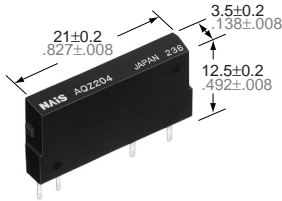


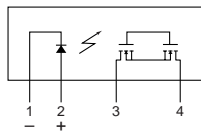
NAIS

POWER PhotoMOS RELAYS 1-channel (Form A) Type

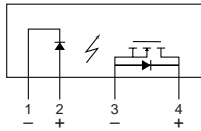
PhotoMOS RELAYS



mm inch



AC/DC type



DC type

FEATURES

1. High capacity PhotoMOS Relay in a compact and slim 4-pin SIL
2. Extremely low ON resistance
3. Control low-level signal
Power Photo MOS relays feature extremely low closed-circuit offset voltage to enable control of low-level analog signals without distortion.
4. Low-level off state leakage current
5. High I/O isolation voltage 2,500 V
6. Eliminates the need for a counter electromotive protection diode in the drive circuit on the input side
7. Eliminate the need for a power supply to drive the power MOSFET
8. PC board layout is simplified
9. No restriction on mounting direction
10. Varistor incorporated type is also available.

TYPICAL APPLICATIONS

- High-speed inspection machines
- IC checker
- NC machine, Robots
- Office machines
- Telecommunication
- Automotive
- Industrial control

TYPES

1. AC/DC type

| Output rating | | Part No. | Packing quantity | |
|---------------|--------------|----------|------------------|--------------|
| Load voltage | Load current | | Inner carton | Outer carton |
| 60 V | 3.0 A | AQZ202 | 25 pcs. | 500 pcs. |
| 100 V | 2.0 A | AQZ205 | | |
| 200 V | 1.0 A | AQZ207 | | |
| 400 V | 0.5 A | AQZ204 | | |

2. DC type

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

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

RATING

1. 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 | 3 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 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 | | | | |

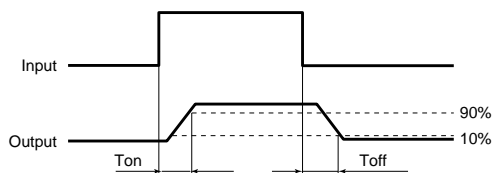
2) Electrical characteristics (Ambient temperature: 25°C 77°F)

| 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 | 1.16 V (1.25 V at $I_F = 50\text{ mA}$) | | | | $I_F = 10\text{ mA}$ | | |
| | 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 | — | 10 μA | | | | $I_F = 0$ $V_L = \text{Max.}$ | |
| Transfer characteristics | Switching speed | Turn on time* | T_{on} | 2.46 ms | 2.40 ms | 1.12 ms | 1.65 ms | $I_F = 10\text{ mA}$ $I_L = 100\text{ mA}$ $V_L = 10\text{ V}$ | |
| | | | | 5.0 ms | | | | | |
| | | Turn off time* | | T_{off} | 5.64 ms | 5.65 ms | 2.57 ms | 3.88 ms | $I_F = 5\text{ mA}$ $I_L = 100\text{ mA}$ $V_L = 10\text{ V}$ |
| | | | | | 10.0 ms | | | | |
| | I/O capacitance | Typical | C_{iso} | 0.8 pF | | | | f = 1 MHz $V_B = 0$ | |
| | | 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 |

Note: Recommendable LED forward current $I_F = 5$ to 10 mA.

For type of connection, see page 35.

*Turn on/off time



AQZ100, 200

2. 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 | 3 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 | | | | |

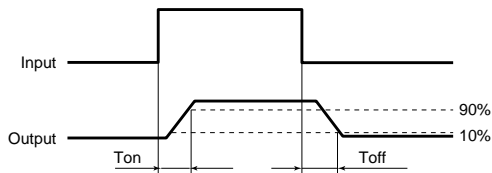
2) Electrical characteristics (Ambient temperature: 25°C 77°F)

| Item | | | Symbol | AQZ102 | AQZ105 | AQZ107 | AQZ104 | Condition | | |
|--------------------------|----------------------------------|----------------|---|------------------|----------------|---------------|--------------------|---|---|--|
| Input | LED operate current | Typical | I_{Fon} | 1.0 mA | | | | $I_L = 100$ mA $V_L = 10$ V | | |
| | | Maximum | | 3.0 mA | | | | | | |
| | LED turn off current | Minimum | I_{Foff} | 0.4 mA | | | | $I_L = 100$ mA $V_L = 10$ V | | |
| | | Typical | | 0.9 mA | | | | | | |
| LED dropout voltage | Typical | V_F | 1.16 V (1.25 V at $I_F = 50$ mA) | | | | $I_F = 10$ mA | | | |
| | Maximum | | 1.5 V | | | | | | | |
| Output | On resistance | Typical | R_{on} | 0.05 Ω | 0.081 Ω | 0.34 Ω | 1.06 Ω | $I_F = 10$ mA $I_L = Max.$ Within 1 s on time | | |
| | | Maximum | | 0.09 Ω | 0.17 Ω | 0.55 Ω | 1.6 Ω | | | |
| | Off state leakage current | Maximum | — | 10 μ A | | | | $I_F = 0$ $V_L = Max.$ | | |
| Transfer characteristics | Switching speed | Turn on time* | T_{on} | Typical | 1.66 ms | 1.89 ms | 0.83 ms | 1.01 ms | $I_F = 10$ mA $I_L = 100$ mA $V_L = 10$ V | |
| | | | | Maximum | 5.0 ms | | | | | |
| | | Turn off time* | | T_{off} | Typical | 3.79 ms | 4.50 ms | 1.75 ms | 2.34 ms | $I_F = 5$ mA $I_L = 100$ mA $V_L = 10$ V |
| | | | | | Maximum | 10.0 ms | | | | |
| | I/O capacitance | Typical | C_{iso} | 0.8 pF | | | | $f = 1$ MHz $V_B = 0$ | | |
| | | 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 | | | | $I_F = 10$ mA Duty factor = 50% $I_L \times V_L = 200$ (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 | | | |

Note: Recommendable LED forward current $I_F = 5$ to 10 mA.

For type of connection, see page 35.

*Turn on/off time

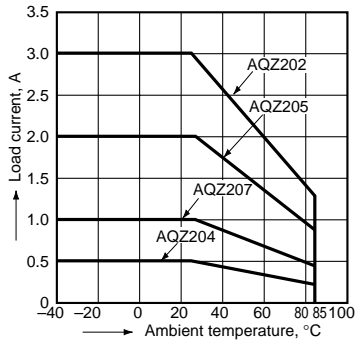


- For Dimensions, see Page 29.
- For Schematic and Wiring Diagrams, see Page 35.
- For Cautions for Use, see Page 40.

REFERENCE DATA

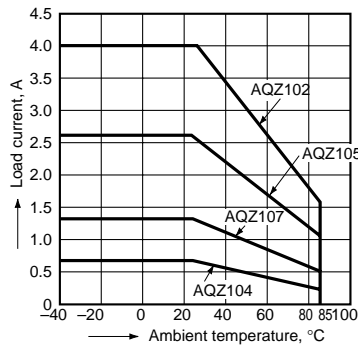
1.-(1) Load current vs. ambient temperature characteristics (AC/DC type)

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



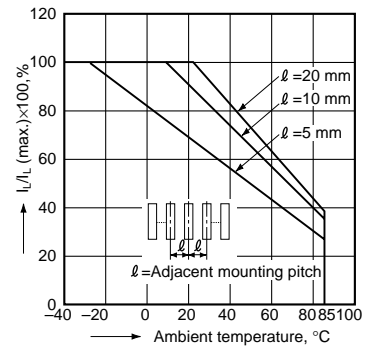
1.-(2) Load current vs. ambient temperature characteristics (DC type)

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



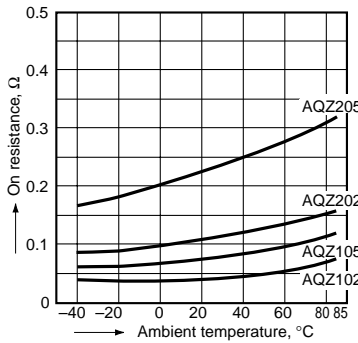
2. Load current vs. ambient temperature characteristics in adjacent mounting

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



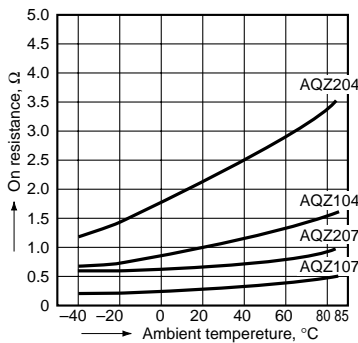
3.-(1) On resistance vs. ambient temperature characteristics

LED current: 10 mA;
Continuous load current: 1.2 A (DC) (AQZ202),
0.8 A (DC) (AQZ205),
1.6 A (DC) (AQZ102),
1.04 A (DC) (AQZ105)



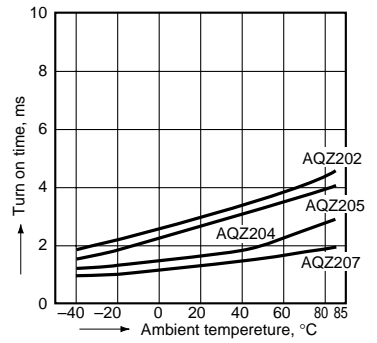
3.-(2) On resistance vs. ambient temperature characteristics

LED current: 10 mA;
Continuous load current: 0.4 A (DC) (AQZ207),
0.2 A (DC) (AQZ204),
0.52 A (DC) (AQZ107),
0.28 A (DC) (AQZ104)



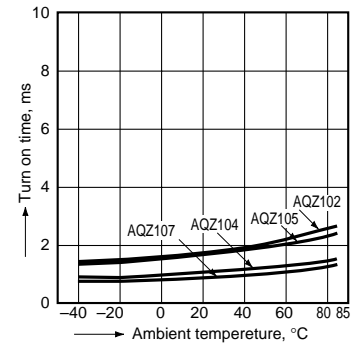
4.-(1) Turn on time vs. ambient temperature characteristics (AC/DC type)

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



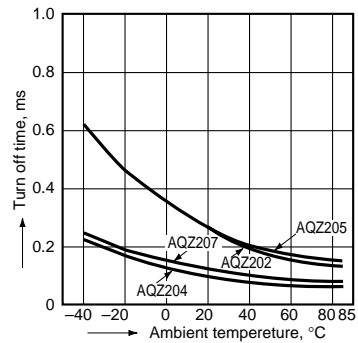
4.-(2) Turn on time vs. ambient temperature characteristics (DC type)

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



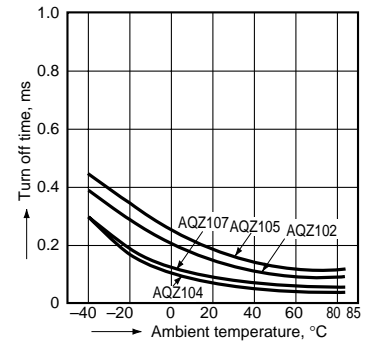
5.-(1) Turn off time vs. ambient temperature characteristics (AC/DC type)

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



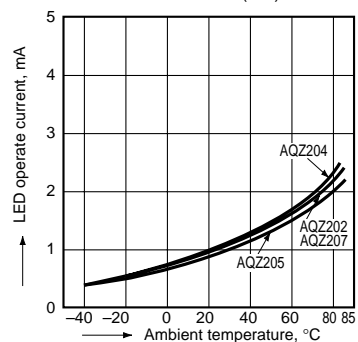
5.-(2) Turn off time vs. ambient temperature characteristics (DC type)

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



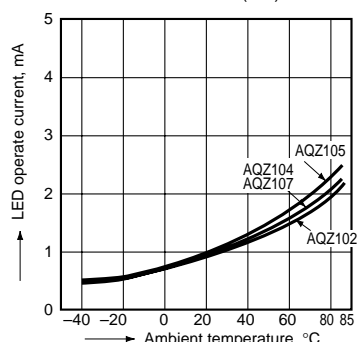
6.-(1) LED operate vs. ambient temperature characteristics (AC/DC type)

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



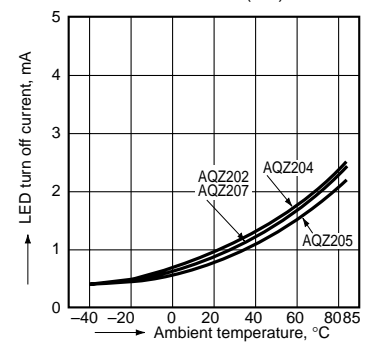
6.-(2) LED operate vs. ambient temperature characteristics (DC type)

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



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

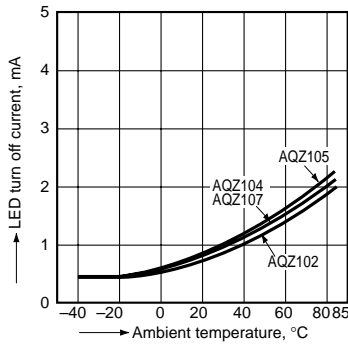
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



AQZ100, 200

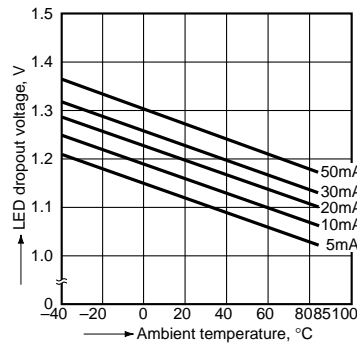
7.-(2) LED turn off current vs. ambient temperature characteristics (DC type)

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



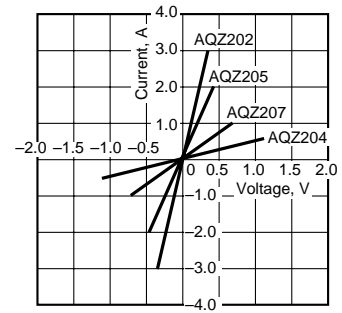
8. LED dropout voltage vs. ambient temperature characteristics

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



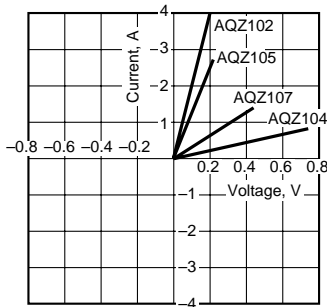
9.-(1) Voltage vs. current characteristics of output at MOS portion (AC/DC type)

Ambient temperature: 25°C 77°F



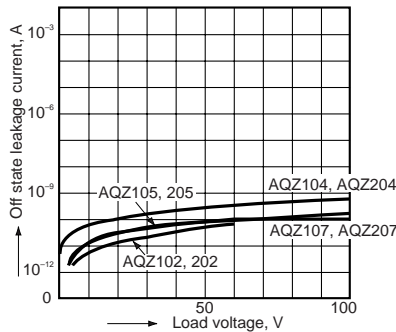
9.-(2) Voltage vs. current characteristics of output at MOS portion (DC type)

Ambient temperature: 25°C 77°F



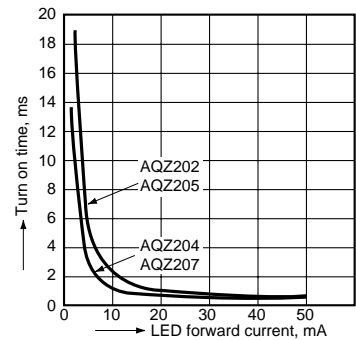
10. Off state leakage current

Ambient temperature: 25°C 77°F



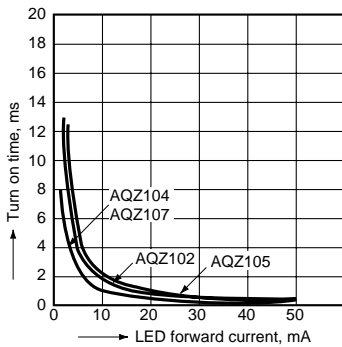
11.-(1) LED forward current vs. turn on time characteristics (AC/DC type)

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



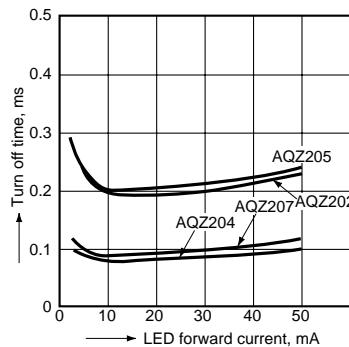
11.-(2) LED forward current vs. turn on time characteristics (DC type)

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



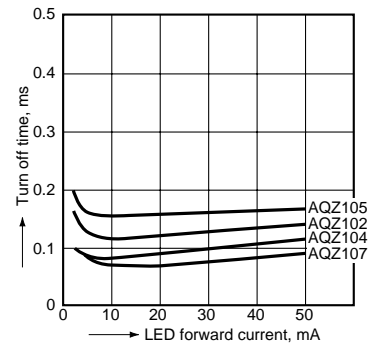
12.-(1) LED forward current vs. turn off time characteristics (AC/DC type)

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



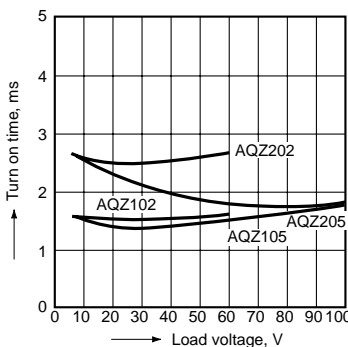
12.-(2) LED forward current vs. turn off time characteristics (DC type)

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



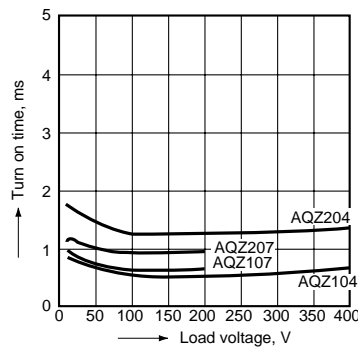
13.-(1) Load voltage vs. turn on time characteristics (Load voltage: 60, 100 V type)

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



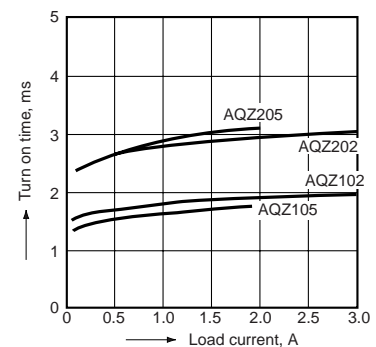
13.-(2) Load voltage vs. turn on time characteristics (Load voltage: 200, 400 V type)

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



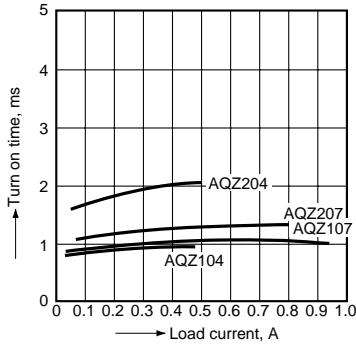
14.-(1) Load current vs. turn on time characteristics (Load voltage: 60, 100 V type)

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



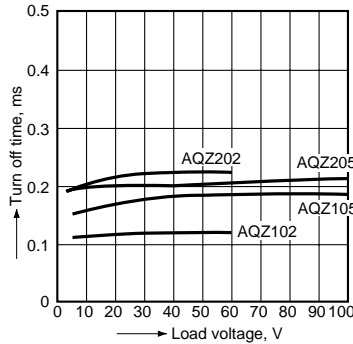
14.-(2) Load current vs. turn on time characteristics (Load voltage: 200, 400 V type)

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



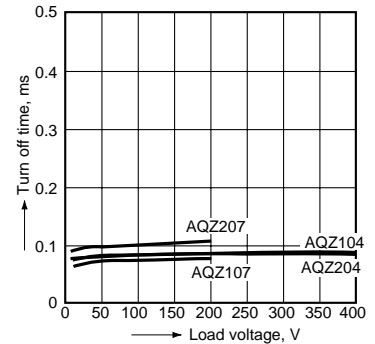
15.-(1) Load voltage vs. turn off time characteristics (Load voltage: 60, 100 V type)

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



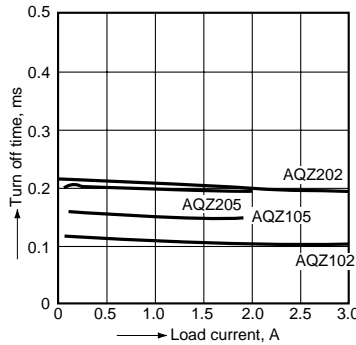
15.-(2) Load voltage vs. turn off time characteristics (Load voltage: 200, 400 V type)

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



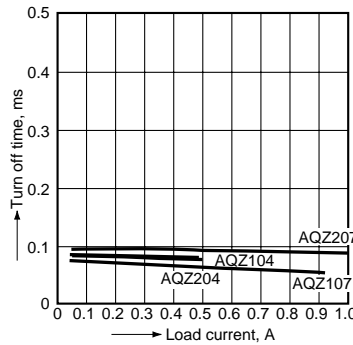
16.-(1) Load current vs. turn off time characteristics (Load voltage: 60, 100 V type)

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



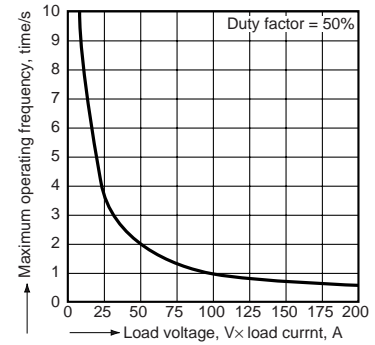
16.-(2) Load current vs. turn off time characteristics (Load voltage: 200, 400 V type)

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



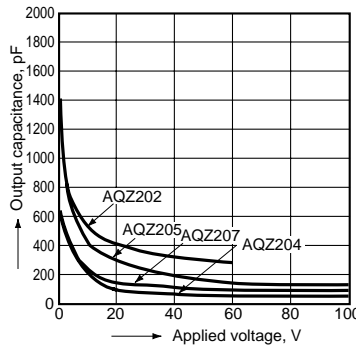
17. Maximum operating frequency vs. load voltage/current characteristics

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



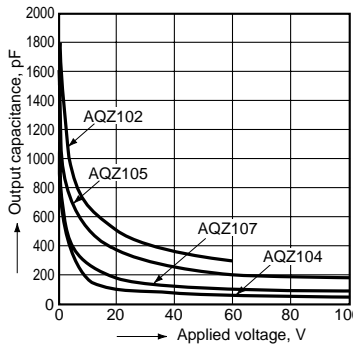
18.-(1) Applied voltage vs. output capacitance characteristics (AC/DC type)

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



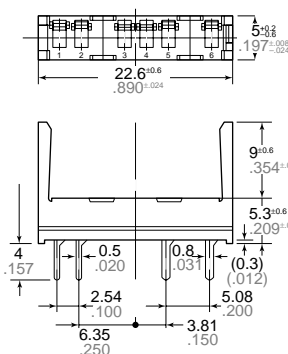
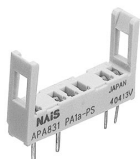
18.-(2) Applied voltage vs. output capacitance characteristics (DC type)

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

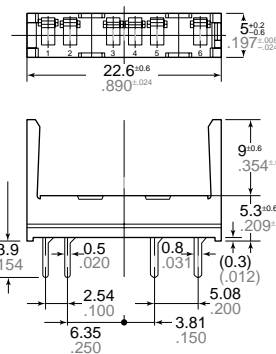


ACCESSORY

Socket



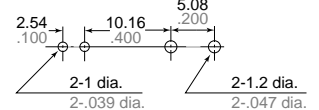
PA1a-PS



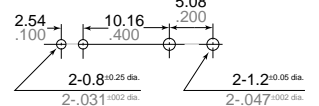
PA1a-PS-H

mm inch

PC board pattern (BOTTOM VIEW) Standard type



Self clinching type



Tolerance: ±0.1 ±.004