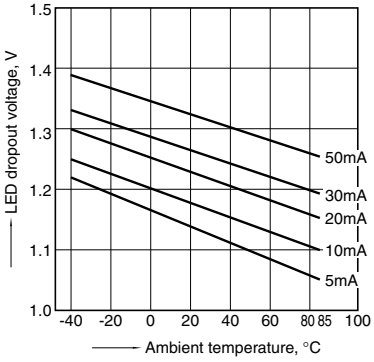

7. LED turn off current vs. ambient temperature characteristics

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



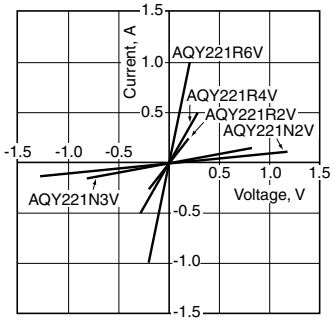

8. LED dropout voltage vs. ambient temperature characteristics

LED current: 5 to 50 mA



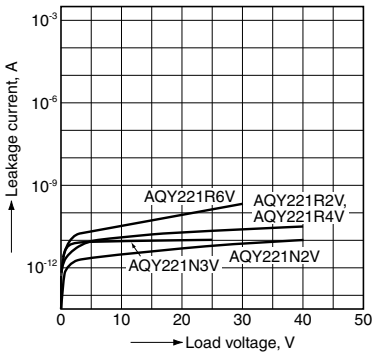

9. Current vs. voltage characteristics of output at MOS portion

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



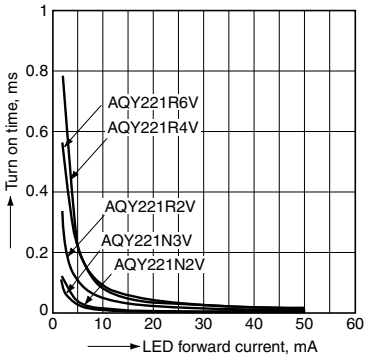
10. Off state leakage current vs. load voltage characteristics

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



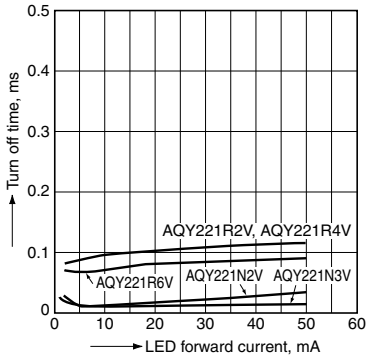

11. Turn on time vs. LED forward current characteristics

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



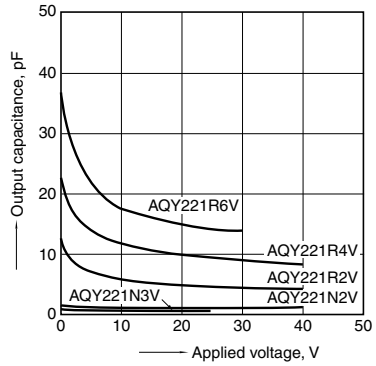

12. Turn off time vs. LED forward current characteristics

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



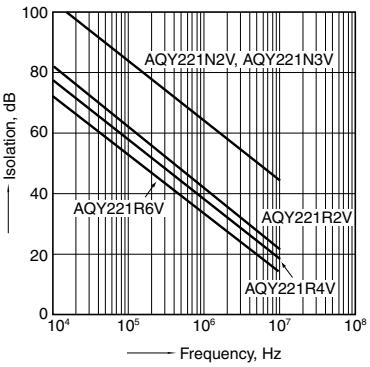

13. Output capacitance vs. applied voltage characteristics

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