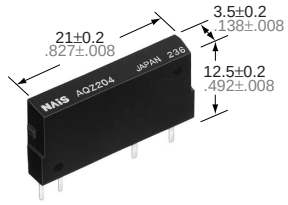
NAiS

POWER PhotoMOS RELAYS
1-channel (Form A) Type

PhotoMOS RELAYS



mm inch

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)

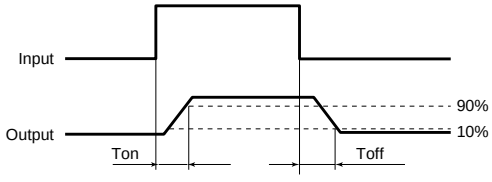
Item		Symbol	AQZ202	AQZ205	AQZ207	AQZ204	Remarks
Input	LED forward current	I_F	50 mA				
	LED reverse voltage	V_R	3 V				
	Peak forward current	I_{FP}	1 A				f = 100 Hz, Duty factor = 0.1%
	Power dissipation	P_{in}	75 mW				
Output	Load voltage (Peak AC)	V_L	60 V	100 V	200 V	400 V	
	Continuous load current	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	1.25 V (1.16 V at I_F = 10 mA)				I_F = 50 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 mA I_L =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 = Max.
Transfer characteristics	Switching speed	Turn on time*	Typical	T_{on}	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*	Typical	T_{off}	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		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 MΩ				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/s² {500 G}1 ms				3 times for 3 axes

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

*Turn on/off time



2. DC type

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

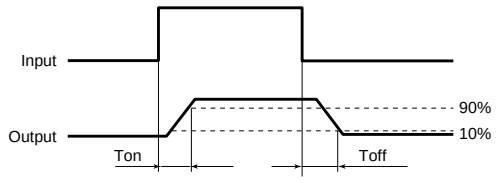
Item		Symbol	AQZ102	AQZ105	AQZ107	AQZ104	Remarks
Input	LED forward current	I_F	50 mA				
	LED reverse voltage	V_R	3 V				
	Peak forward current	I_{FP}	1 A				f = 100 Hz, Duty factor = 0.1%
	Power dissipation	P_{in}	75 mW				
Output	Load voltage (DC)	V_L	60 V	100 V	200 V	400 V	
	Continuous load current (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	1.25 V (1.16 V at I_F = 10 mA)				I_F = 50 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 μA				I_F = 0 V_L = Max.
Transfer characteristics	Switching speed	Turn on time*	Typical	T_{on}	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				
			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				
		Turn off time*	Typical	T_{off}	0.15 ms	0.19 ms	0.08 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		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 MΩ				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/s² {500 G} 1 ms				3 times for 3 axes

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

*Turn on/off time

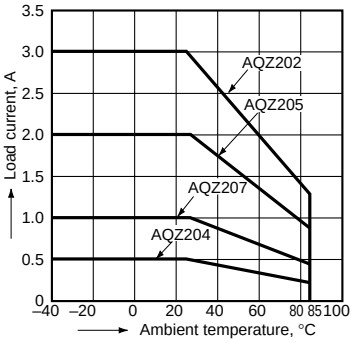


■ **For Dimensions, see Page 442.**
■ **For Schematic and Wiring Diagrams, see Page 448.**
■ **For Cautions for Use, see Page 453.**

REFERENCE DATA

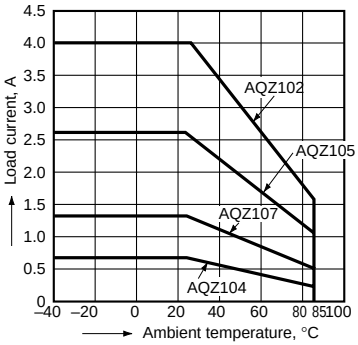
1.-(1) Load current vs. ambient temperature characteristics (AC/DC type)

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



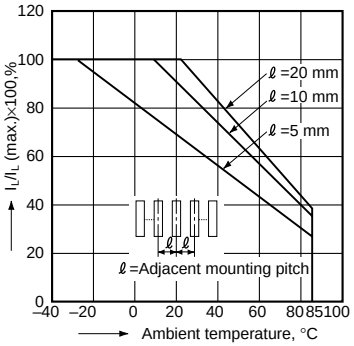
1.-(2) Load current vs. ambient temperature characteristics (DC type)

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



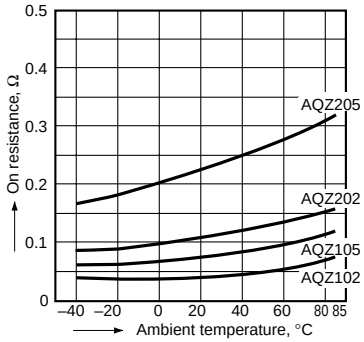
2. Load current vs. ambient temperature characteristics in adjacent mounting

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



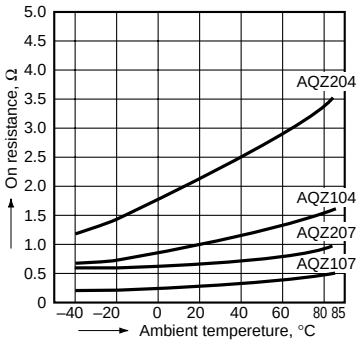
3.-(1) On resistance vs. ambient temperature characteristics

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)



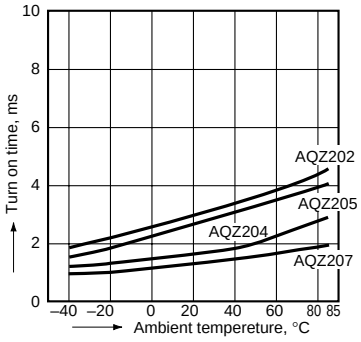
3.-(2) On resistance vs. ambient temperature characteristics

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)



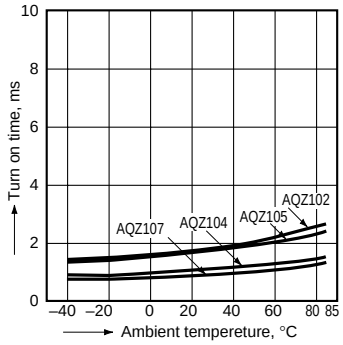
4.-(1) Turn on time vs. ambient temperature characteristics (AC/DC type)

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



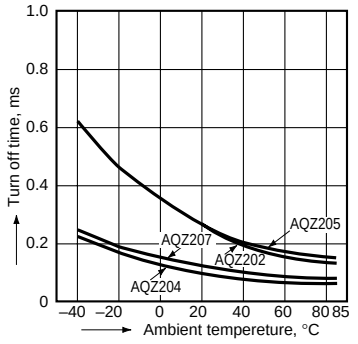
4.-(2) Turn on time vs. ambient temperature characteristics (DC type)

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



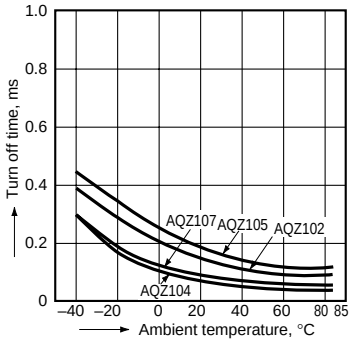
5.-(1) Turn off time vs. ambient temperature characteristics (AC/DC type)

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



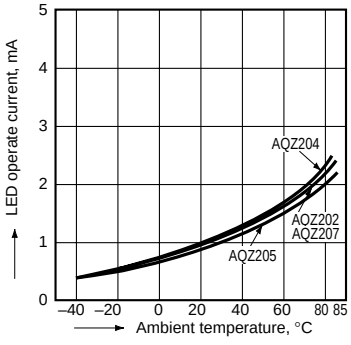
5.-(2) Turn off time vs. ambient temperature characteristics (DC type)

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



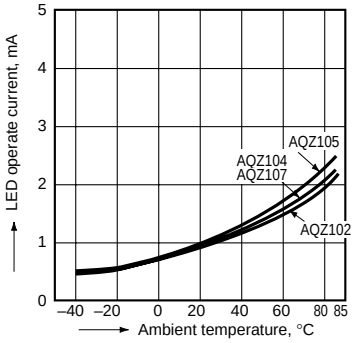
6.-(1) LED operate vs. ambient temperature characteristics (AC/DC type)

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



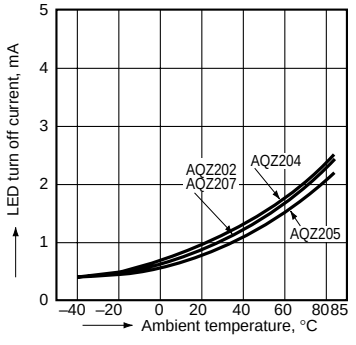
6.-(2) LED operate vs. ambient temperature characteristics (DC type)

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

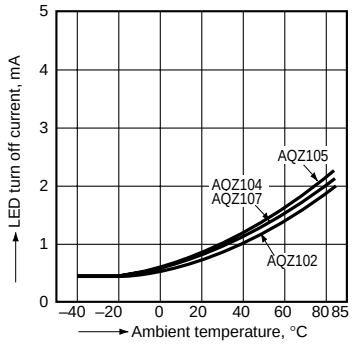


7.-(1) LED turn off current vs. ambient temperature characteristics (AC/DC type)

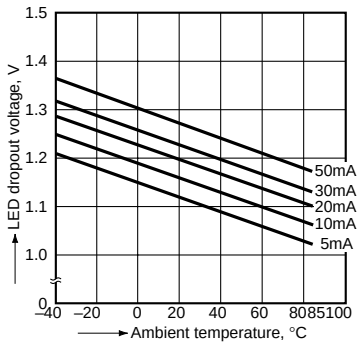
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



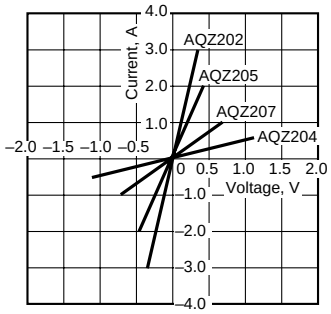
7.-(2) LED turn off current vs. ambient temperature characteristics (DC type)
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC)



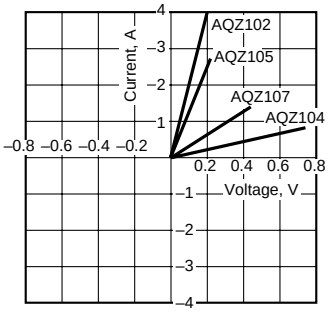
8. LED dropout voltage vs. ambient temperature characteristics
Sample: all types; LED current: 5 to 50 mA



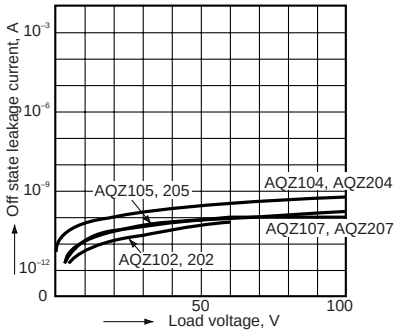
9.-(1) Voltage vs. current characteristics of output at MOS portion (AC/DC type)
Ambient temperature: 25°C 77°F



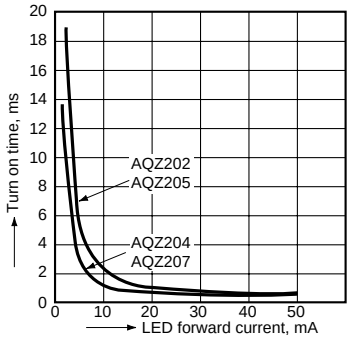
9.-(2) Voltage vs. current characteristics of output at MOS portion (DC type)
Ambient temperature: 25°C 77°F



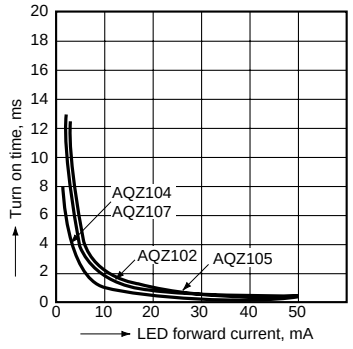
10. Off state leakage current
Ambient temperature: 25°C 77°F



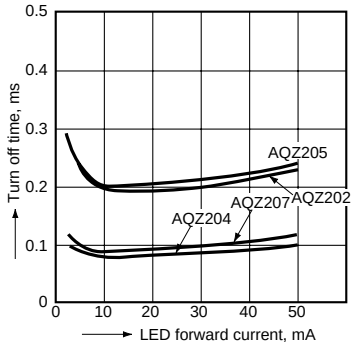
11.-(1) LED forward current vs. turn on time characteristics (AC/DC type)
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC);
Ambient temperature: 25°C 77°F



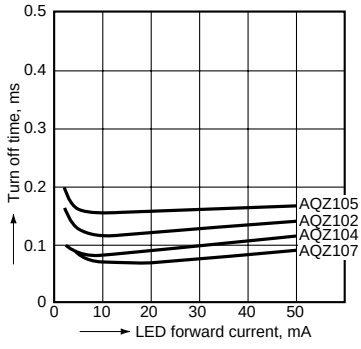
11.-(2) LED forward current vs. turn on time characteristics (DC type)
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC);
Ambient temperature: 25°C 77°F



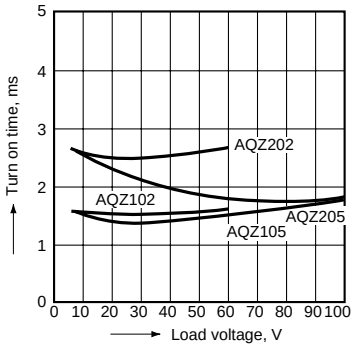
12.-(1) LED forward current vs. turn off time characteristics (AC/DC type)
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC);
Ambient temperature: 25°C 77°F



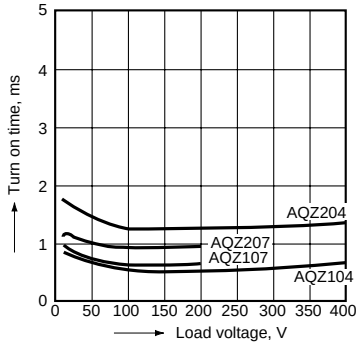
12.-(2) LED forward current vs. turn off time characteristics (DC type)
Measured portion: between terminals 4 and 6;
Load voltage: 10 V (DC);
Continuous load current: 100 mA (DC);
Ambient temperature: 25°C 77°F



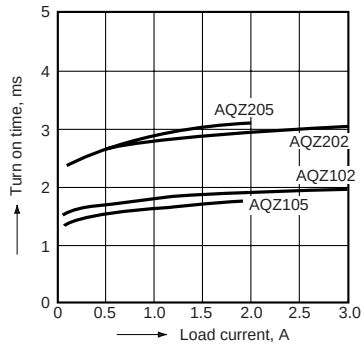
13.-(1) Load voltage vs. turn on time characteristics (Load voltage: 60, 100 V type)
LED current: 10 mA;
Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



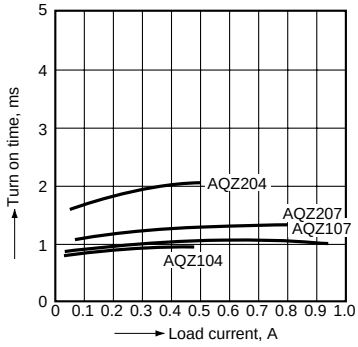
13.-(2) Load voltage vs. turn on time characteristics (Load voltage: 200, 400 V type)
LED current: 10 mA;
Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



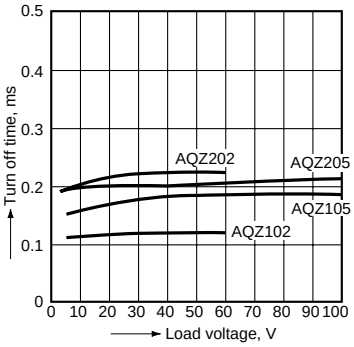
14.-(1) Load current vs. turn on time characteristics (Load voltage: 60, 100 V type)
LED current: 10 mA;
Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



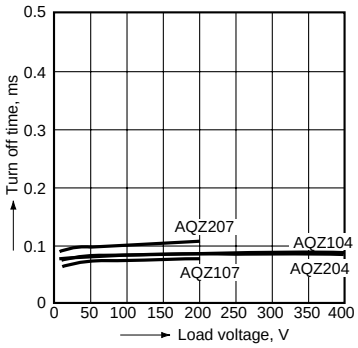
14.-(2) Load current vs. turn on time characteristics (Load voltage: 200, 400 V type)
LED current: 10 mA;
Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



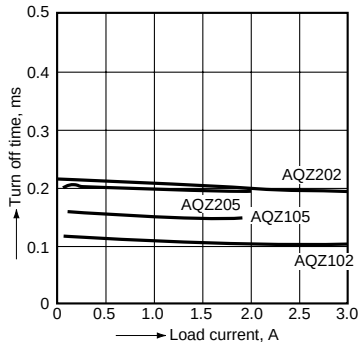
15.-(1) Load voltage vs. turn off time characteristics (Load voltage: 60, 100 V type)
LED current: 10 mA;
Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



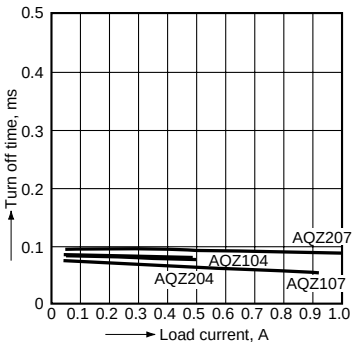
15.-(2) Load voltage vs. turn off time characteristics (Load voltage: 200, 400 V type)
LED current: 10 mA;
Continuous load current: 100 mA;
Ambient temperature: 25°C 77°F



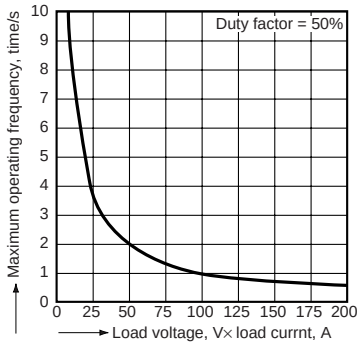
16.-(1) Load current vs. turn off time characteristics (Load voltage: 60, 100 V type)
LED current: 10 mA;
Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



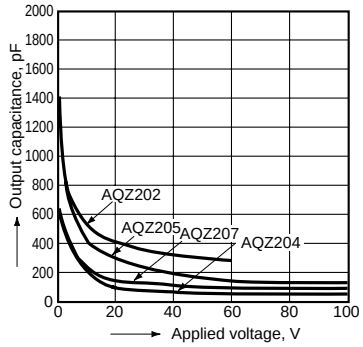
16.-(2) Load current vs. turn off time characteristics (Load voltage: 200, 400 V type)
LED current: 10 mA;
Load voltage: 10 V (DC);
Ambient temperature: 25°C 77°F



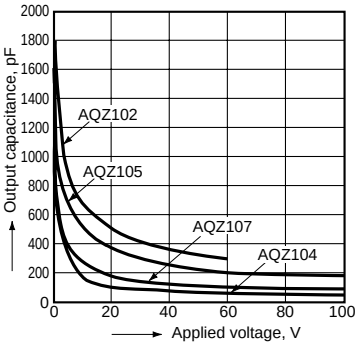
17. Maximum operating frequency vs. load voltage/current characteristics
LED current: 10 mA;
Ambient temperature: 25°C 77°F



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

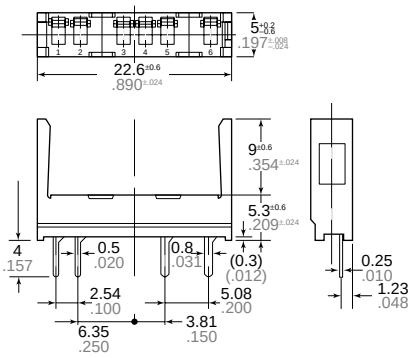


18.-(2) Applied voltage vs. output capacitance characteristics (DC type)
Frequency: 1 MHz;
Ambient temperature: 25°C 77°F

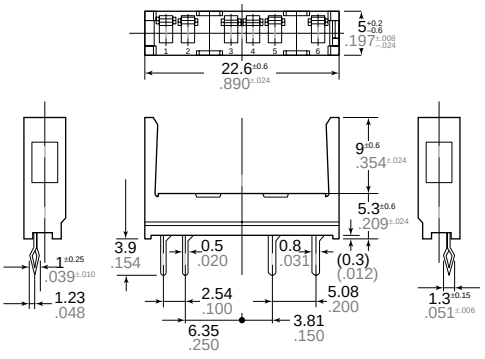


ACCESSORY

Socket



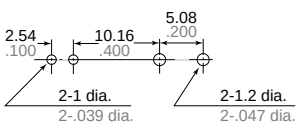
PA1a-PS



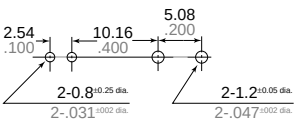
PA1a-PS-H

mm inch

PC board pattern
(BOTTOM VIEW)
Standard type



Self clinching type



Tolerance: ±0.1 ±.004

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