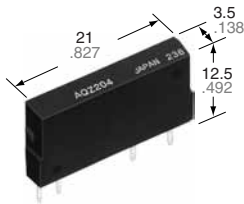


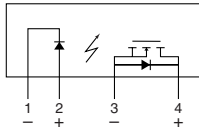
Slim type with high capacity up to 4A DC load type also available

PhotoMOS[®]
Power 1 Form A
 (AQZ100, 200)

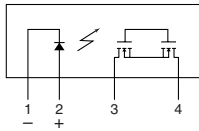


(Height includes standoff)

mm inch



DC type



AC/DC type

RoHS compliant

FEATURES

- 1. Slim SIL4-pin package**
 (W) 3.5 × (D) 21.0 × (H) 12.5 mm
 (W) .138 × (D) .827 × (H) .492 inch
 The compact size of the 4-pin SIL package allows high density mounting.
- 2. Extremely low on-resistance**
- 3. Control low-level signal**
 Power PhotoMOS feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.
- 4. Low-level off state leakage current of max. 10 μA**
- 5. High I/O isolation voltage of 2,500 V**
- 6. Eliminates the need for a counter electromotive protection diode in the drive circuit on the input side**
- 7. Eliminates the need for a power supply to drive the power MOSFET**
- 8. No restriction on mounting direction**
- 9. Low thermoelectromotive force**
- 10. Neither noise nor arc at contact**
- 11. Sockets are also available**
 (PA1a-PS, PA1a-PS-H)
- 12. Can be installed on the RT-3 relay terminal (Power PhotoMOS type)**

TYPICAL APPLICATIONS

- Traffic signals
- Measuring instruments
- Industrial machines

TYPES

1. DC type

| | Output rating* | | Package | Part No. | Packing quantity | |
|---------|----------------|--------------|----------|----------|------------------|--------------|
| | Load voltage | Load current | | | Inner carton | Outer carton |
| DC only | 60 V | 4.0 A | SIL4-pin | AQZ102 | 25 pcs. | 500 pcs. |
| | 100 V | 2.6 A | | AQZ105 | | |
| | 200 V | 1.3 A | | AQZ107 | | |
| | 400 V | 0.7 A | | AQZ104 | | |

* Load voltage and current of DC type: DC

2. AC/DC type

| | Output rating* | | Package | Part No. | Packing quantity | |
|----------------|----------------|--------------|----------|----------|------------------|--------------|
| | Load voltage | Load current | | | Inner carton | Outer carton |
| AC/DC dual use | 60 V | 3.0 A | SIL4-pin | AQZ202 | 25 pcs. | 500 pcs. |
| | 100 V | 2.0 A | | AQZ205 | | |
| | 200 V | 1.0 A | | AQZ207 | | |
| | 400 V | 0.5 A | | AQZ204 | | |

* Load voltage and current of AC/DC type: Peak AC/DC.

RATING

1. DC type

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

| Item | | Symbol | AQZ102 | AQZ105 | AQZ107 | AQZ104 | Remarks |
|-------------------------|------------------------------|------------|---------------------------------|--------|--------|--------|------------------------------------|
| Input | LED forward current | I_F | 50 mA | | | | |
| | LED reverse voltage | V_R | 5 V | | | | |
| | Peak forward current | I_{FP} | 1 A | | | | f = 100 Hz, Duty factor = 0.1% |
| | Power dissipation | P_{in} | 75 mW | | | | |
| Output | Load voltage (DC) | V_L | 60 V | 100 V | 200 V | 400 V | |
| | Continuous load current (DC) | I_L | 4.0 A | 2.6 A | 1.3 A | 0.7 A | |
| | Peak load current | I_{peak} | 9.0 A | 6.0 A | 3.0 A | 1.5 A | 100 ms (1 shot), $V_L = DC$ |
| | Power dissipation | P_{out} | 1.35 W | | | | |
| Total power dissipation | | P_T | 1.35 W | | | | |
| I/O isolation voltage | | V_{iso} | 2,500 V AC | | | | |
| Temperature limits | Operating | T_{opr} | -40°C to +85°C -40°F to +185°F | | | | Non-condensing at low temperatures |
| | Storage | T_{stg} | -40°C to +100°C -40°F to +212°F | | | | |

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

| Item | | Symbol | AQZ102 | AQZ105 | AQZ107 | AQZ104 | Condition |
|----------------------------------|---------------------------|--|---------|---------|---------|---|---|
| Input | LED operate current | Typical | 1.0 mA | | | | $I_L = 100\text{ mA}$ $V_L = 10\text{ V}$ |
| | | Maximum | 3.0 mA | | | | |
| | LED turn off current | Minimum | 0.4 mA | | | | $I_L = 100\text{ mA}$ $V_L = 10\text{ V}$ |
| | | Typical | 0.9 mA | | | | |
| LED dropout voltage | Typical | 1.25 V (1.16 V at $I_F = 10\text{ mA}$) | | | | $I_F = 50\text{ mA}$ | |
| | Maximum | 1.5 V | | | | | |
| Output | On resistance | Typical | 0.05 Ω | 0.081 Ω | 0.34 Ω | 1.06 Ω | $I_F = 10\text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time |
| | | Maximum | 0.09 Ω | 0.17 Ω | 0.55 Ω | 1.6 Ω | |
| | Off state leakage current | Maximum | 10 μA | | | | |
| Transfer characteristics | Turn on time* | Typical | 1.66 ms | 1.89 ms | 0.83 ms | 1.01 ms | $I_F = 10\text{ mA}$ $I_L = 100\text{ mA}$ $V_L = 10\text{ V}$ |
| | | Maximum | 5.0 ms | | | | |
| | | Typical | 3.79 ms | 4.50 ms | 1.75 ms | 2.34 ms | |
| | | Maximum | 10.0 ms | | | | |
| | Turn off time* | Typical | 0.15 ms | 0.19 ms | 0.08 ms | 0.08 ms | $I_F = 5\text{ mA or }10\text{ mA}$ $I_L = 100\text{ mA}$ $V_L = 10\text{ V}$ |
| | | Maximum | 3.0 ms | | | | |
| | I/O capacitance | Typical | 0.8 pF | | | | f = 1 MHz $V_B = 0\text{ V}$ |
| | | Maximum | 1.5 pF | | | | |
| Initial I/O isolation resistance | Minimum | 1,000 MΩ | | | | 500 V DC | |
| Maximum operating speed | Maximum | 0.5 times/s | | | | $I_F = 10\text{ mA}$ Duty factor = 50% $I_L \times V_L = 200\text{ (VA)}$ | |
| Vibration resistance | Minimum | 10 to 55 Hz at double amplitude of 3 mm | | | | 2 hours for 3 axes | |
| Shock resistance | Minimum | 4,900 m/s ² {500 G} 1 ms | | | | 3 times for 3 axes | |

Power 1 Form A (AQZ100, 200)

2. AC/DC type

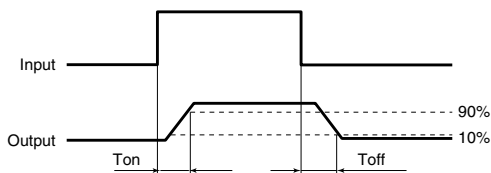
1) Absolute maximum ratings (Ambient temperature: 25°C 77°F)

| Item | | Symbol | AQZ202 | AQZ205 | AQZ207 | AQZ204 | Remarks |
|-------------------------|-------------------------|------------|---------------------------------|--------|--------|--------|---|
| Input | LED forward current | I_F | 50 mA | | | | |
| | LED reverse voltage | V_R | 5 V | | | | |
| | Peak forward current | I_{FP} | 1 A | | | | $f = 100 \text{ Hz}$, Duty factor = 0.1% |
| | Power dissipation | P_{in} | 75 mW | | | | |
| Output | Load voltage (Peak AC) | V_L | 60 V | 100 V | 200 V | 400 V | |
| | Continuous load current | I_L | 3.0 A | 2.0 A | 1.0 A | 0.5 A | Peak AC, DC |
| | Peak load current | I_{peak} | 9.0 A | 6.0 A | 3.0 A | 1.5 A | 100 ms (1 shot), $V_L = \text{DC}$ |
| | Power dissipation | P_{out} | 1.6 W | | | | |
| Total power dissipation | | P_T | 1.6 W | | | | |
| I/O isolation voltage | | V_{iso} | 2,500 V AC | | | | |
| Temperature limits | Operating | T_{opr} | -40°C to +85°C -40°F to +185°F | | | | Non-condensing at low temperatures |
| | Storage | T_{stg} | -40°C to +100°C -40°F to +212°F | | | | |

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

| Item | | | Symbol | AQZ202 | AQZ205 | AQZ207 | AQZ204 | Condition |
|----------------------------------|---------------------------|-----------|---|------------------|---------------|--------------|---|---|
| Input | LED operate current | Typical | I_{Fon} | 1.0 mA | | | | $I_L = 100 \text{ mA}$ $V_L = 10 \text{ V}$ |
| | | Maximum | | 3.0 mA | | | | |
| | LED turn off current | Minimum | I_{Foff} | 0.4 mA | | | | $I_L = 100 \text{ mA}$ $V_L = 10 \text{ V}$ |
| | | Typical | | 0.9 mA | | | | |
| LED dropout voltage | Typical | V_F | 1.25 V (1.16 V at $I_F = 10 \text{ mA}$) | | | | $I_F = 50 \text{ mA}$ | |
| | Maximum | | 1.5 V | | | | | |
| Output | On resistance | Typical | R_{on} | 0.11 Ω | 0.23 Ω | 0.7 Ω | 2.1 Ω | $I_F = 10 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time |
| | | Maximum | | 0.18 Ω | 0.34 Ω | 1.1 Ω | 3.2 Ω | |
| | Off state leakage current | Maximum | I_{Leak} | 10 μA | | | | $I_F = 0 \text{ mA}$ $V_L = \text{Max.}$ |
| Transfer characteristics | Turn on time* | Typical | T_{on} | 2.46 ms | 2.40 ms | 1.12 ms | 1.65 ms | $I_F = 10 \text{ mA}$ $I_L = 100 \text{ mA}$ $V_L = 10 \text{ V}$ |
| | | Maximum | | 5.0 ms | | | | |
| | | Typical | | 5.64 ms | 5.65 ms | 2.57 ms | 3.88 ms | |
| | | Maximum | | 10.0 ms | | | | |
| | Turn off time* | Typical | T_{off} | 0.22 ms | 0.21 ms | 0.10 ms | 0.08 ms | $I_F = 5 \text{ mA}$ or 10 mA $I_L = 100 \text{ mA}$ $V_L = 10 \text{ V}$ |
| | | Maximum | | 3.0 ms | | | | |
| | I/O capacitance | Typical | C_{iso} | 0.8 pF | | | | $f = 1 \text{ MHz}$ $V_B = 0 \text{ V}$ |
| | | Maximum | | 1.5 pF | | | | |
| Initial I/O isolation resistance | Minimum | R_{iso} | 1,000 M Ω | | | | 500 V DC | |
| Maximum operating speed | Maximum | — | 0.5 cps | | | | $I_F = 10 \text{ mA}$ Duty factor = 50% $I_L = \text{Max.}$, $V_L = \text{Max.}$ | |
| Vibration resistance | Minimum | — | 10 to 55 Hz at double amplitude of 3 mm | | | | 2 hours for 3 axes | |
| Shock resistance | Minimum | — | 4,900 m/s ² {500 G} 1 ms | | | | 3 times for 3 axes | |

*Turn on/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 to 10 | mA |

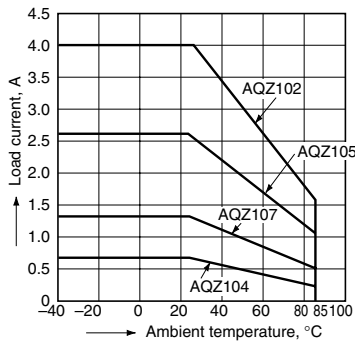
■ These products are not designed for automotive use.

If you are considering to use these products for automotive applications, please contact your local Panasonic Corporation technical representative.

REFERENCE DATA

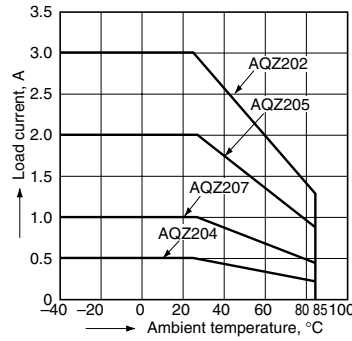
1.-(1) Load current vs. ambient temperature characteristics (DC type)

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



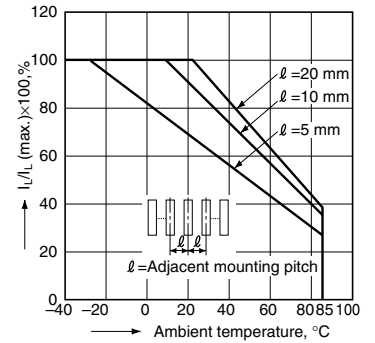
1.-(2) Load current vs. ambient temperature characteristics (AC/DC type)

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



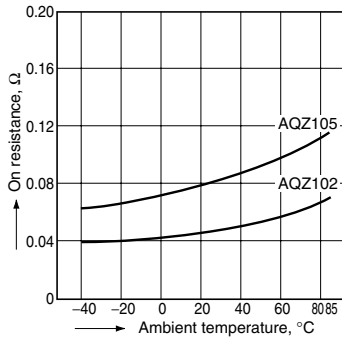
2. Load current vs. ambient temperature characteristics in adjacent mounting

I_L : Load current;
 I_L (max.): Maximum continuous load current



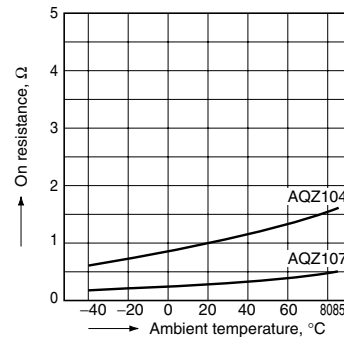
3.-(1) On resistance vs. ambient temperature characteristics (DC type)

LED current: 10 mA;
Continuous load current: 1.6 A (DC) (AQZ102),
1.04 A (DC) (AQZ105)



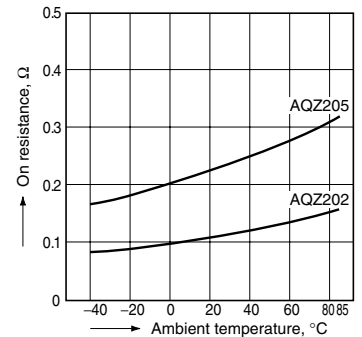
3.-(2) On resistance vs. ambient temperature characteristics (DC type)

LED current: 10 mA;
Continuous load current: 0.52 A (DC) (AQZ107),
0.28 A (DC) (AQZ104)



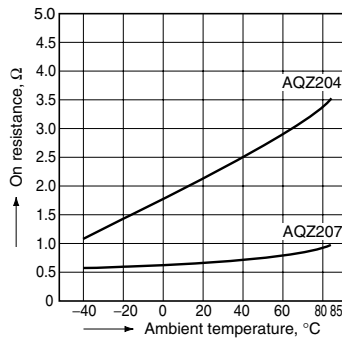
3.-(3) On resistance vs. ambient temperature characteristics (AC/DC type)

LED current: 10 mA;
Continuous load current: 1.2 A (DC) (AQZ202),
0.8 A (DC) (AQZ205)



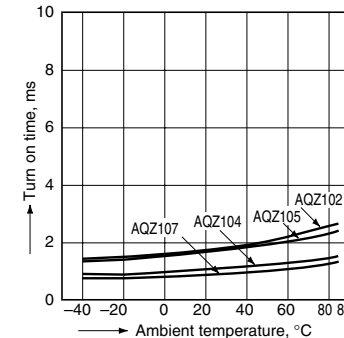
3.-(4) On resistance vs. ambient temperature characteristics (AC/DC type)

LED current: 10 mA;
Continuous load current: 0.4 A (DC) (AQZ207),
0.2 A (DC) (AQZ204)



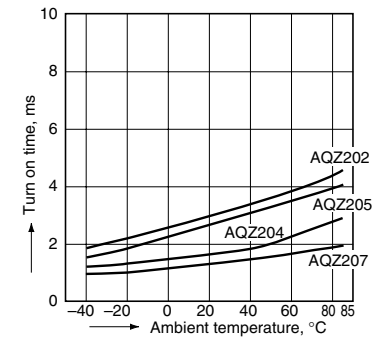
4.-(1) Turn on time vs. ambient temperature characteristics (DC type)

LED current: 10 mA;
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



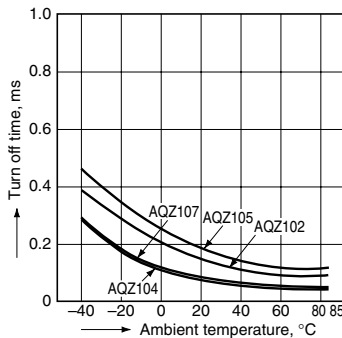
4.-(2) Turn on time vs. ambient temperature characteristics (AC/DC type)

LED current: 10 mA;
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



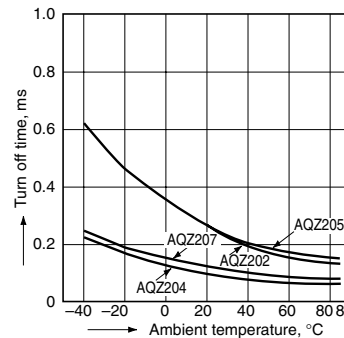
5.-(1) Turn off time vs. ambient temperature characteristics (DC type)

LED current: 10 mA;
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



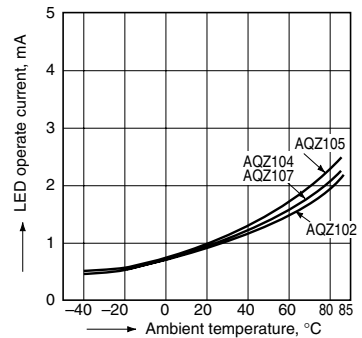
5.-(2) Turn off time vs. ambient temperature characteristics (AC/DC type)

LED current: 10 mA;
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



6.-(1) LED operate vs. ambient temperature characteristics (DC type)

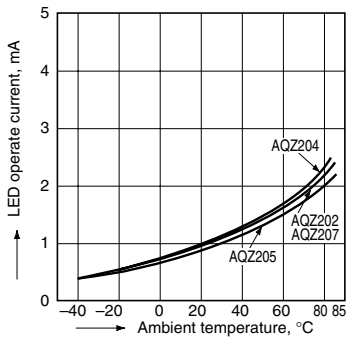
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



Power 1 Form A (AQZ100, 200)

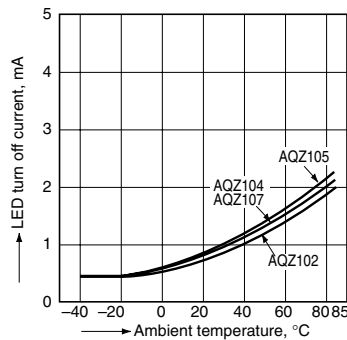
6.-(2) LED operate vs. ambient temperature characteristics (AC/DC type)

Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



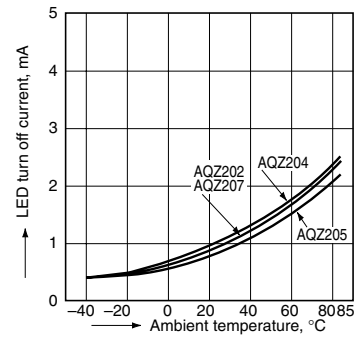
7.-(1) LED turn off current vs. ambient temperature characteristics (DC type)

Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



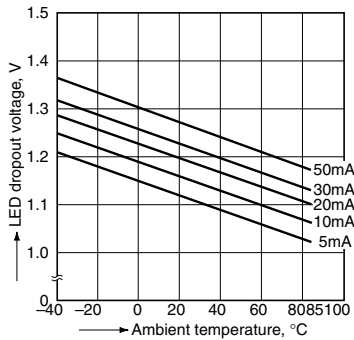
7.-(2) LED turn off current vs. ambient temperature characteristics (AC/DC type)

Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



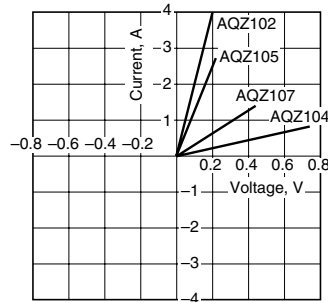
8. LED dropout voltage vs. ambient temperature characteristics

Sample: all types; LED current: 5 to 50 mA



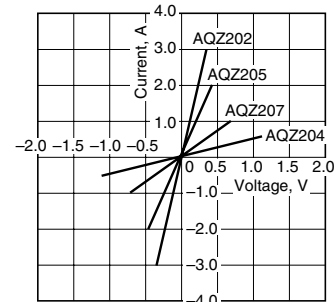
9.-(1) Current vs. voltage characteristics of output at MOS portion (DC type)

Ambient temperature: 25°C 77°F



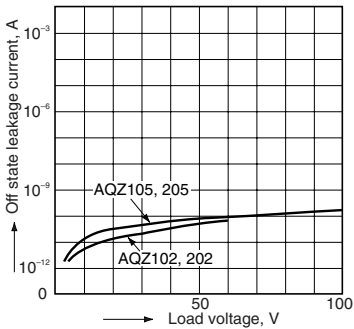
9.-(2) Current vs. voltage characteristics of output at MOS portion (AC/DC type)

Ambient temperature: 25°C 77°F



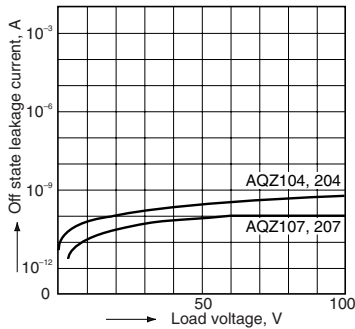
10.-(1) Off state leakage current vs. load voltage characteristics

Ambient temperature: 25°C 77°F



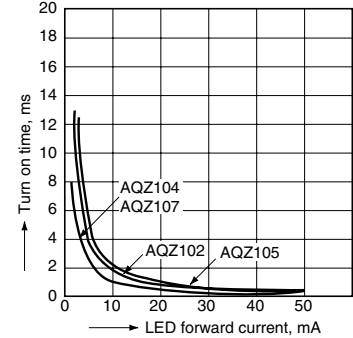
10.-(2) Off state leakage current vs. load voltage characteristics

Ambient temperature: 25°C 77°F



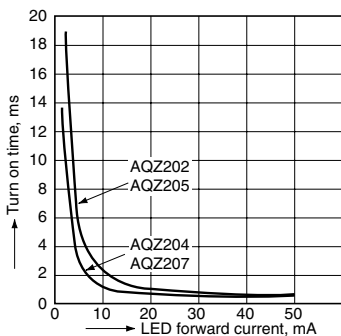
11.-(1) Turn on time vs. LED forward current characteristics (DC type)

Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC);
Ambient temperature: 25°C 77°F



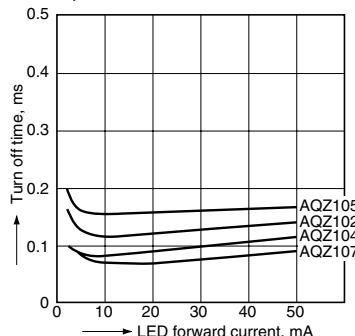
11.-(2) Turn on time vs. LED forward current characteristics (AC/DC type)

Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC);
Ambient temperature: 25°C 77°F



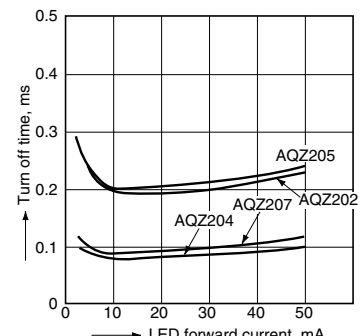
12.-(1) Turn off time vs. LED forward current characteristics (DC type)

Measured portion: between terminals 4 and 6;
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC);
Ambient temperature: 25°C 77°F



12.-(2) Turn off time vs. LED forward current characteristics (AC/DC type)

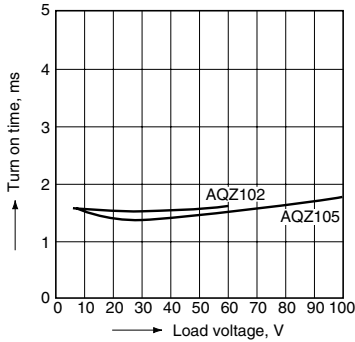
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC);
Ambient temperature: 25°C 77°F



Power 1 Form A (AQZ100, 200)

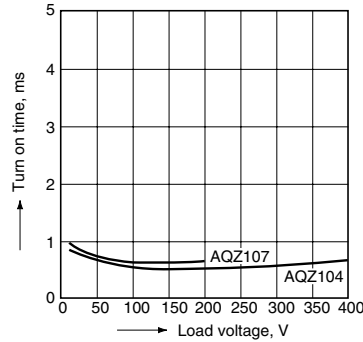
13.-(1) Turn on time vs. load voltage characteristics (DC type)

LED current: 10 mA;
Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



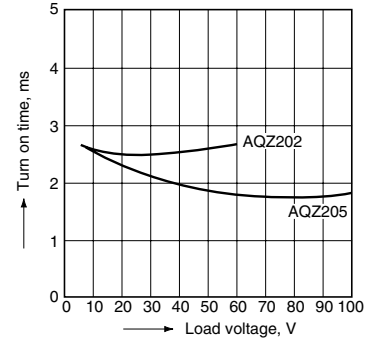
13.-(2) Turn on time vs. load voltage characteristics (DC type)

LED current: 10 mA;
Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



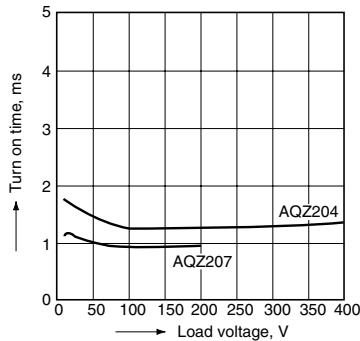
13.-(3) Turn on time vs. load voltage characteristics (AC/DC type)

LED current: 10 mA;
Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



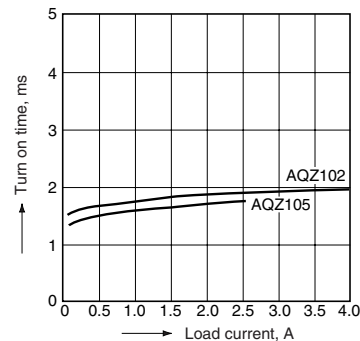
13.-(4) Turn on time vs. load voltage characteristics (AC/DC type)

LED current: 10 mA;
Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



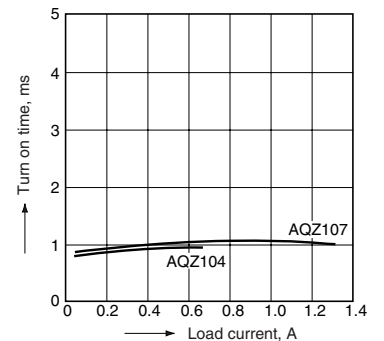
14.-(1) Turn on time vs. load current characteristics (DC type)

LED current: 10 mA;
Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



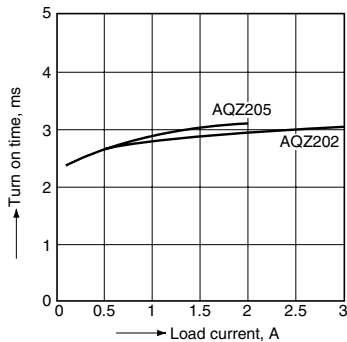
14.-(2) Turn on time vs. load current characteristics (DC type)

LED current: 10 mA;
Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



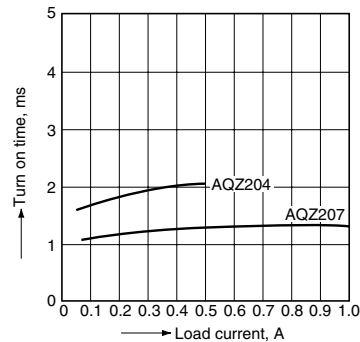
14.-(3) Turn on time vs. load current characteristics (AC/DC type)

LED current: 10 mA;
Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



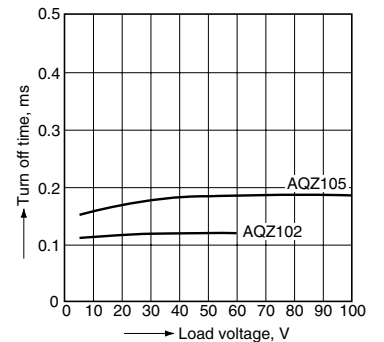
14.-(4) Turn on time vs. load current characteristics (AC/DC type)

LED current: 10 mA;
Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



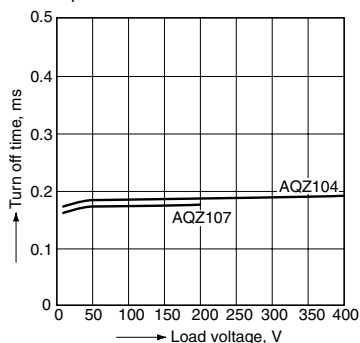
15.-(1) Turn off time vs. load voltage characteristics (DC type)

LED current: 10 mA;
Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



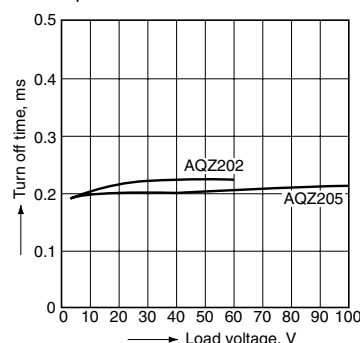
15.-(2) Turn off time vs. load voltage characteristics (DC type)

LED current: 10 mA;
Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



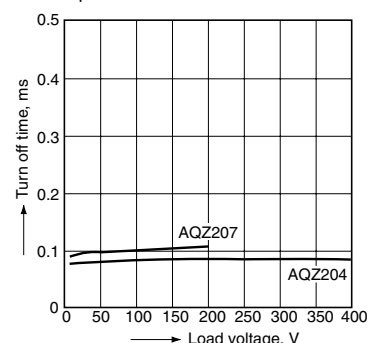
15.-(3) Turn off time vs. load voltage characteristics (AC/DC type)

LED current: 10 mA;
Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



15.-(4) Turn off time vs. load voltage characteristics (AC/DC type)

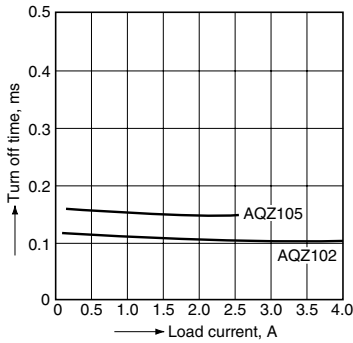
LED current: 10 mA;
Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



Power 1 Form A (AQZ100, 200)

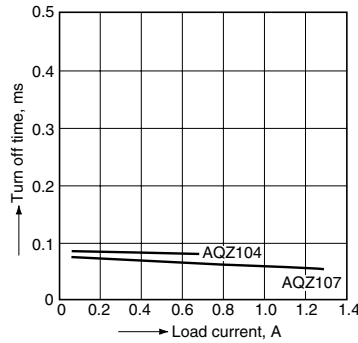
16.-(1) Turn off time vs. load current characteristics (DC type)

LED current: 10 mA;
Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



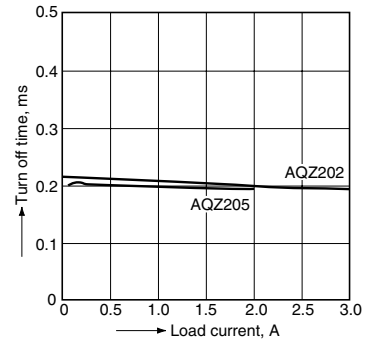
16.-(2) Turn off time vs. load current characteristics (DC type)

LED current: 10 mA;
Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



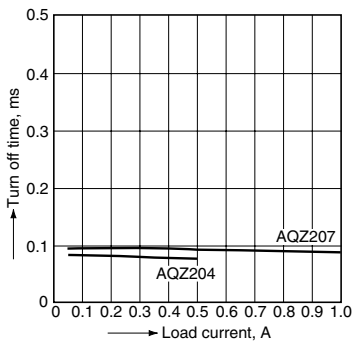
16.-(3) Turn off time vs. load current characteristics (AC/DC type)

LED current: 10 mA;
Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



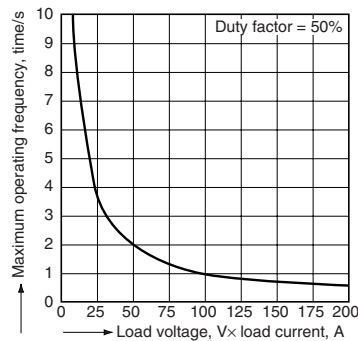
16.-(4) Turn off time vs. load current characteristics (AC/DC type)

LED current: 10 mA;
Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



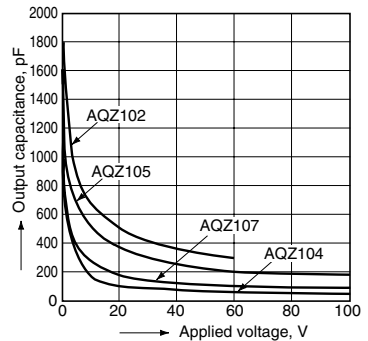
17. Maximum operating frequency vs. load voltage/current characteristics

Sample: All types;
LED current: 10 mA;
Ambient temperature: 25°C 77°F



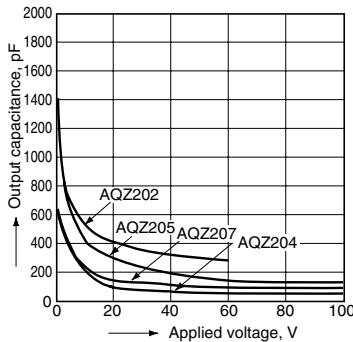
18.-(1) Output capacitance vs. applied voltage characteristics (DC type)

Frequency: 1 MHz;
Ambient temperature: 25°C 77°F



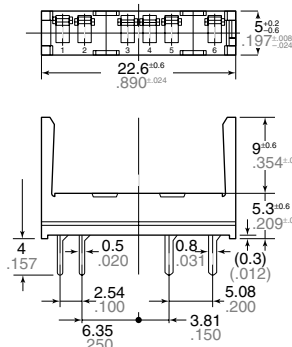
18.-(2) Output capacitance vs. applied voltage characteristics (AC/DC type)

Frequency: 1 MHz;
Ambient temperature: 25°C 77°F

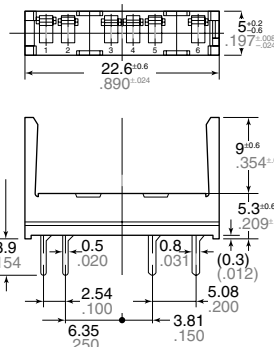


ACCESSORY (mm inch)

Socket



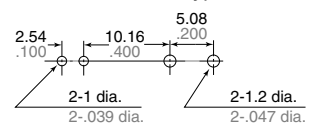
PA1a-PS



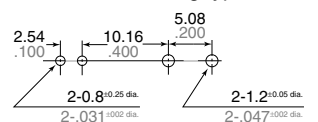
PA1a-PS-H

PC board pattern (BOTTOM VIEW)

Standard type



Self clinching type



Tolerance: ±0.1 ±.004