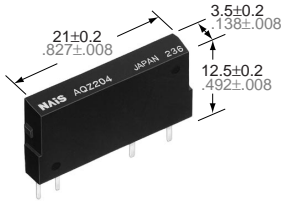


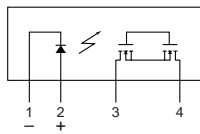
# NAIS

## POWER PhotoMOS RELAYS 1-channel (Form A) Type

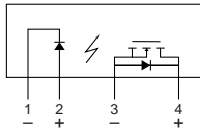
# PhotoMOS RELAYS



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				

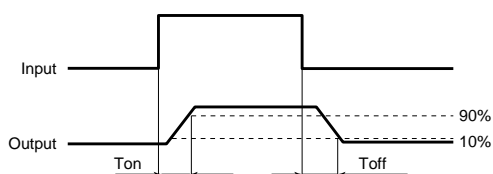
2) Electrical characteristics (Ambient temperature: 25°C 77°F)

Item			Symbol	AQZ202	AQZ205	AQZ207	AQZ204	Condition	
Input	LED operate current	Typical	$I_{Fon}$	1.0 mA				$I_L = 100$ 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	$R_{on}$	0.11 $\Omega$	0.23 $\Omega$	0.7 $\Omega$	2.1 $\Omega$	$I_F = 10$ mA $I_L = Max.$ Within 1 s on time	
		Maximum		0.18 $\Omega$	0.34 $\Omega$	1.1 $\Omega$	3.2 $\Omega$		
	Off state leakage current	Maximum	—	10 $\mu$ A				$I_F = 0$ $V_L = Max.$	
Transfer characteristics	Switching speed	Turn on time*	$T_{on}$	Typical	2.46 ms	2.40 ms	1.12 ms	1.65 ms	$I_F = 10$ mA $I_L = 100$ mA $V_L = 10$ V
				Maximum	5.0 ms				
		Typical		5.64 ms	5.65 ms	2.57 ms	3.88 ms	$I_F = 5$ mA $I_L = 100$ mA $V_L = 10$ V	
		Maximum		10.0 ms					
	Turn off time*	$T_{off}$	Typical	0.22 ms	0.21 ms	0.10 ms	0.08 ms	$I_F = 5$ mA or 10 mA $I_L = 100$ mA $V_L = 10$ V	
			Maximum	3.0 ms					
	I/O capacitance		$C_{iso}$	Typical	0.8 pF				$f = 1$ 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				$I_F = 10$ mA Duty factor = 50% $I_L = Max., V_L = Max.$	
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 <sup>2</sup> {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				$f = 100 \text{ Hz}$ , 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				

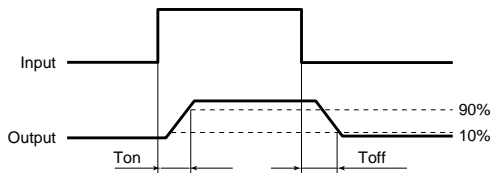
2) Electrical characteristics (Ambient temperature: 25°C 77°F)

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	$V_F$	1.16 V (1.25 V at $I_F = 50 \text{ mA}$ )				$I_F = 10 \text{ mA}$	
Maximum		1.5 V							
Output	On resistance	Typical	$R_{on}$	0.05 $\Omega$	0.081 $\Omega$	0.34 $\Omega$	1.06 $\Omega$	$I_F = 10 \text{ mA}$ $I_L = \text{Max.}$ Within 1 s on time	
		Maximum		0.09 $\Omega$	0.17 $\Omega$	0.55 $\Omega$	1.6 $\Omega$		
	Off state leakage current	Maximum	—	10 $\mu\text{A}$				$I_F = 0$ $V_L = \text{Max.}$	
Transfer characteristics	Switching speed	Turn on time*	$T_{on}$	Typical	1.66 ms	1.89 ms	0.83 ms	1.01 ms	$I_F = 10 \text{ mA}$ $I_L = 100 \text{ mA}$ $V_L = 10 \text{ V}$
				Maximum	5.0 ms				
		Turn off time*		Typical	3.79 ms	4.50 ms	1.75 ms	2.34 ms	$I_F = 5 \text{ mA}$ $I_L = 100 \text{ mA}$ $V_L = 10 \text{ V}$
				Maximum	10.0 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				$I_F = 10 \text{ mA}$ 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 <sup>2</sup> {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

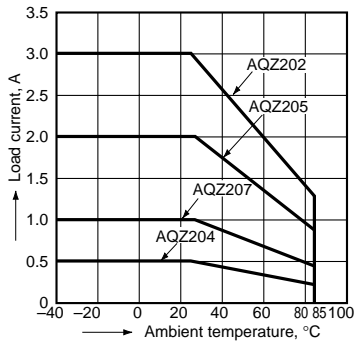


- For Dimensions, see Page 29.
- For Schematic and Wiring Diagrams, see Page 35.
- For Cautions for Use, see Page 40.

**REFERENCE DATA**

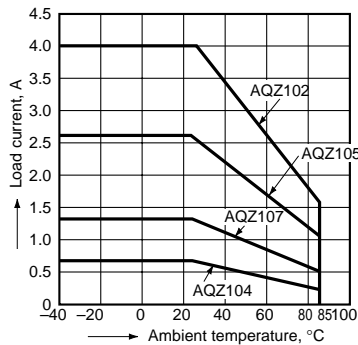
1.-(1) Load current vs. ambient temperature characteristics (AC/DC type)

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



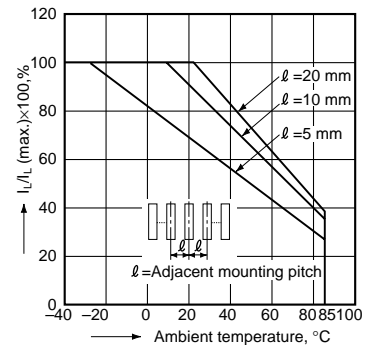
1.-(2) Load current vs. ambient temperature characteristics (DC type)

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



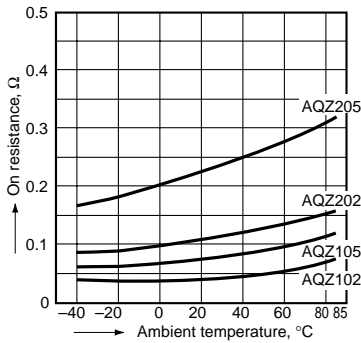
2. Load current vs. ambient temperature characteristics in adjacent mounting

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



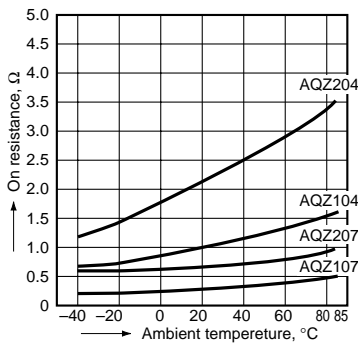
3.-(1) On resistance vs. ambient temperature characteristics

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)



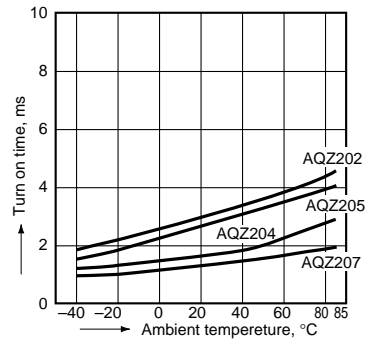
3.-(2) On resistance vs. ambient temperature characteristics

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)



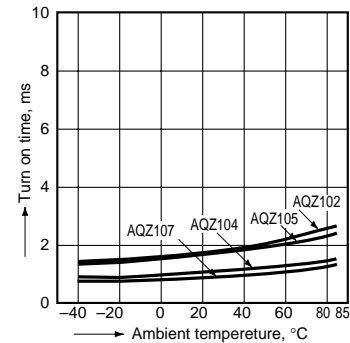
4.-(1) Turn on time vs. ambient temperature characteristics (AC/DC type)

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



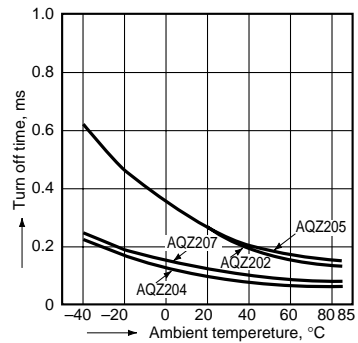
4.-(2) Turn on time vs. ambient temperature characteristics (DC type)

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



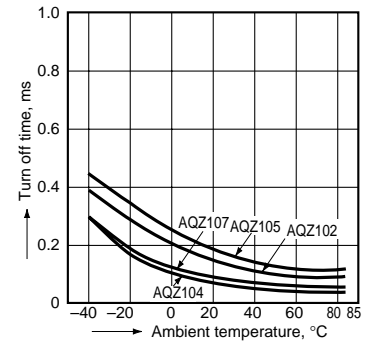
5.-(1) Turn off time vs. ambient temperature characteristics (AC/DC type)

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



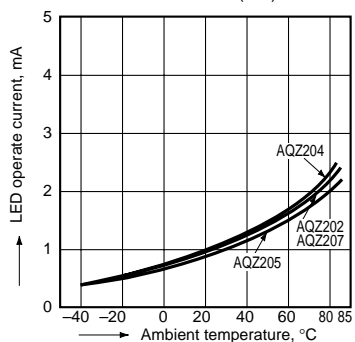
5.-(2) Turn off time vs. ambient temperature characteristics (DC type)

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



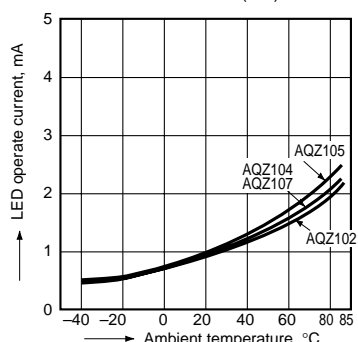
6.-(1) LED operate vs. ambient temperature characteristics (AC/DC type)

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



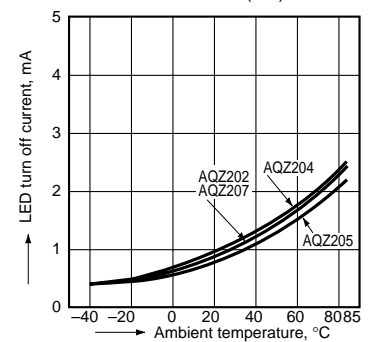
6.-(2) LED operate vs. ambient temperature characteristics (DC type)

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



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

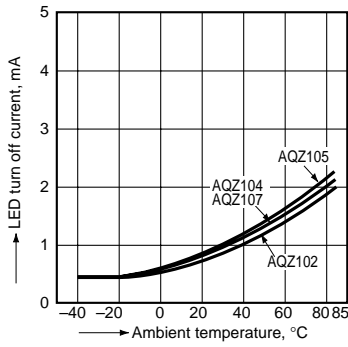
Load voltage: 10 V (DC);  
Continuous load current: 100 mA (DC)



# AQZ100, 200

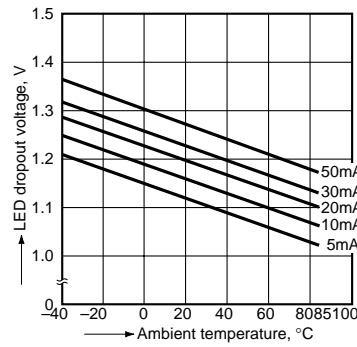
7.-(2) LED turn off current vs. ambient temperature characteristics (DC type)

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



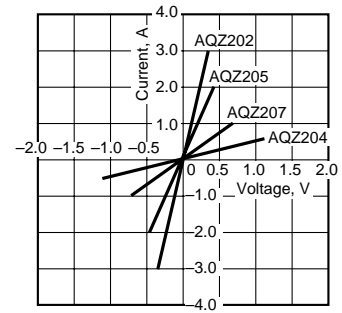
8. LED dropout voltage vs. ambient temperature characteristics

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



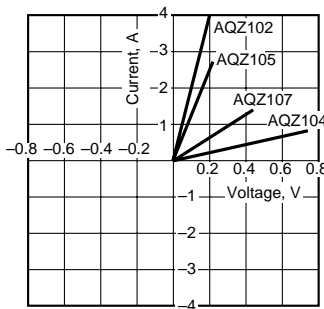
9.-(1) Voltage vs. current characteristics of output at MOS portion (AC/DC type)

Ambient temperature: 25°C 77°F



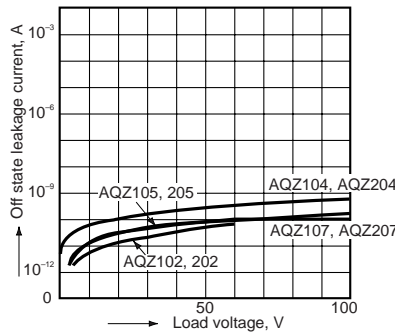
9.-(2) Voltage vs. current characteristics of output at MOS portion (DC type)

Ambient temperature: 25°C 77°F



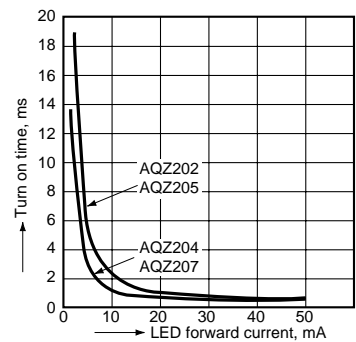
10. Off state leakage current

Ambient temperature: 25°C 77°F



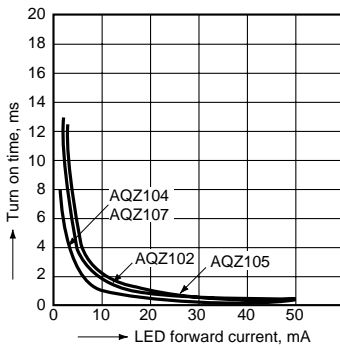
11.-(1) LED forward current vs. turn on time characteristics (AC/DC type)

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



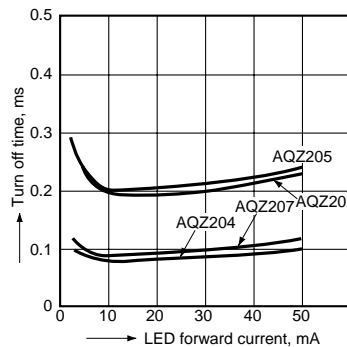
11.-(2) LED forward current vs. turn on time characteristics (DC type)

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



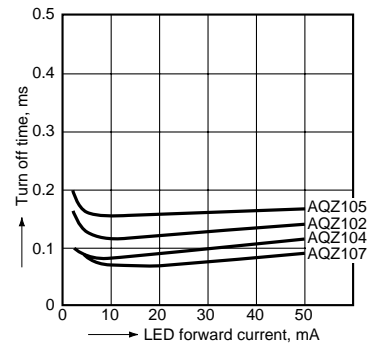
12.-(1) LED forward current vs. turn off time characteristics (AC/DC type)

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



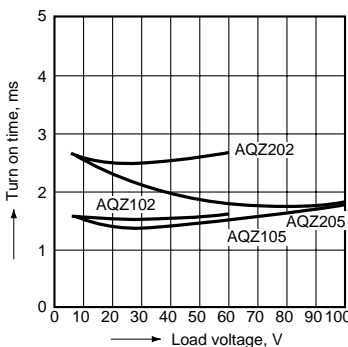
12.-(2) LED forward current vs. turn off time characteristics (DC type)

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



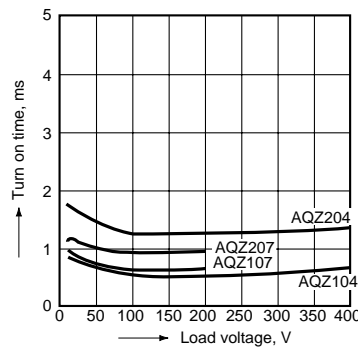
13.-(1) Load voltage vs. turn on time characteristics (Load voltage: 60, 100 V type)

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



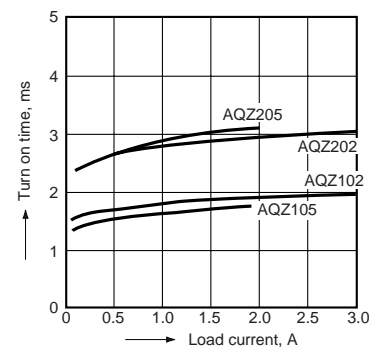
13.-(2) Load voltage vs. turn on time characteristics (Load voltage: 200, 400 V type)

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

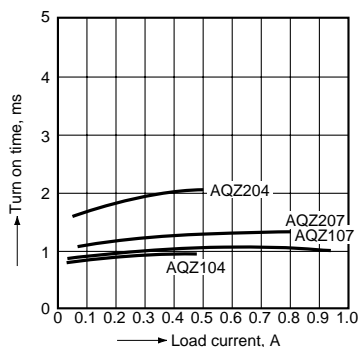


14.-(1) Load current vs. turn on time characteristics (Load voltage: 60, 100 V type)

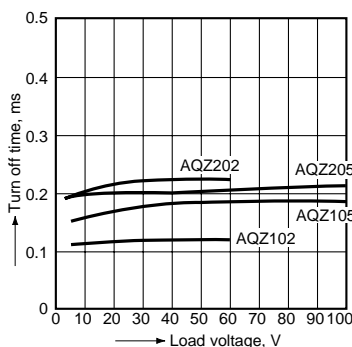
LED current: 10 mA;  
Load voltage: 10 V (DC);  
Ambient temperature: 25°C 77°F



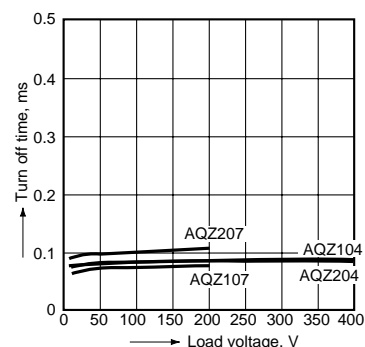
14.-(2) Load current vs. turn on time characteristics (Load voltage: 200, 400 V type)  
LED current: 10 mA;  
Load voltage: 10 V (DC);  
Ambient temperature: 25°C 77°F



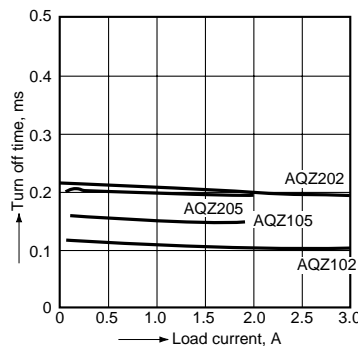
15.-(1) Load voltage vs. turn off time characteristics (Load voltage: 60, 100 V type)  
LED current: 10 mA;  
Continuous load current: 100 mA;  
Ambient temperature: 25°C 77°F



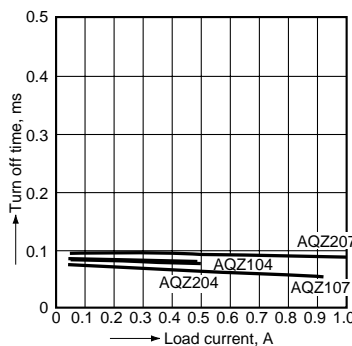
15.-(2) Load voltage vs. turn off time characteristics (Load voltage: 200, 400 V type)  
LED current: 10 mA;  
Continuous load current: 100 mA;  
Ambient temperature: 25°C 77°F



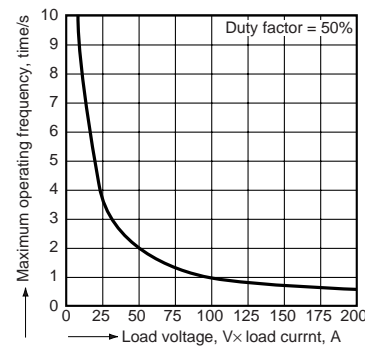
16.-(1) Load current vs. turn off time characteristics (Load voltage: 60, 100 V type)  
LED current: 10 mA;  
Load voltage: 10 V (DC);  
Ambient temperature: 25°C 77°F



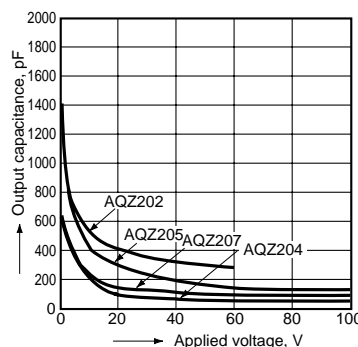
16.-(2) Load current vs. turn off time characteristics (Load voltage: 200, 400 V type)  
LED current: 10 mA;  
Load voltage: 10 V (DC);  
Ambient temperature: 25°C 77°F



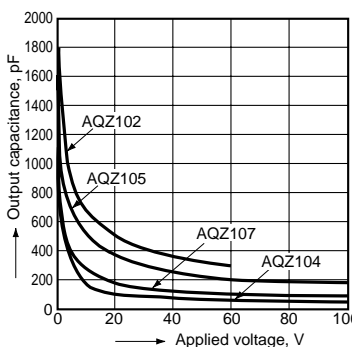
17. Maximum operating frequency vs. load voltage/current characteristics  
LED current: 10 mA;  
Ambient temperature: 25°C 77°F



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

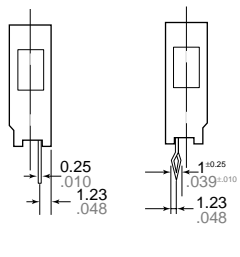
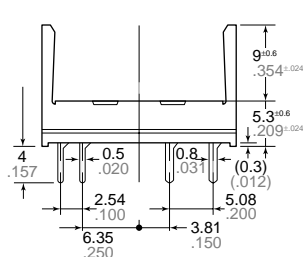
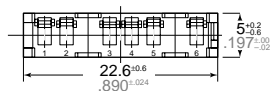
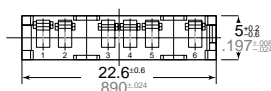


18.-(2) Applied voltage vs. output capacitance characteristics (DC type)  
Frequency: 1 MHz;  
Ambient temperature: 25°C 77°F



## ACCESSORY

### Socket

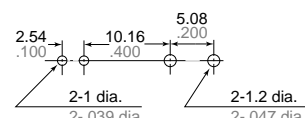


PA1a-PS

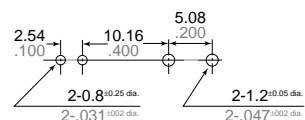
PA1a-PS-H

mm inch

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



### Self clinching type



Tolerance: ±0.1 ±.004