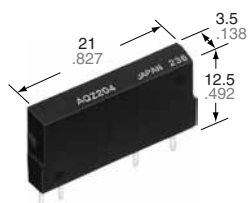


Panasonic

ideas for life

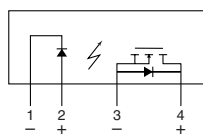
Slim type with high capacity up to 4A DC load type also available

PhotoMOS®
Power 1 Form A
 (AQZ100, 200)

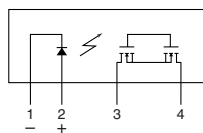


(Height includes standoff)

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.

Power 1 Form A (AQZ100, 200)

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 | | | | $f = 100 \text{ Hz}$, 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), $V_L = \text{DC}$ |
| | 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 | 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} | 0.05 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 | I_{Leak} | 10 μA | | | | $I_F = 0 \text{ mA}$ $V_L = \text{Max.}$ |
| Transfer characteristics | Turn on time* | Typical | T_{on} | 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 | T_{off} | 0.15 ms | 0.19 ms | 0.08 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% $I_L \times V_L = 200 \text{ (VA)}$ | |
| 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

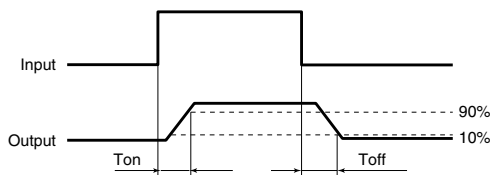
1) Absolute maximum ratings (Ambient temperature: 25°C 77°F)

| 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 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), $V_L = DC$ |
| | 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 | $I_F = 5\text{ mA or } 10\text{ mA}$ $I_L = 100\text{ mA}$ $V_L = 10\text{ V}$ |
| | | Maximum | | 3.0 ms | | | | |
| | I/O capacitance | Typical | C_{iso} | 0.8 pF | | | | f = 1 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 |

■ 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.

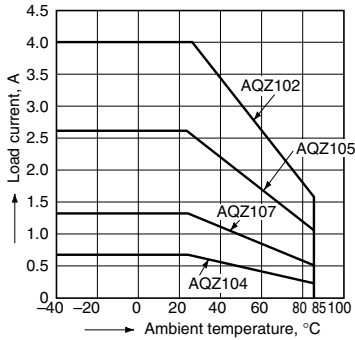
For more information.

Power 1 Form A (AQZ100, 200)

REFERENCE DATA

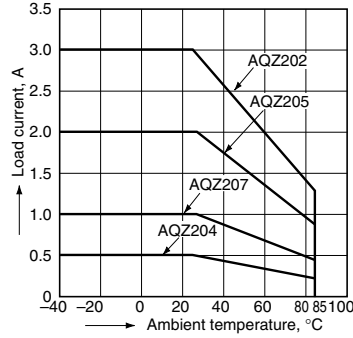
1.-(1) Load current vs. ambient temperature characteristics (DC type)

Allowable ambient temperature: -40°C to $+85^{\circ}\text{C}$
 -40°F to $+185^{\circ}\text{F}$



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

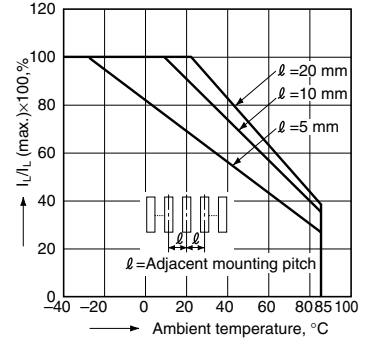
Allowable ambient temperature: -40°C to $+85^{\circ}\text{C}$
 -40°F to $+185^{\circ}\text{F}$



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

I_L : Load current;

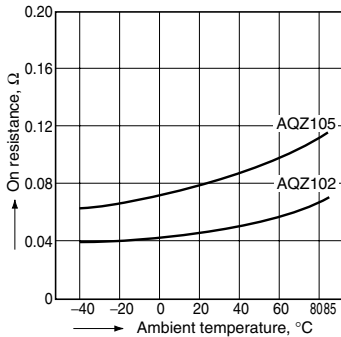
$I_L(\text{max.})$: Maximum continuous load current



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

LED current: 10 mA;

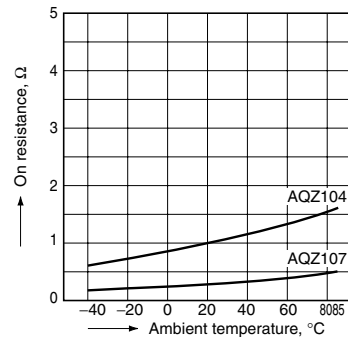
Continuous load current: 1.6 A (DC) (AQZ102),
1.04 A (DC) (AQZ105)



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

LED current: 10 mA;

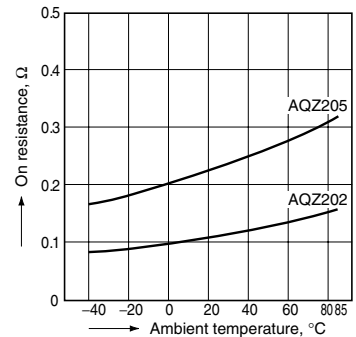
Continuous load current: 0.52 A (DC) (AQZ107),
0.28 A (DC) (AQZ104)



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

LED current: 10 mA;

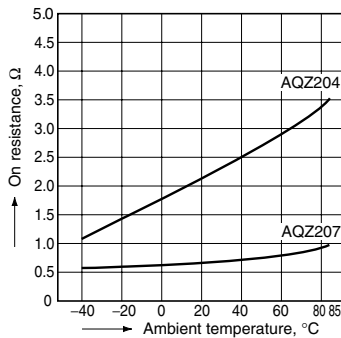
Continuous load current: 1.2 A (DC) (AQZ202),
0.8 A (DC) (AQZ205)



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)

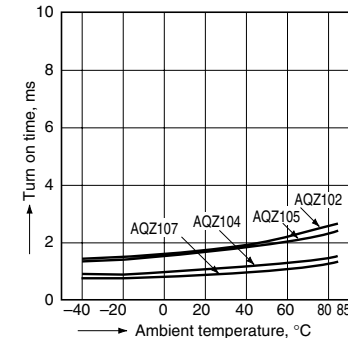


4.-(1) Turn on time vs. ambient temperature characteristics (DC type)

LED current: 10 mA;

Load voltage: 10 V (DC);

Continuous load current: 100 mA (DC)

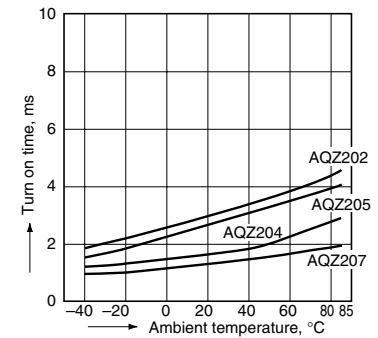


4.-(2) Turn on time vs. ambient temperature characteristics (AC/DC type)

LED current: 10 mA;

Load voltage: 10 V (DC);

Continuous load current: 100 mA (DC)

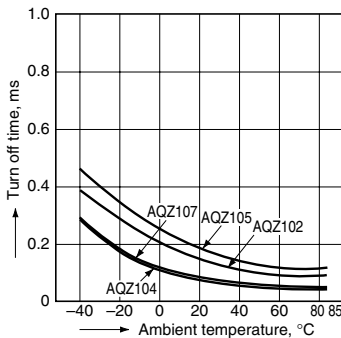


5.-(1) Turn off time vs. ambient temperature characteristics (DC type)

LED current: 10 mA;

Load voltage: 10 V (DC);

Continuous load current: 100 mA (DC)

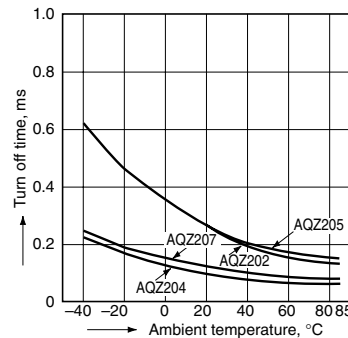


5.-(2) Turn off time vs. ambient temperature characteristics (AC/DC type)

LED current: 10 mA;

Load voltage: 10 V (DC);

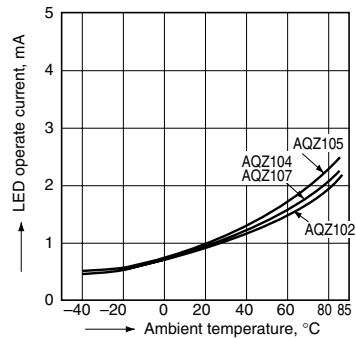
Continuous load current: 100 mA (DC)



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

Load voltage: 10 V (DC);

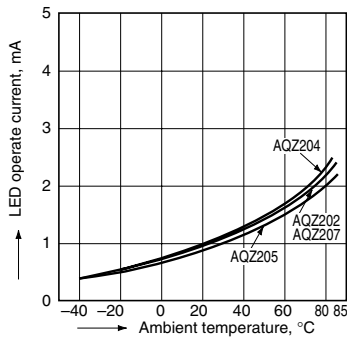
Continuous load current: 100 mA (DC)



Power 1 Form A (AQZ100, 200)

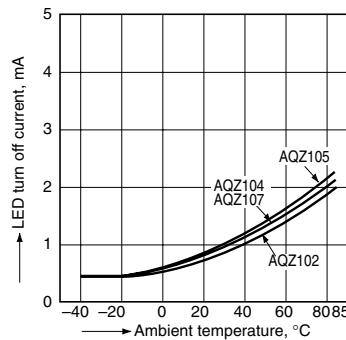
6.-(2) LED operate vs. ambient temperature characteristics (AC/DC type)

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



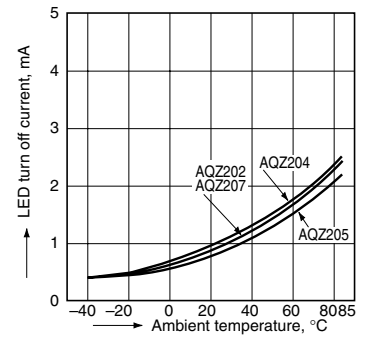
7.-(1) LED turn off current vs. ambient temperature characteristics (DC type)

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



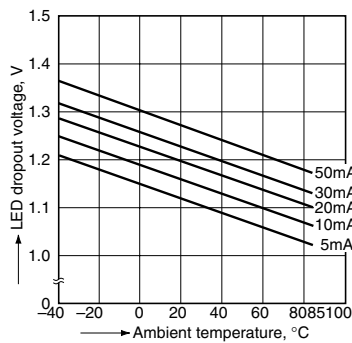
7.-(2) LED turn off current vs. ambient temperature characteristics (AC/DC type)

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



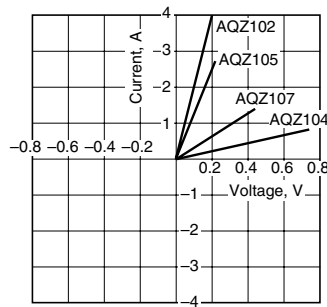
8. LED dropout voltage vs. ambient temperature characteristics

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



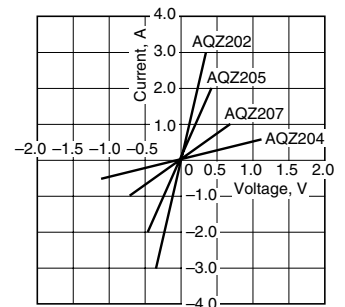
9.-(1) Current vs. voltage characteristics of output at MOS portion (DC type)

Ambient temperature: 25°C 77°F



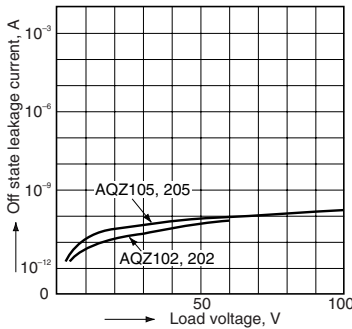
9.-(2) Current vs. voltage characteristics of output at MOS portion (AC/DC type)

Ambient temperature: 25°C 77°F



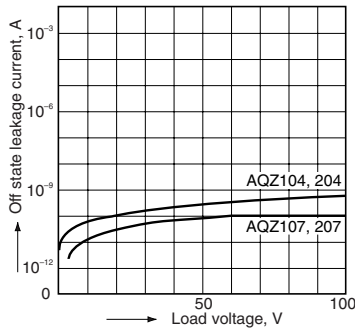
10.-(1) Off state leakage current vs. load voltage characteristics

Ambient temperature: 25°C 77°F



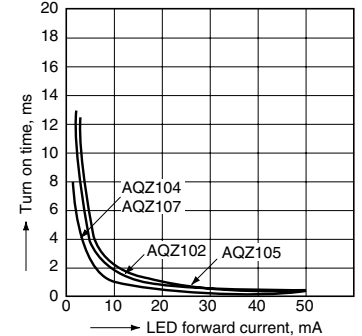
10.-(2) Off state leakage current vs. load voltage characteristics

Ambient temperature: 25°C 77°F



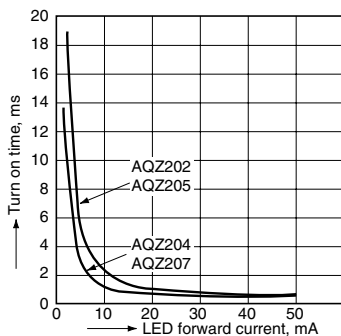
11.-(1) Turn on time vs. LED forward current characteristics (DC type)

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



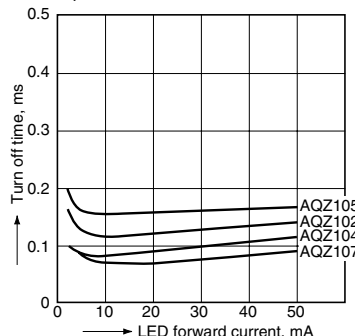
11.-(2) Turn on time vs. LED forward current characteristics (AC/DC type)

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



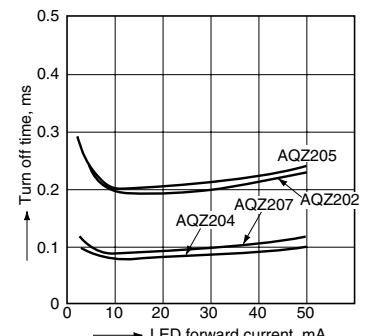
12.-(1) Turn off time vs. LED forward current characteristics (DC type)

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)

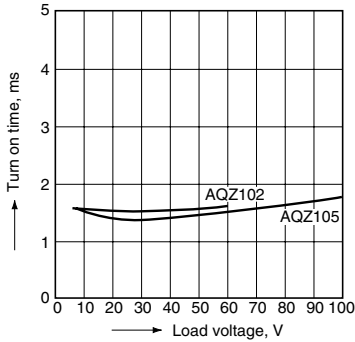
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC);
Ambient temperature: 25°C 77°F



Power 1 Form A (AQZ100, 200)

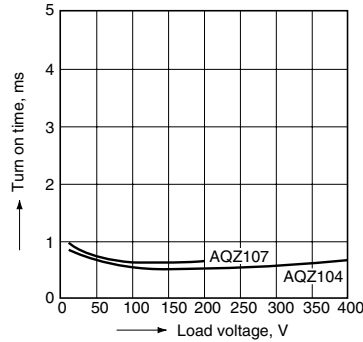
13.-(1) Turn on time vs. load voltage characteristics (DC type)

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



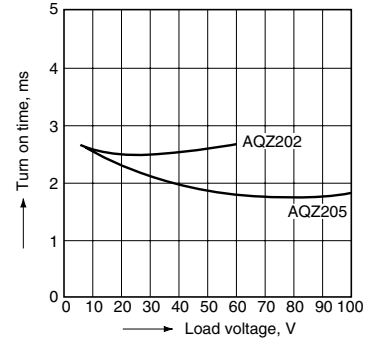
13.-(2) Turn on time vs. load voltage characteristics (DC type)

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



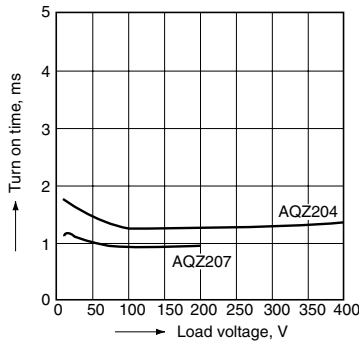
13.-(3) Turn on time vs. load voltage characteristics (AC/DC type)

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



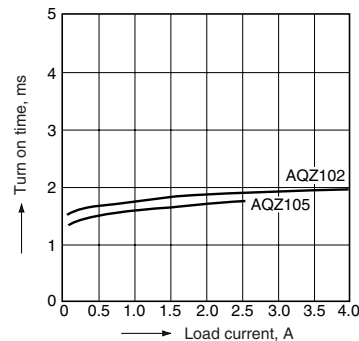
13.-(4) Turn on time vs. load voltage characteristics (AC/DC type)

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



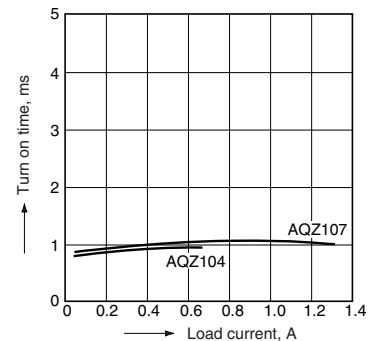
14.-(1) Turn on time vs. load current characteristics (DC type)

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



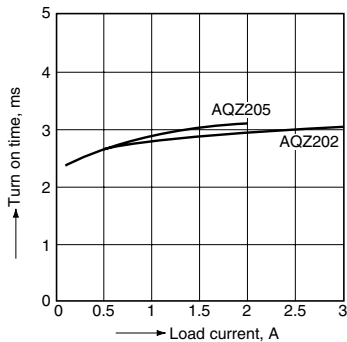
14.-(2) Turn on time vs. load current characteristics (DC type)

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



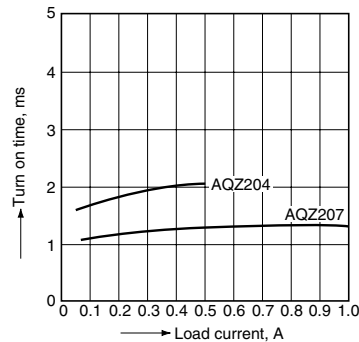
14.-(3) Turn on time vs. load current characteristics (AC/DC type)

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



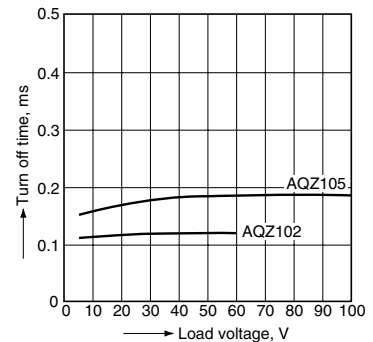
14.-(4) Turn on time vs. load current characteristics (AC/DC type)

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



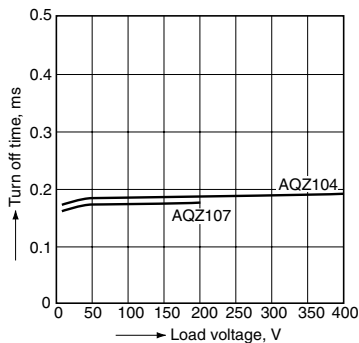
15.-(1) Turn off time vs. load voltage characteristics (DC type)

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



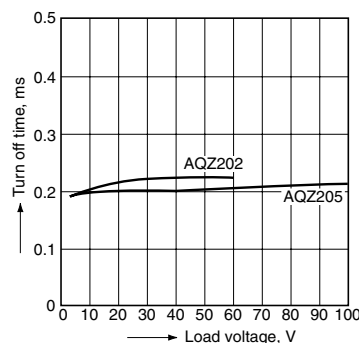
15.-(2) Turn off time vs. load voltage characteristics (DC type)

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



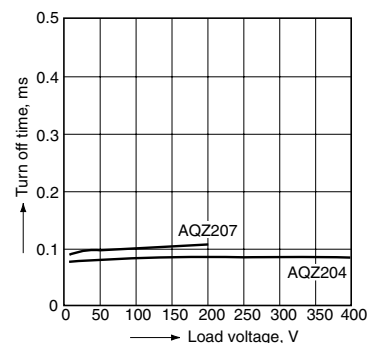
15.-(3) Turn off time vs. load voltage characteristics (AC/DC type)

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)

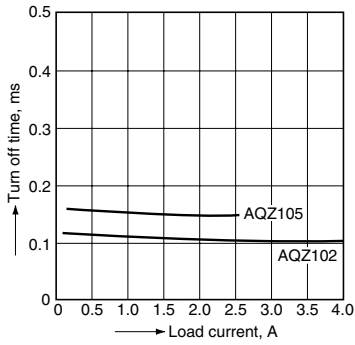
LED current: 10 mA;
Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



Power 1 Form A (AQZ100, 200)

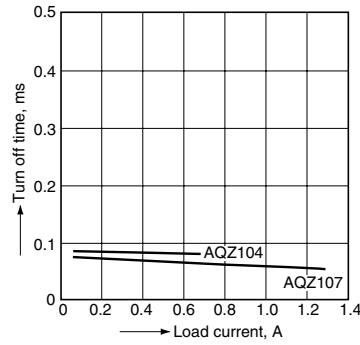
16.-(1) Turn off time vs. load current characteristics (DC type)

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



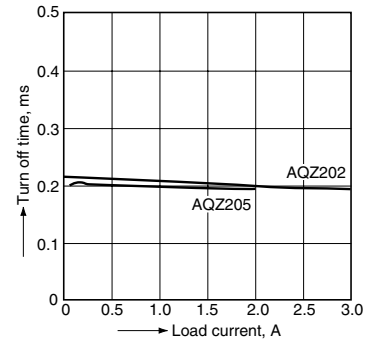
16.-(2) Turn off time vs. load current characteristics (DC type)

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



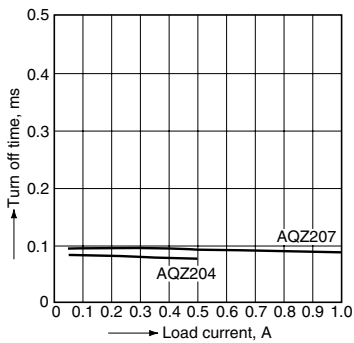
16.-(3) Turn off time vs. load current characteristics (AC/DC type)

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



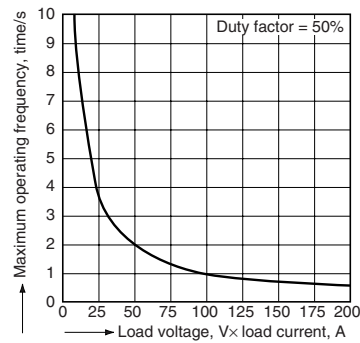
16.-(4) Turn off time vs. load current characteristics (AC/DC type)

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



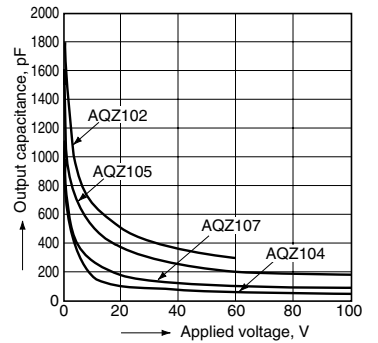
17. Maximum operating frequency vs. load voltage/current characteristics

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



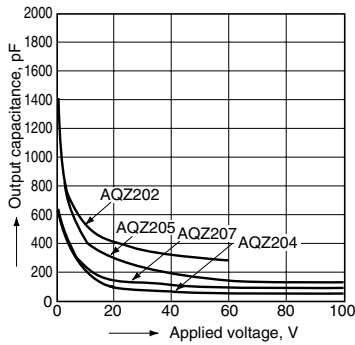
18.-(1) Output capacitance vs. applied voltage characteristics (DC type)

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



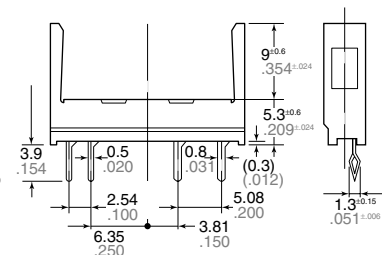
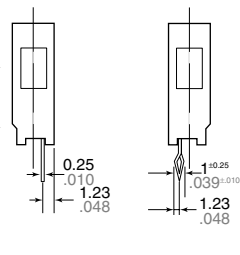
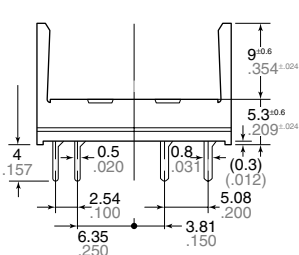
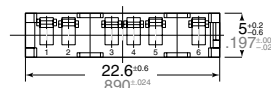
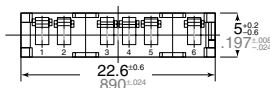
18.-(2) Output capacitance vs. applied voltage characteristics (AC/DC type)

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

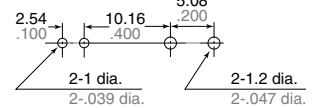


ACCESSORY (mm inch)

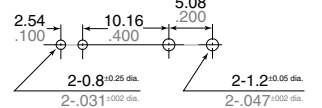
Socket



PC board pattern (BOTTOM VIEW) Standard type



Self clinching type



Tolerance: ±0.1 ±.004

PA1a-PS

PA1a-PS-H