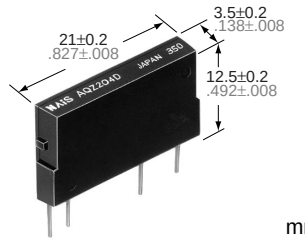
NAiS

POWER PhotoMOS RELAYS (Voltage Sensitive Type)

PhotoMOS RELAYS



mm inch

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 73.5mm² 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

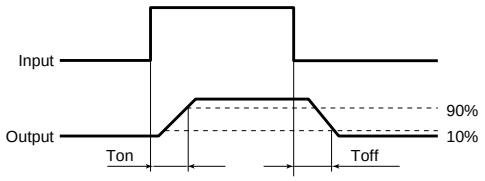
1) Absolute maximum ratings (Ambient temperature: 25°C 77°F)

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 mA V_L = 10 V
			Maximum		4 V				
	Turn off voltage		Minimum	V_{Foff}	0.8 V				I_L = 100 mA V_L = 10 V
			Typical		1.3 V				
	Input current		Typical	I_{IN}	6.5 mA				V_{IN} = 5 V
Output	On resistance		Typical	R_{on}	0.066 Ω	0.180 Ω	0.64 Ω	2.4 Ω	V_{IN} = 5 V 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	I_{leak}	10 μA				V_{IN} = 0 V_L = Max.
Transfer characteristics	Switching speed	Turn on time*	Typical	T_{on}	5.8 ms	4.2 ms	2.7 ms	2.3 ms	V_{IN} = 5 V I_L = 100 mA V_L = 10 V
			Maximum		10.0 ms				
		Turn off time*	Typical	T_{off}	0.2 ms	0.2 ms	0.1 ms	0.1 ms	V_{IN} = 5 V 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				V_{IN}= 5 V 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

Recommendable LED forward current I_F = 5 to 10 mA.
*Turn on/off time



2. DC type

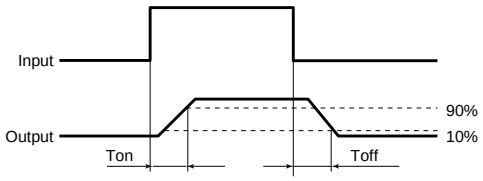
1) Absolute maximum ratings (Ambient temperature: 25°C 77°F)

Item		Symbol	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				

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

Item				Symbol	AQZ102D	AQZ105D	AQZ107D	AQZ104D	Remarks
Input	Operate voltage		Typical	V_{Fon}	1.4 V				I_L = 100 mA V_L = 10 V
			Maximum		4 V				
	Turn off voltage		Minimum	V_{Foff}	0.8 V				I_L = 100 mA V_L = 10 V
			Typical		1.3 V				
	Input current		Typical	I_{IN}	6.5 mA				V_{IN} = 5 V
Output	On resistance		Typical	R_{on}	0.033 Ω	0.090 Ω	0.33 Ω	1.23 Ω	V_{IN} = 5 V 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	I_{leak}	10 μA				V_{IN} = 0 V_L = Max.
Transfer characteristics	Switching speed	Turn on time*	Typical	T_{on}	3.3 ms	2.2 ms	1.5 ms	1.2 ms	V_{IN} = 5 V I_L = 100 mA V_L = 10 V
			Maximum		10.0 ms				
		Turn off time*	Typical	T_{off}	0.2 ms	0.2 ms	0.1 ms	0.1 ms	V_{IN} = 5 V 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				V_{IN}= 5 V 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

Recommendable LED forward current I_F = 5 to 10 mA.
*Turn on/off time

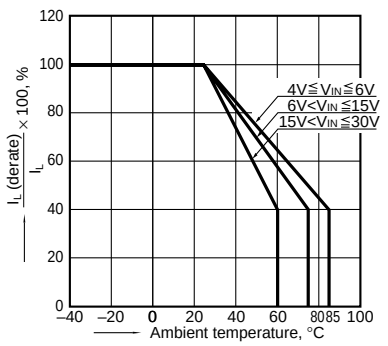


■ **For Dimensions, see Page 442.**
■ **For Schematic and Wiring Diagrams, see Page 448.**
■ **For Cautions for Use, see Page 453.**

REFERENCE DATA

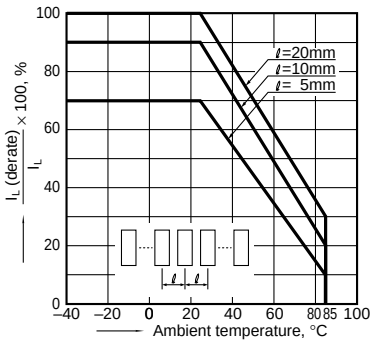
1. Load current vs. ambient temperature characteristics

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



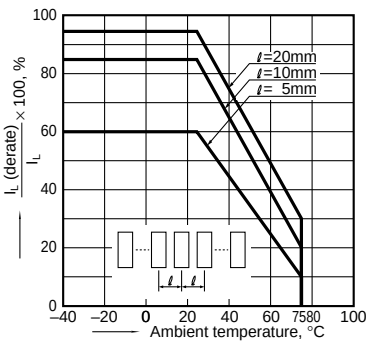
2.-(1) Load current vs. ambient temperature characteristics in adjacent mounting

Input voltage: 4V ≦ V_{IN} ≦ 6V;
I_L (derate): Load current (derate); I_L: Absolute maximum ratings of continuous load current; ℓ : Adjacent mounting pitch



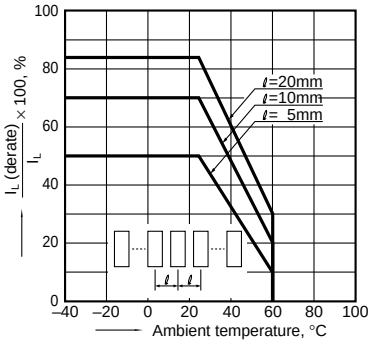
2.-(2) Load current vs. ambient temperature characteristics in adjacent mounting

Input voltage: 6V < V_{IN} ≦ 15V;
I_L (derate): Load current (derate); I_L: Absolute maximum ratings of continuous load current; ℓ : Adjacent mounting pitch



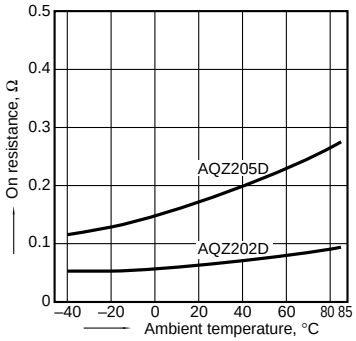
2.-(3) Load current vs. ambient temperature characteristics in adjacent mounting

Input voltage: 15V<V_{IN} ≦ 30V;
I_L (derate): Load current (derate); I_L: Absolute maximum ratings of continuous load current; ℓ : Adjacent mounting pitch



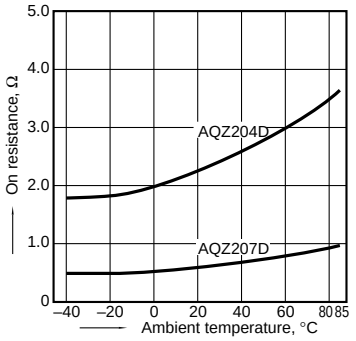
3.-(1) On resistance vs. ambient temperature characteristics (AC/DC type)

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



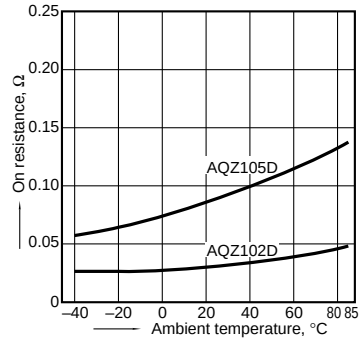
3.-(2) On resistance vs. ambient temperature characteristics (AC/DC type)

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



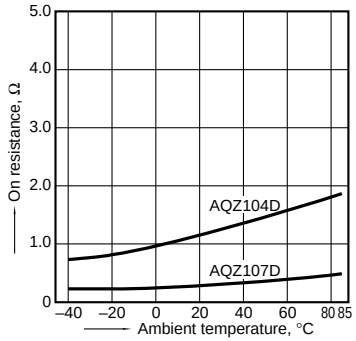
3.-(3) On resistance vs. ambient temperature characteristics (DC type)

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



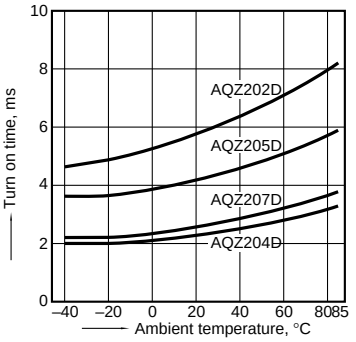
3.-(4) On resistance vs. ambient temperature characteristics (DC type)

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



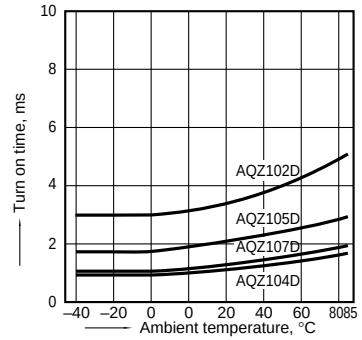
4.-(1) Turn on time vs. ambient temperature characteristics (AC/DC type)

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



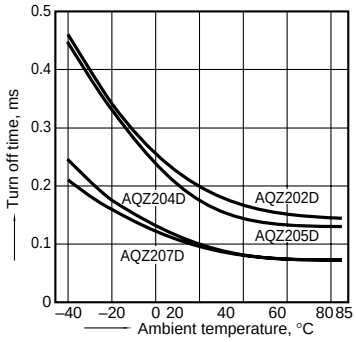
4.-(2) Turn on time vs. ambient temperature characteristics (DC type)

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



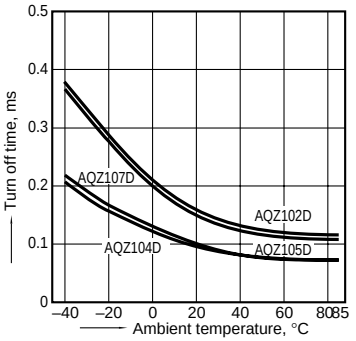
5.-(1) Turn off time vs. ambient temperature characteristics (AC/DC type)

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



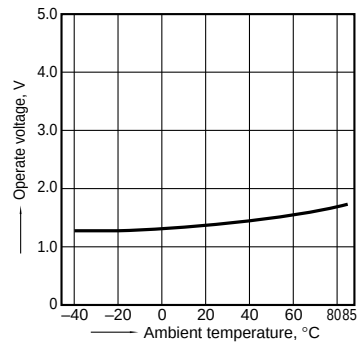
5.-(2) Turn off time vs. ambient temperature characteristics (DC type)

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



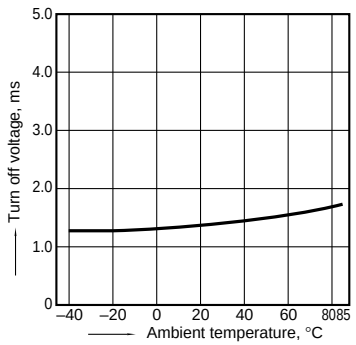
6. Operate voltage vs. ambient temperature characteristics

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



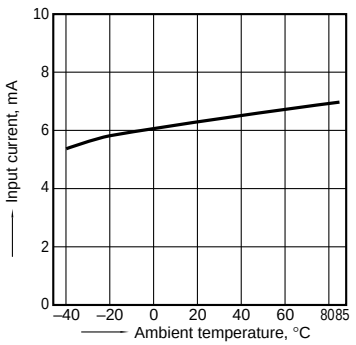
7. Turn off voltage vs. ambient temperature characteristics

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

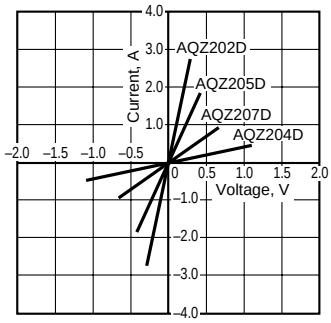


8. Input current vs. ambient temperature characteristics

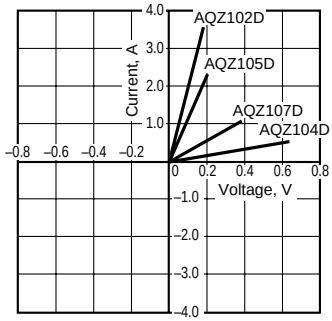
Input voltage: 5 V



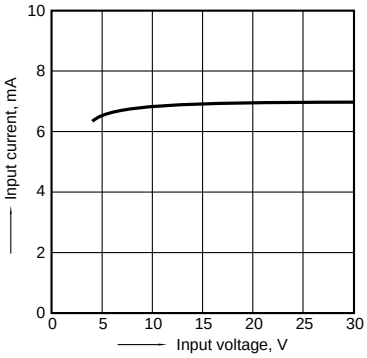
9.-(1) Voltage vs. current characteristics of output at MOS portion (AC/DC type)
Ambient temperature: 25°C 77°F



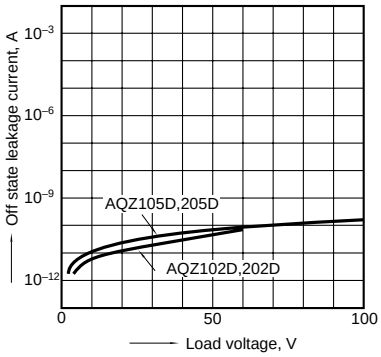
9.-(2) Voltage vs. current characteristics of output at MOS portion (DC type)
Ambient temperature: 25°C 77°F



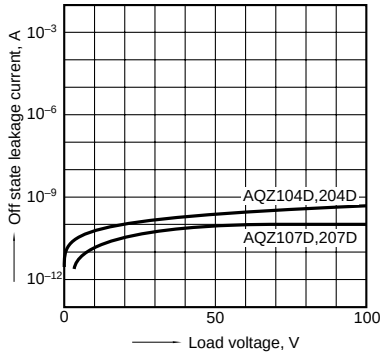
10. Input voltage vs. input current characteristics
Ambient temperature: 25°C 77°F



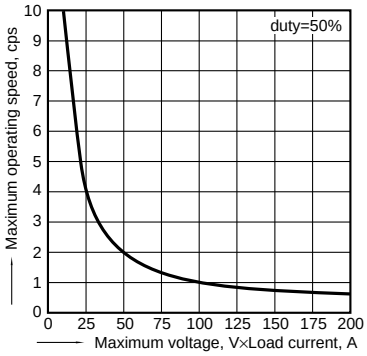
11.-(1) Off state leakage current
Ambient temperature: 25°C 77°F



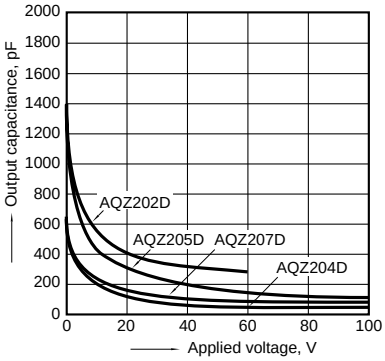
11.-(2) Off state leakage current
Ambient temperature: 25°C 77°F



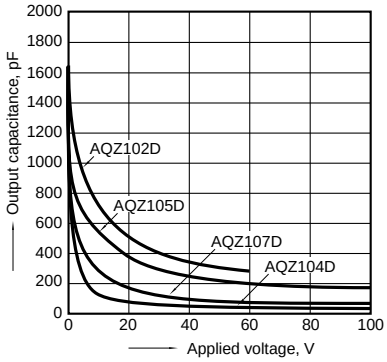
12. Maximum operating speed vs. load voltage × load current characteristics
Input voltage: 5V; Ambient temperature: 25°C 77°F



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



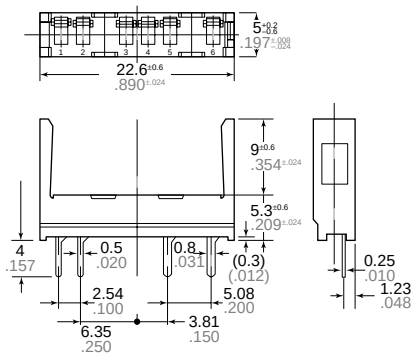
13.-(2) Applied voltage vs. output capacitance characteristics (DC type)
Frequency: 1 MHz; Ambient temperature: 25°C 77°F



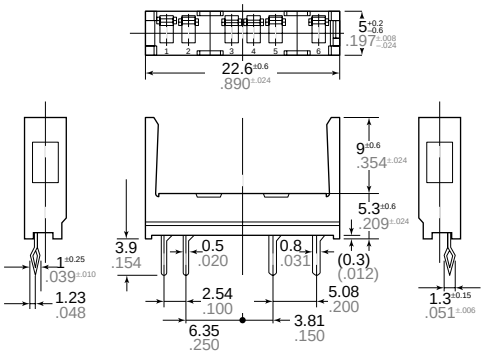
ACCESSORY

mm inch

Socket

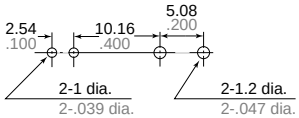


PA1a-PS

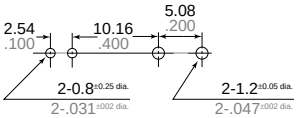


PA1a-PS-H

PC board pattern
(BOTTOM VIEW)
Standard type



Self clinching type



Tolerance: ±0.1 ±.004

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