

**Slim and high capacity  
up to 3.6A  
Voltage-driven type**

**PhotoMOS<sup>®</sup>**  
**1 Form A Voltage-sensitive**  
(AQZ100D, 200D)

## FEATURES

### 1. A voltage-sensitive power PhotoMOS

Conventional power PhotoMOS are connected externally to an input limiting resistor in order to obtain the appropriate LED current. Adding an internal constant-current element renders the input limiting resistor unnecessary, making it possible for the PhotoMOS to be voltage-driven.

### 2. Wide range of input voltages

Allows a wide range of input voltages from 4 to 30 V DC. The PhotoMOS can be used in 5 V, 12 V or 24 V DC systems.

### 3. Both AC/DC dual types and DC-only types available

The AC/DC dual type is capable of bi-directional control, and unlike conventional SSRs, does not have to be used differently depending on the load. The DC-only type is well suited for control of DC solenoids and DC motors.

### 4. High capacity

Supports the various types of load control, from very small loads to a max. 2.7 A for the AC/DC dual type, max. 3.6 A for the DC-only type.

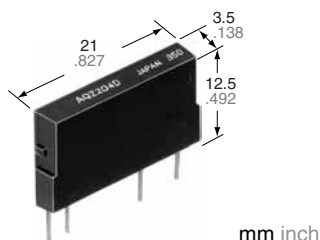
### 5. High sensitivity and low on-resistance

Max. 3.6 A load can be controlled with the min. input voltage of 4 V DC. The on-resistance is also low at typ. 0.033  $\Omega$  (AQZ102D).

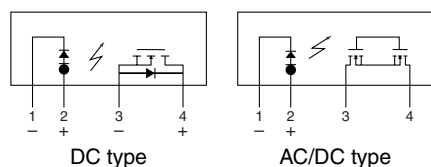
### 6. Slim SIL4-pin package

(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.



(Height includes  
standoff)



**RoHS compliant**

## TYPES

### 1. DC type

|         | Output rating* |              | Package  | Part No. | Packing quantity |              |
|---------|----------------|--------------|----------|----------|------------------|--------------|
|         | Load voltage   | Load current |          |          | Inner carton     | Outer carton |
| DC only | 60 V           | 3.6 A        | SIL4-pin | AQZ102D  | 25 pcs.          | 500 pcs.     |
|         | 100 V          | 2.3 A        |          | AQZ105D  |                  |              |
|         | 200 V          | 1.1 A        |          | AQZ107D  |                  |              |
|         | 400 V          | 0.6 A        |          | AQZ104D  |                  |              |

\* 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           | 2.7 A        | SIL4-pin | AQZ202D  | 25 pcs.          | 500 pcs.     |
|                | 100 V          | 1.8 A        |          | AQZ205D  |                  |              |
|                | 200 V          | 0.9 A        |          | AQZ207D  |                  |              |
|                | 400 V          | 0.45 A       |          | AQZ204D  |                  |              |

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

# 1 Form A Voltage-sensitive (AQZ100D, 200D)

## RATING

### 1. DC type

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

| Item                    |                              | Symbol     | AQZ102D                                                                                                                                                                    | AQZ105D | AQZ107D | AQZ104D | Remarks                            |
|-------------------------|------------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|------------------------------------|
| Input                   | Input voltage                | $V_{IN}$   | 30 V                                                                                                                                                                       |         |         |         |                                    |
|                         | Input reverse voltage        | $V_{RIN}$  | 5 V                                                                                                                                                                        |         |         |         |                                    |
|                         | Power dissipation            | $P_{in}$   | 300 mW                                                                                                                                                                     |         |         |         |                                    |
| Output                  | Load voltage (DC)            | $V_L$      | 60 V                                                                                                                                                                       | 100 V   | 200 V   | 400 V   |                                    |
|                         | Continuous load current (DC) | $I_L$      | 3.6 A                                                                                                                                                                      | 2.3 A   | 1.1 A   | 0.6 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 (4 V ≤ $V_{IN}$ ≤ 6 V)<br>-40°C to +75°C -40°F to +167°F (6 V < $V_{IN}$ ≤ 15 V)<br>-40°C to +60°C -40°F to +140°F (15 V < $V_{IN}$ ≤ 30 V) |         |         |         | 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            | AQZ102D                                 | AQZ105D | AQZ107D | AQZ104D | Remarks                                                                                 |
|--------------------------|----------------------------------|---------|-------------------|-----------------------------------------|---------|---------|---------|-----------------------------------------------------------------------------------------|
| Input                    | Operate voltage                  | Typical | V <sub>Fon</sub>  | 1.4 V                                   |         |         |         | I <sub>L</sub> = 100 mA                                                                 |
|                          |                                  | Maximum |                   | 4 V                                     |         |         |         | V <sub>L</sub> = 10 V                                                                   |
|                          | Turn off voltage                 | Minimum | V <sub>Foff</sub> | 0.8 V                                   |         |         |         | I <sub>L</sub> = 100 mA                                                                 |
|                          |                                  | Typical |                   | 1.3 V                                   |         |         |         | V <sub>L</sub> = 10 V                                                                   |
|                          | Input current                    | Typical | I <sub>IN</sub>   | 6.5 mA                                  |         |         |         | V <sub>IN</sub> = 5 V                                                                   |
| Output                   | On resistance                    | Typical | R <sub>on</sub>   | 0.033 Ω                                 | 0.090 Ω | 0.33 Ω  | 1.23 Ω  | V <sub>IN</sub> = 5 V                                                                   |
|                          |                                  | Maximum |                   | 0.09 Ω                                  | 0.17 Ω  | 0.55 Ω  | 1.6 Ω   | I <sub>L</sub> = Max.<br>Within 1 s on time                                             |
|                          | Off state leakage current        | Maximum | I <sub>Leak</sub> | 10 μA                                   |         |         |         | V <sub>IN</sub> = 0 V<br>V <sub>L</sub> = Max.                                          |
| Transfer characteristics | Turn on time*                    | Typical | T <sub>on</sub>   | 3.3 ms                                  | 2.2 ms  | 1.5 ms  | 1.2 ms  | V <sub>IN</sub> = 5 V                                                                   |
|                          |                                  | Maximum |                   | 10.0 ms                                 |         |         |         | I <sub>L</sub> = 100 mA<br>V <sub>L</sub> = 10 V                                        |
|                          | Turn off time*                   | Typical | T <sub>off</sub>  | 0.2 ms                                  |         | 0.1 ms  |         | V <sub>IN</sub> = 5 V                                                                   |
|                          |                                  | Maximum |                   | 3.0 ms                                  |         |         |         | I <sub>L</sub> = 100 mA<br>V <sub>L</sub> = 10 V                                        |
|                          | I/O capacitance                  | Typical | C <sub>iso</sub>  | 0.8 pF                                  |         |         |         | f = 1 MHz                                                                               |
|                          |                                  | Maximum |                   | 1.5 pF                                  |         |         |         | V <sub>B</sub> = 0 V                                                                    |
|                          | Initial I/O isolation resistance | Minimum | R <sub>iso</sub>  | 1,000 MΩ                                |         |         |         | 500 V DC                                                                                |
|                          | Maximum operating speed          | Maximum | —                 | 0.5 cps                                 |         |         |         | V <sub>IN</sub> = 5 V<br>Duty factor = 50%<br>I <sub>L</sub> ×V <sub>L</sub> = 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 <sup>2</sup> {500 G}1 ms      |         |         |         | 3 times for 3 axes                                                                      |

### 2. AC/DC type

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

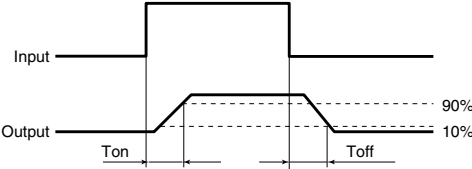
| Item                    |                         | Symbol     | AQZ202D                                                                                                                                                                    | AQZ205D | AQZ207D | AQZ204D | Remarks                            |
|-------------------------|-------------------------|------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|---------|---------|------------------------------------|
| Input                   | Input voltage           | $V_{IN}$   | 30 V                                                                                                                                                                       |         |         |         |                                    |
|                         | Input reverse voltage   | $V_{RIN}$  | 5 V                                                                                                                                                                        |         |         |         |                                    |
|                         | Power dissipation       | $P_{in}$   | 300 mW                                                                                                                                                                     |         |         |         |                                    |
| Output                  | Load voltage (peak AC)  | $V_L$      | 60 V                                                                                                                                                                       | 100 V   | 200 V   | 400 V   |                                    |
|                         | Continuous load current | $I_L$      | 2.7 A                                                                                                                                                                      | 1.8 A   | 0.9 A   | 0.45 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 (4 V ≤ $V_{IN}$ ≤ 6 V)<br>-40°C to +75°C -40°F to +167°F (6 V < $V_{IN}$ ≤ 15 V)<br>-40°C to +60°C -40°F to +140°F (15 V < $V_{IN}$ ≤ 30 V) |         |         |         | Non-condensing at low temperatures |
|                         | Storage                 | $T_{stg}$  | -40°C to +100°C -40°F to +212°F                                                                                                                                            |         |         |         |                                    |

1 Form A Voltage-sensitive (AQZ10OD, 20OD)

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

| Item                     |                                  |         | Symbol            | AQZ202D                                 | AQZ205D | AQZ207D | AQZ204D | Remarks                                                                                 |
|--------------------------|----------------------------------|---------|-------------------|-----------------------------------------|---------|---------|---------|-----------------------------------------------------------------------------------------|
| Input                    | Operate voltage                  | Typical | V <sub>Fon</sub>  | 1.4 V                                   |         |         |         | I <sub>L</sub> = 100 mA                                                                 |
|                          |                                  | Maximum |                   | 4 V                                     |         |         |         | V <sub>L</sub> = 10 V                                                                   |
|                          | Turn off voltage                 | Minimum | V <sub>Foff</sub> | 0.8 V                                   |         |         |         | I <sub>L</sub> = 100 mA                                                                 |
|                          |                                  | Typical |                   | 1.3 V                                   |         |         |         | V <sub>L</sub> = 10 V                                                                   |
|                          | Input current                    | Typical | I <sub>IN</sub>   | 6.5 mA                                  |         |         |         | V <sub>IN</sub> = 5 V                                                                   |
| Output                   | On resistance                    | Typical | R <sub>on</sub>   | 0.066 Ω                                 | 0.180 Ω | 0.64 Ω  | 2.4 Ω   | V <sub>IN</sub> = 5 V                                                                   |
|                          |                                  | Maximum |                   | 0.18 Ω                                  | 0.34 Ω  | 1.1 Ω   | 3.2 Ω   | I <sub>L</sub> = Max.<br>Within 1 s on time                                             |
|                          | Off state leakage current        | Maximum | I <sub>Leak</sub> | 10 μA                                   |         |         |         | V <sub>IN</sub> = 0 V<br>V <sub>L</sub> = Max.                                          |
| Transfer characteristics | Turn on time*                    | Typical | T <sub>on</sub>   | 5.8 ms                                  | 4.2 ms  | 2.7 ms  | 2.3 ms  | V <sub>IN</sub> = 5 V                                                                   |
|                          |                                  | Maximum |                   | 10.0 ms                                 |         |         |         | I <sub>L</sub> = 100 mA<br>V <sub>L</sub> = 10 V                                        |
|                          | Turn off time*                   | Typical | T <sub>off</sub>  | 0.2 ms                                  |         | 0.1 ms  |         | V <sub>IN</sub> = 5 V                                                                   |
|                          |                                  | Maximum |                   | 3.0 ms                                  |         |         |         | I <sub>L</sub> = 100 mA<br>V <sub>L</sub> = 10 V                                        |
|                          | I/O capacitance                  | Typical | C <sub>iso</sub>  | 0.8 pF                                  |         |         |         | f = 1 MHz                                                                               |
|                          |                                  | Maximum |                   | 1.5 pF                                  |         |         |         | V <sub>B</sub> = 0 V                                                                    |
|                          | Initial I/O isolation resistance | Minimum | R <sub>iso</sub>  | 1,000 MΩ                                |         |         |         | 500 V DC                                                                                |
|                          | Maximum operating speed          | Maximum | —                 | 0.5 cps                                 |         |         |         | V <sub>IN</sub> = 5 V<br>Duty factor = 50%<br>I <sub>L</sub> ×V <sub>L</sub> = 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/s² {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 voltage | V <sub>IN</sub> | 5                 | V    |

- For Dimensions.
- For Schematic and Wiring Diagrams.
- For Cautions for Use.

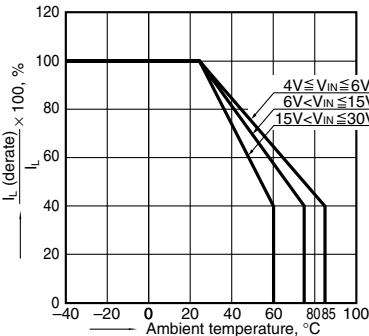
■ These products are not designed for automotive use.  
If you are considering to use these products for automotive applications, please contact your local Panasonic Corporation technical representative.  
For more information.

REFERENCE DATA

1. Load current vs. ambient temperature characteristics

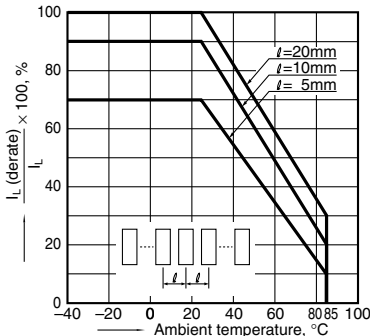
Allowable ambient temperature: -40°C to +85°C  
-40°F to +185°F;

V<sub>IN</sub>: Input voltage; I<sub>L</sub> (derate): Load current (derate); I<sub>L</sub>: Absolute maximum ratings of continuous load current



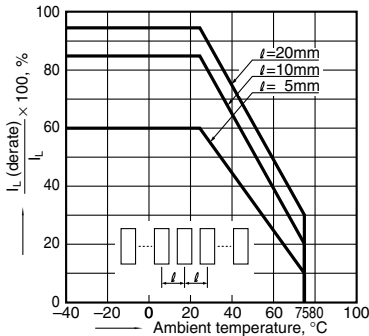
2.-(1) Load current vs. ambient temperature characteristics in adjacent mounting

Input voltage: 4V ≤ V<sub>IN</sub> ≤ 6V;  
I<sub>L</sub> (derate): Load current (derate); I<sub>L</sub>: Absolute maximum ratings of continuous load current; ℓ: Adjacent mounting pitch



2.-(2) Load current vs. ambient temperature characteristics in adjacent mounting

Input voltage: 6V < V<sub>IN</sub> ≤ 15V;  
I<sub>L</sub> (derate): Load current (derate); I<sub>L</sub>: Absolute maximum ratings of continuous load current; ℓ: Adjacent mounting pitch

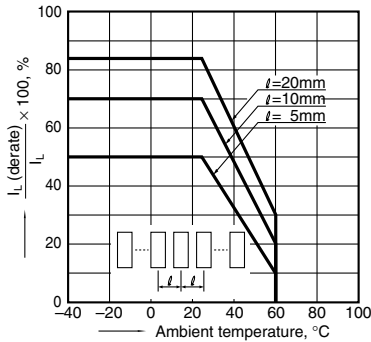


# 1 Form A Voltage-sensitive (AQZ100D, 200D)

## 2.-(3) Load current vs. ambient temperature characteristics in adjacent mounting

Input voltage:  $15V < V_{IN} \leq 30V$ ;

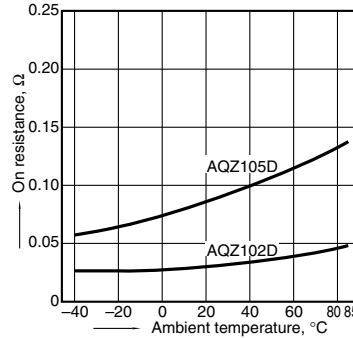
$I_L$  (derate): Load current (derate);  $I_L$ : Absolute maximum ratings of continuous load current;  $\ell$ : Adjacent mounting pitch



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

Input voltage: 5 V;

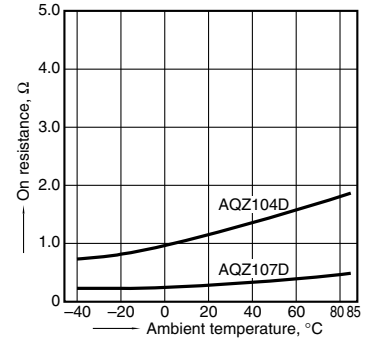
Continuous load current: 3.6 A (DC) (AQZ102D)  
2.3 A (DC) (AQZ105D)



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

Input voltage: 5 V;

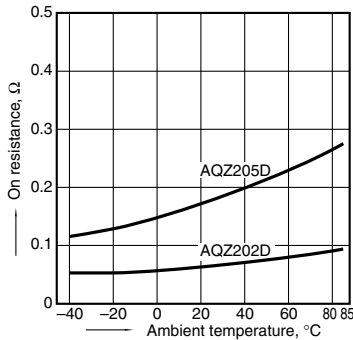
Continuous load current: 1.1 A (DC) (AQZ107D)  
0.6 A (DC) (AQZ104D)



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

Input voltage: 5 V;

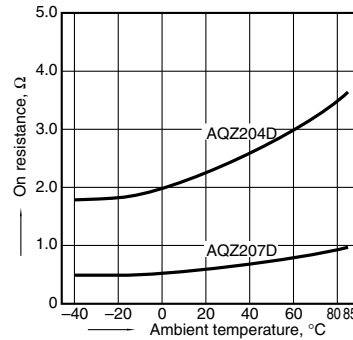
Continuous load current: 2.7 A (DC) (AQZ202D)  
1.8 A (DC) (AQZ205D)



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

Input voltage: 5 V;

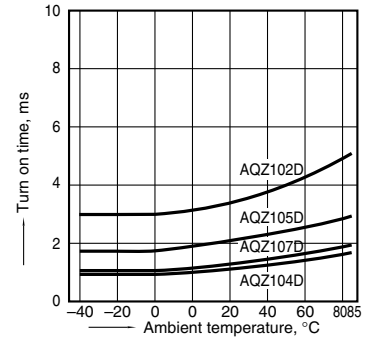
Continuous load current: 0.9 A (DC) (AQZ207D)  
0.45 A (DC) (AQZ204D)



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

Input voltage: 5 V; Load voltage: 10 V (DC);

Continuous load current: 100 mA (DC)

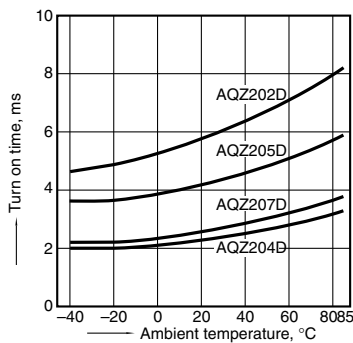


## 4.-(2) Turn on time vs. ambient temperature characteristics (AC/DC type)

Input voltage: 5 V;

Load voltage: 10 V (DC);

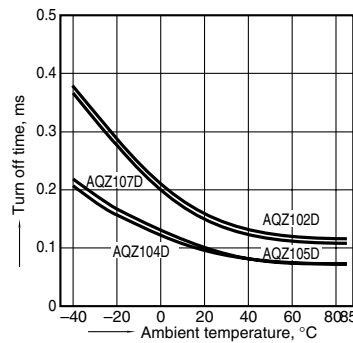
Continuous load current: 100 mA (DC)



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

Input voltage: 5 V; Load voltage: 10 V (DC);

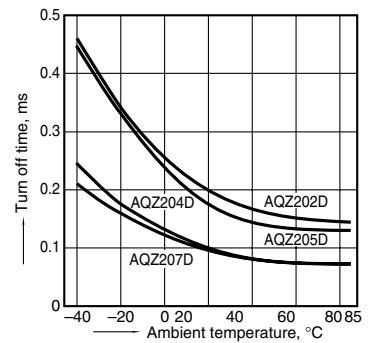
Continuous load current: 100 mA (DC)



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

Input voltage: 5 V; Load voltage: 10 V (DC);

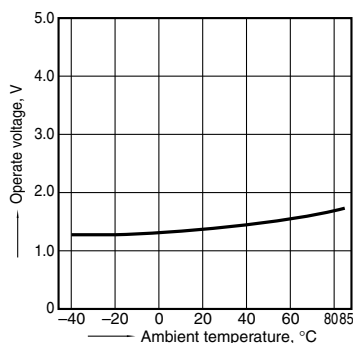
Continuous load current: 100 mA (DC)



## 6. Operate voltage vs. ambient temperature characteristics

Load voltage: 10 V (DC);

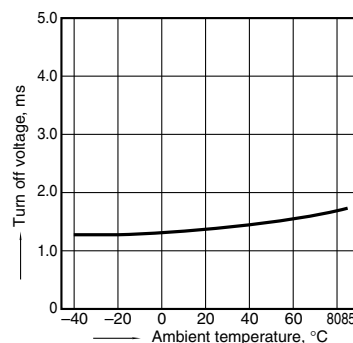
Continuous load current: 100 mA (DC)



## 7. Turn off voltage vs. ambient temperature characteristics

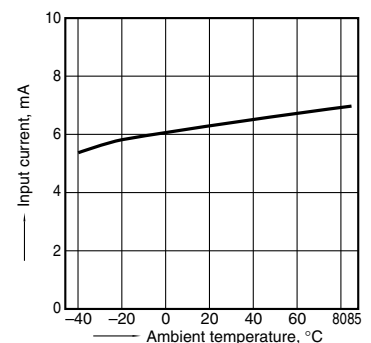
Load voltage: 10 V (DC);

Continuous load current: 100 mA (DC)



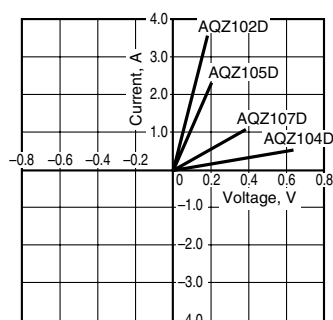
## 8. Input current vs. ambient temperature characteristics

Input voltage: 5 V

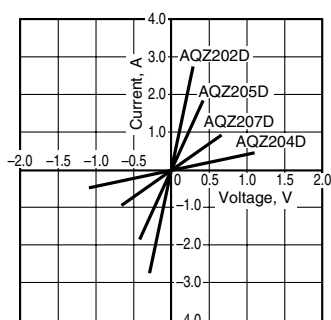


# 1 Form A Voltage-sensitive (AQZ10○D, 20○D)

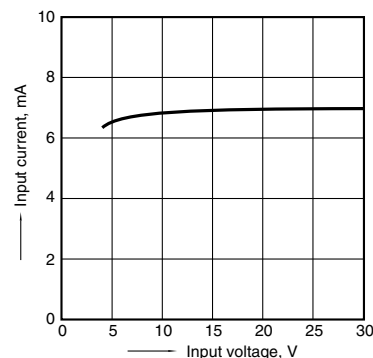
9.-(1) Current vs. voltage characteristics of output at MOS portion (DC type)  
Ambient temperature: 25°C 77°F



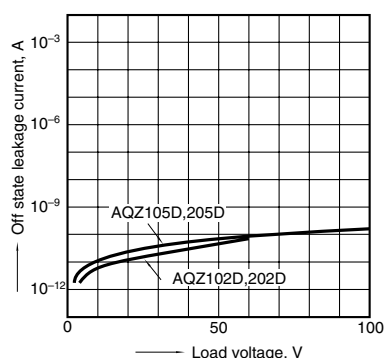
9.-(2) Current vs. voltage characteristics of output at MOS portion (AC/DC type)  
Ambient temperature: 25°C 77°F



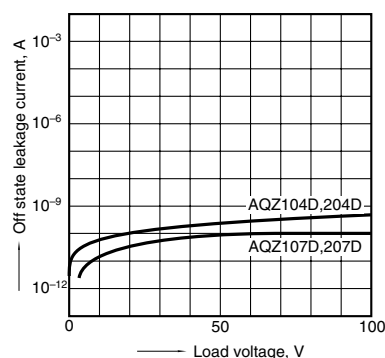
10. Input current vs. input voltage characteristics  
Ambient temperature: 25°C 77°F



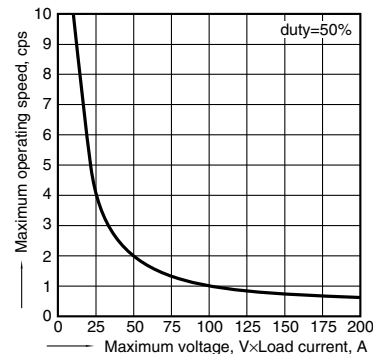
11.-(1) Off state leakage current vs. load voltage characteristics  
Ambient temperature: 25°C 77°F



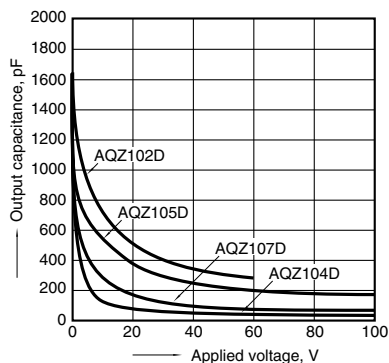
11.-(2) Off state leakage current vs. load voltage characteristics  
Ambient temperature: 25°C 77°F



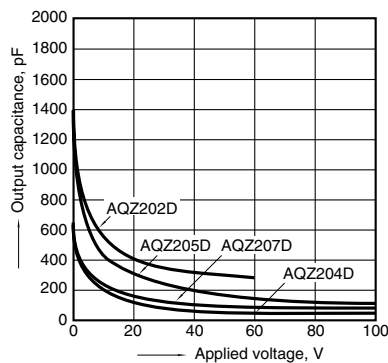
12. Maximum operating speed vs. load voltage × load current characteristics  
Input voltage: 5V; Ambient temperature: 25°C 77°F



13.-(1) Output capacitance vs. applied voltage characteristics (DC type)  
Frequency: 1 MHz; Ambient temperature: 25°C 77°F

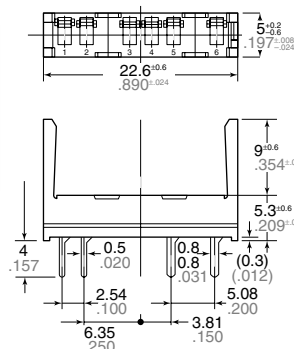


13.-(2) Output capacitance vs. applied voltage characteristics (AC/DC type)  
Frequency: 1 MHz; Ambient temperature: 25°C 77°F

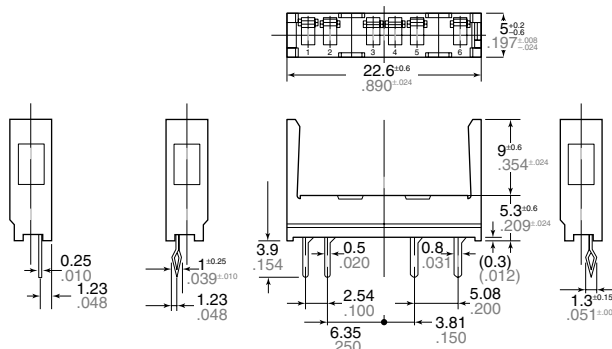


## ACCESSORY (mm inch)

### Socket



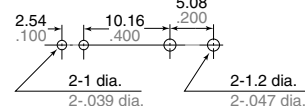
PA1a-PS



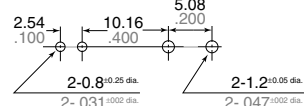
PA1a-PS-H

### PC board pattern (BOTTOM VIEW)

#### Standard type



#### Self clinching type



Tolerance: ±0.1 ±0.04