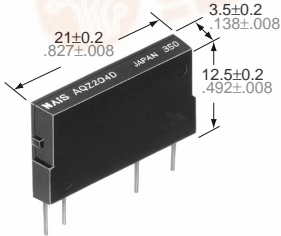




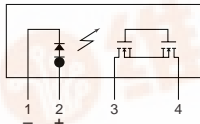
# NAIS

## POWER PhotoMOS RELAYS (Voltage Sensitive Type)

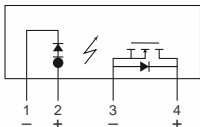
# PhotoMOS RELAYS



mm inch



AC/DC type



DC type

### FEATURES

#### 1. A voltage sensitive power PhotoMOS relay

Conventional power PhotoMOS relays 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 relay to be voltage driven.

#### 2. Wide range of input voltages

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

#### 3. Large capacity PhotoMOS relay

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

#### 4. Both AC/DC dual types and DC-only types are 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.

#### 5. High sensitivity, low ON resistance

A maximum 3.6 A load can be controlled with the minimum input voltage of 4 V DC. The ON resistance is also low at 0.09 Ω (AQZ102D).

#### 6. Small scale, slim type, 4-pin SIL

Length 21.0 mm×width 3.5 mm×height 12.5 mm. High precision mounting is possible because of the small 73.5mm<sup>2</sup> area of the 4-pin SIL.

### TYPES

#### 1. AC/DC type

Output rating		Part No.	Packing quantity	
Load voltage	Load current		Inner carton	Outer carton
60 V	2.7 A	AQZ202D	25 pcs.	500 pcs.
100 V	1.8 A	AQZ205D		
200 V	0.9 A	AQZ207D		
400 V	0.45 A	AQZ204D		

#### 2. DC type

Output rating		Part No.	Packing quantity	
Load voltage	Load current		Inner carton	Outer carton
60 V	3.6 A	AQZ102D	25 pcs.	500 pcs.
100 V	2.3 A	AQZ105D		
200 V	1.1 A	AQZ107D		
400 V	0.6 A	AQZ104D		

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	AQZ202D	AQZ205D	AQZ207D	AQZ204D	Remarks
Input	Input voltage	$V_{IN}$	30 V				
	Input reverse voltage	$V_{RIN}$	3 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 (Peak AC)	$I_L$	2.7 A	1.8 A	0.9 A	0.45 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 (4 V ≤ $V_{IN}$ ≤ 6 V) -40°C to +75°C -40°F to +167°F (6 V < $V_{IN}$ ≤ 15 V) -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				

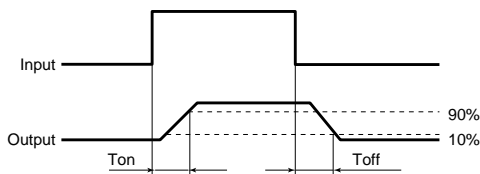
2) Electrical characteristics (Ambient temperature: 25°C 77°F)

Item			Symbol	AQZ202D	AQZ205D	AQZ207D	AQZ204D	Remarks	
Input	Operate voltage	Typical	$V_{Fon}$	1.4 V				$I_L = 100\text{ mA}$ $V_L = 10\text{ V}$	
		Maximum		4 V					
	Turn off voltage	Minimum	$V_{Foff}$	0.8 V				$I_L = 100\text{ mA}$ $V_L = 10\text{ V}$	
		Typical		1.3 V					
Input current		Typical	$I_{IN}$	6.5 mA				$V_{IN} = 5\text{ V}$	
Output	On resistance	Typical	$R_{on}$	0.066 Ω	0.180 Ω	0.64 Ω	2.4 Ω	$V_{IN} = 5\text{ V}$ $I_L = \text{Max.}$ 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				$V_{IN} = 0$ $V_L = \text{Max.}$	
Transfer characteristics	Switching speed	Turn on time*	$T_{on}$	Typical	5.8 ms	4.2 ms	2.7 ms	2.3 ms	$V_{IN} = 5\text{ V}$ $I_L = 100\text{ mA}$ $V_L = 10\text{ V}$
		Maximum		10.0 ms					
	Turn off time*	$T_{off}$	Typical	0.2 ms	0.2 ms	0.1 ms	0.1 ms	$V_{IN} = 5\text{ V}$ $I_L = 100\text{ mA}$ $V_L = 10\text{ V}$	
			Maximum	3.0 ms					
	I/O capacitance		Typical	$C_{iso}$	0.8 pF				$f = 1\text{ MHz}$ $V_B = 0$
			Maximum		1.5 pF				
	Initial I/O isolation resistance		Minimum	$R_{iso}$	1,000 MΩ				500 V DC
Maximum operating speed		Maximum	—	0.5 cps				$V_{IN} = 5\text{ V}$ 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 <sup>2</sup> {500 G} 1 ms				3 times for 3 axes	

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

For type of connection, see page 35.

\*Turn on/off time



### 2. 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	$V_{RIN}$	3 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) -40°C to +75°C -40°F to +167°F (6 V < $V_{IN}$ ≤ 15 V) -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				

# AQZ100D, 200D

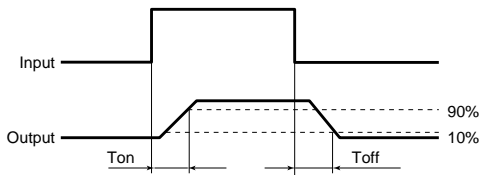
## 2) Electrical characteristics (Ambient temperature: 25°C 77°F)

Item		Symbol	AQZ102D	AQZ105D	AQZ107D	AQZ104D	Remarks	
Input	Operate voltage	Typical	1.4 V				$I_L = 100 \text{ mA}$ $V_L = 10 \text{ V}$	
		Maximum	4 V					
	Turn off voltage	Minimum	0.8 V				$I_L = 100 \text{ mA}$ $V_L = 10 \text{ V}$	
		Typical	1.3 V					
Input current	Typical	$I_{IN}$	6.5 mA				$V_{IN} = 5 \text{ V}$	
Output	On resistance	Typical	0.033 $\Omega$	0.090 $\Omega$	0.33 $\Omega$	1.23 $\Omega$	$V_{IN} = 5 \text{ V}$ $I_L = \text{Max.}$ Within 1 s on time	
		Maximum	0.09 $\Omega$	0.17 $\Omega$	0.55 $\Omega$	1.6 $\Omega$		
	Off state leakage current	Maximum	$I_{leak}$	10 $\mu\text{A}$				$V_{IN} = 0$ $V_L = \text{Max.}$
Transfer characteristics	Switching speed	Turn on time*	Typical	3.3 ms	2.2 ms	1.5 ms	1.2 ms	$V_{IN} = 5 \text{ V}$ $I_L = 100 \text{ mA}$ $V_L = 10 \text{ V}$
			Maximum	10.0 ms				
		Turn off time*	Typical	0.2 ms	0.2 ms	0.1 ms	0.1 ms	$V_{IN} = 5 \text{ V}$ $I_L = 100 \text{ mA}$ $V_L = 10 \text{ V}$
			Maximum	3.0 ms				
	I/O capacitance	Typical	$C_{iso}$	0.8 pF				$f = 1 \text{ MHz}$ $V_B = 0$
		Maximum		1.5 pF				
	Initial I/O isolation resistance	Minimum	$R_{iso}$	1,000 M $\Omega$				500 V DC
Maximum operating speed	Maximum	—	0.5 cps				$V_{IN} = 5 \text{ V}$ 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 <sup>2</sup> {500 G}1 ms				3 times for 3 axes	

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.

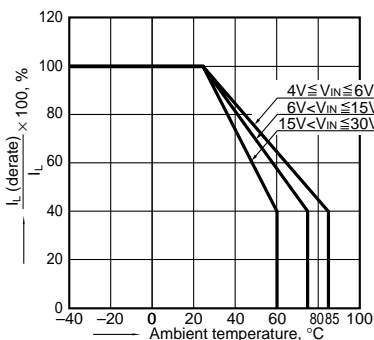
## REFERENCE DATA

### 1. Load current vs. ambient temperature characteristics

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

-40°F to +185°F;

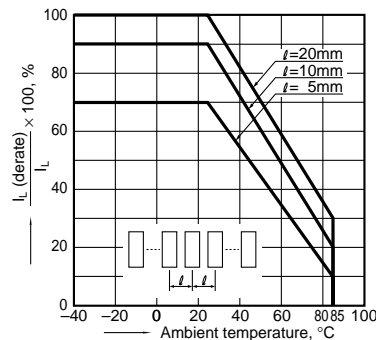
$V_{IN}$ : Input voltage;  $I_L$  (derate): Load current (derate);  $I_L$ : Absolute maximum ratings of continuous load current



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

Input voltage:  $4\text{V} \leq V_{IN} \leq 6\text{V}$ ;

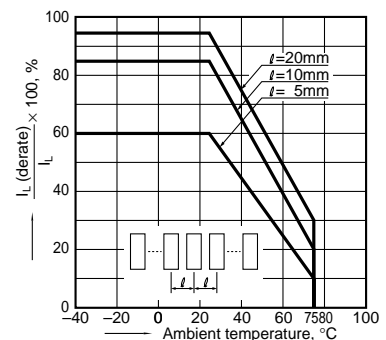
$I_L$  (derate): Load current (derate);  $I_L$ : Absolute maximum ratings of continuous load current;  $\ell$ : Adjacent mounting pitch



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

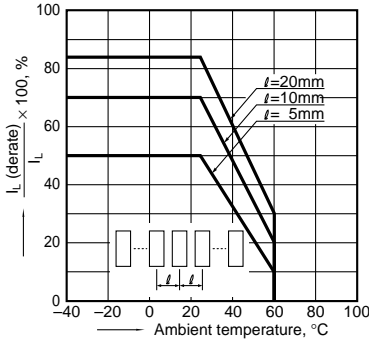
Input voltage:  $6\text{V} < V_{IN} \leq 15\text{V}$ ;

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



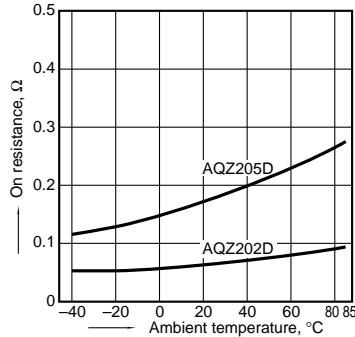
## 2.-(3) Load current vs. ambient temperature characteristics in adjacent mounting

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



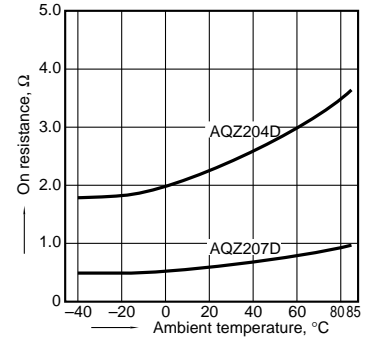
## 3.-(1) On resistance vs. ambient temperature characteristics (AC/DC type)

Input voltage: 5 V;  
 Continuous load current: 2.7 A (DC) (AQZ202D)  
 1.8 A (DC) (AQZ205D)



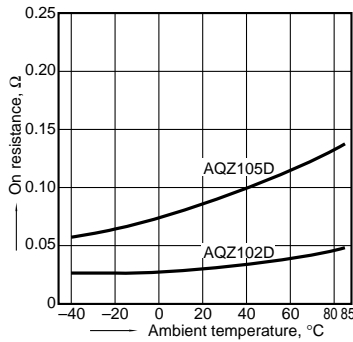
## 3.-(2) On resistance vs. ambient temperature characteristics (AC/DC type)

Input voltage: 5 V;  
 Continuous load current: 0.9 A (DC) (AQZ207D)  
 0.45 A (DC) (AQZ204D)



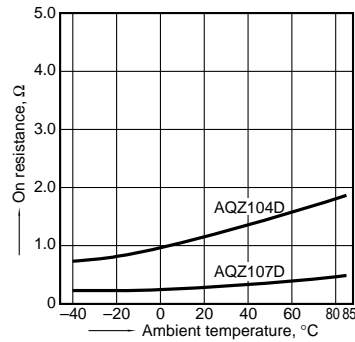
## 3.-(3) On resistance vs. ambient temperature characteristics (DC type)

Input voltage: 5 V;  
 Continuous load current: 3.6 A (DC) (AQZ102D)  
 2.3 A (DC) (AQZ105D)



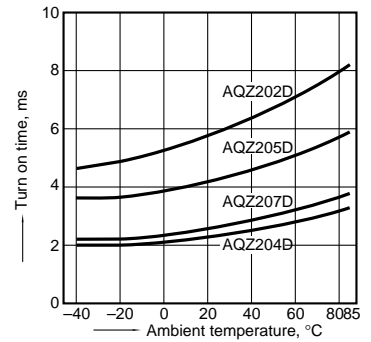
## 3.-(4) On resistance vs. ambient temperature characteristics (DC type)

Input voltage: 5 V;  
 Continuous load current: 1.1 A (DC) (AQZ107D)  
 0.6 A (DC) (AQZ104D)



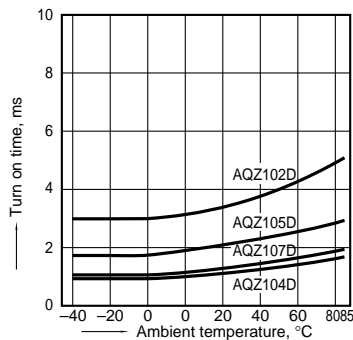
## 4.-(1) Turn on time vs. ambient temperature characteristics (AC/DC type)

Input voltage: 5 V;  
 Load voltage: 10 V (DC);  
 Continuous load current: 100 mA (DC)



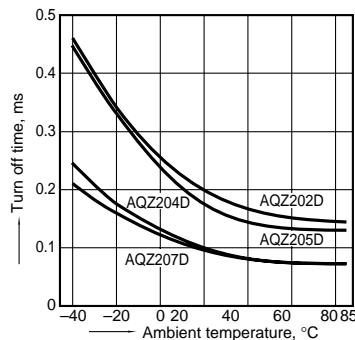
## 4.-(2) Turn on time vs. ambient temperature characteristics (DC type)

Input voltage: 5 V; Load voltage: 10 V (DC);  
 Continuous load current: 100 mA (DC)



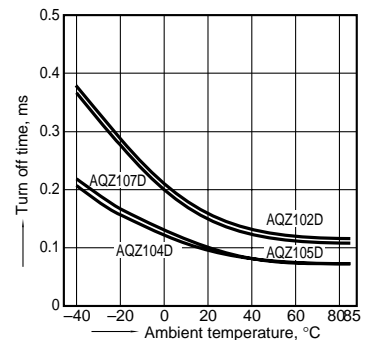
## 5.-(1) Turn off time vs. ambient temperature characteristics (AC/DC type)

Input voltage: 5 V; Load voltage: 10 V (DC);  
 Continuous load current: 100 mA (DC)



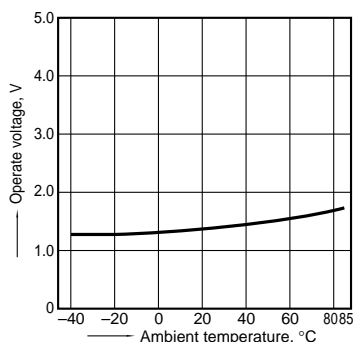
## 5.-(2) Turn off time vs. ambient temperature characteristics (DC type)

Input voltage: 5 V; Load voltage: 10 V (DC);  
 Continuous load current: 100 mA (DC)



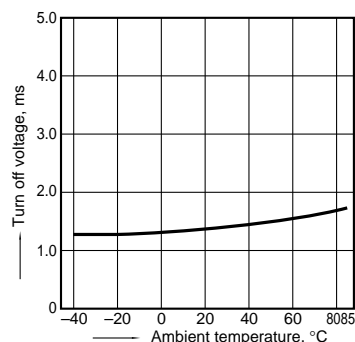
## 6. Operate voltage vs. ambient temperature characteristics

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



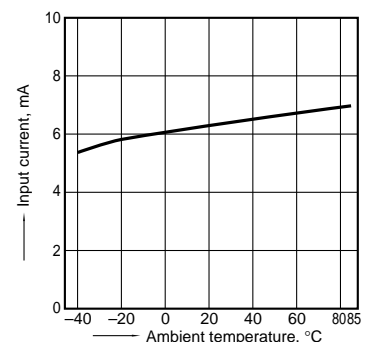
## 7. Turn off voltage vs. ambient temperature characteristics

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



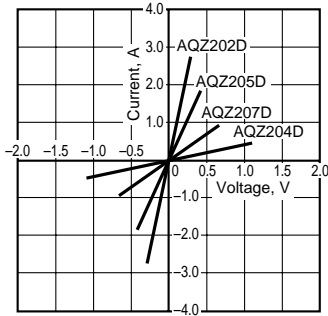
## 8. Input current vs. ambient temperature characteristics

Input voltage: 5 V

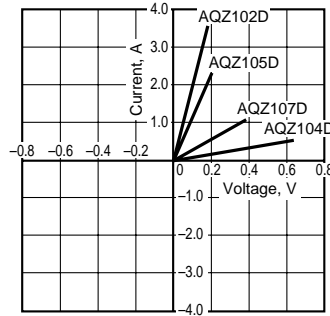


# AQZ100D, 200D

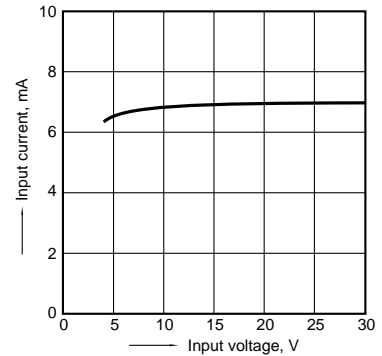
9.-(1) Voltage vs. current characteristics of output at MOS portion (AC/DC type)  
Ambient temperature: 25°C 77°F



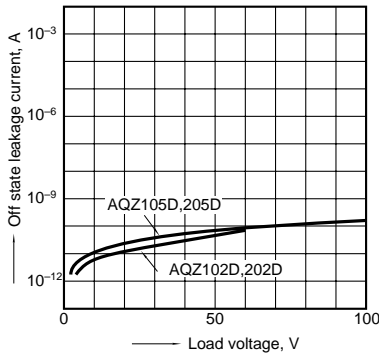
9.-(2) Voltage vs. current characteristics of output at MOS portion (DC type)  
Ambient temperature: 25°C 77°F



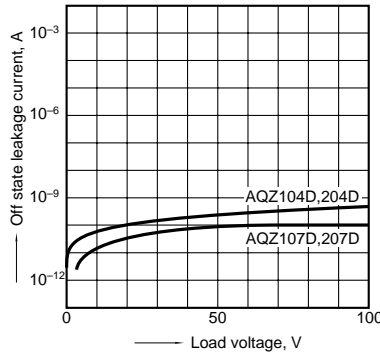
10. Input voltage vs. input current characteristics  
Ambient temperature: 25°C 77°F



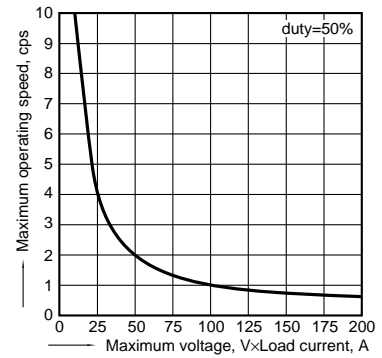
11.-(1) Off state leakage current  
Ambient temperature: 25°C 77°F



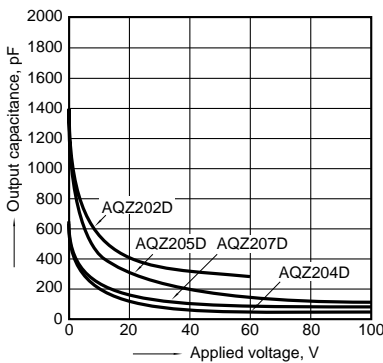
11.-(2) Off state leakage current  
Ambient temperature: 25°C 77°F



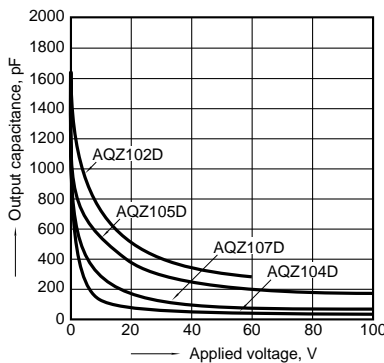
12. Maximum operating speed vs. load voltage × load current characteristics  
Input voltage: 5V; Ambient temperature: 25°C 77°F



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

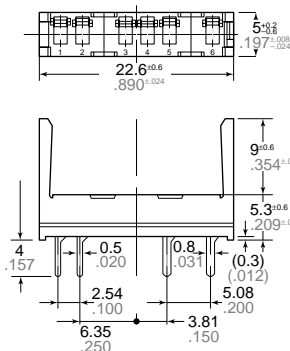


13.-(2) Applied voltage vs. output capacitance characteristics (DC type)  
Frequency: 1 MHz; Ambient temperature: 25°C 77°F

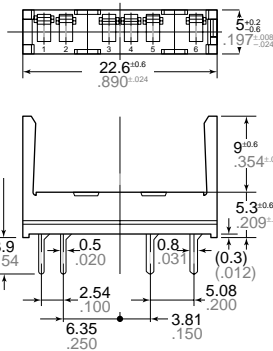


## ACCESSORY

### Socket



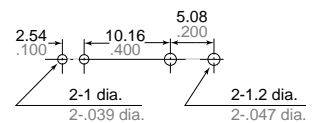
PA1a-PS



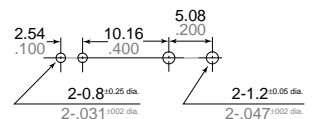
PA1a-PS-H

mm inch

### PC board pattern (BOTTOM VIEW) Standard type



### Self clinching type



Tolerance: ±0.1 ±0.04