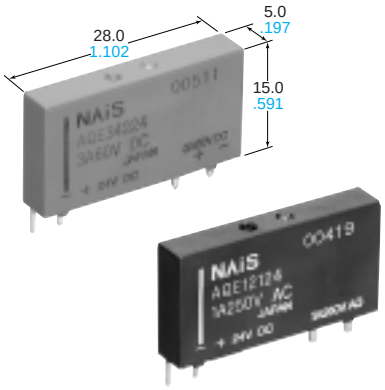
UL Pending CSA Pending VDE Pending

AQ-E SOLID STATE RELAY

AQ-E RELAYS



mm inch

FEATURES

1. Conforms to European safety standards (VDE0110)
dielectric distance between input and output
- Creepage distance: Min. 3.0 mm
- Clearances distance: Min. 2.5 mm

2. The small-sized slim type
28 mm (L)×5 mm (W)×15 mm
1.063 inch (L)×.197 inch (W)×.591 inch
permits high density mounting to PC board

3. High dielectric strength: 2,500V AC
(between input and output)

4. Two load types available:
DC output type (3A)
AC output type (1A)

5. Zero-cross type are availale (AC type)
The zero-cross type generates minimal noise

6. Snubber circuit integrated (AC type)
The snubber circuit is integrated to prevent malfunction caused by the rapid rise of voltage on the output side, such as inductive load and current.

TYPES

Type	Load voltage	Input voltage	Part No.
AC output	75 to 250 V AC	5 V DC	AQE12105
		12 V DC	AQE12112
		24 V DC	AQE12124
DC output	3 to 60 V DC	5 V DC	AQE34205
		12 V DC	AQE34212
		24 V DC	AQE34224

TYPICAL APPLICATIONS

- **Interface relays for programmable controllers**
- **Industrial equipment**
- **Timers and counters**
- **Air conditioners**

ORDERING INFORMATION

Ex. AQE [1] [2] [1] [0] [5]

Load current	Load voltage	Type	Input voltage
1: 1 A 3: 3 A	2: 75 to 250 V AC 4: 3 to 60 V DC	1: AC output (Zero-cross) 2: DC output	05: 5 V DC 12: 12 V DC 24: 24 V DC

(Note) Standard packing: Carton 20 pcs., Case 1,000 pcs.

SPECIFICATIONS

Ratings (at 20°C 68°F, Input voltage ripple: 1% or less)

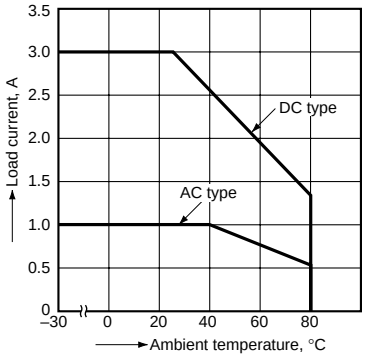
Item	Type	AC output			DC output			Remarks
	Part No.	AQE12105	AQE12112	AQE12124	AQE34205	AQE34212	AQE34224	
Input side	Input voltage	4 to 6 V DC	9.6 to 14.4 V DC	21.6 to 26.4 V DC	4 to 6 V DC	9.6 to 14.4 V DC	21.6 to 26.4 V DC	
	Input impedance	Approx. 0.5k Ω	Approx. 1.3k Ω	Approx. 3k Ω	Approx. 0.5k Ω	Approx. 1.3k Ω	Approx. 3k Ω	
	Drop-out voltage, min.	0.5 V DC	1.2 V DC	2.4 V DC	0.5 V DC	1.2 V DC	2.4 V DC	
	Reverse voltage	3 V						
Load side	Max. load current	1 A AC			3 A DC			
	Load voltage	75 to 250 V AC			3 to 60 V DC			
	Frequency	45 to 65 Hz			—			
	Non-repetitive surge current	20 A			15 A			AC: In one cycle at 60 Hz DC: 10 ms
	Max. "OFF-state" leakage current	1.5 mA (applied 200 V)			10μA			
	Max. "ON-state" voltage drop	1.6 V			0.3 V			at Max. carrying current
	Min. load curent	20 mA			1 mA			
	OFF state dV/dt	50 V/μs			—			
	Max. operating speed	—			0.5cps.			at rated operating voltage, rated load voltage and current

Characteristics (at 20°C 68°F, Input voltage ripple: 1% or less)

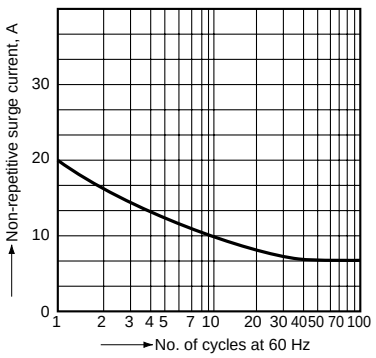
Item		AC output	DC output	Remarks
Operate time max.		(1/2 cycle of voltage sine wave) + 1 ms	2 ms	
Release time, max.		(1/2 cycle of voltage sine wave) + 1 ms	0.4 ms	
Insulation resistance, min.		10^9 Ω between input and output		Using 500 V DC megger
Breakdown voltage		2,500 Vrms between input and output		Initial for 1 min.
Vibration resistance	Functional	10 to 55 Hz double amplitude of 1.5 mm		1 hour for X, Y, Z axes
	Destructive	10 to 55 Hz double amplitude of 1.5 mm		10 min. for X, Y, Z axes
Shock resistance	Functional	Min. 490 m/s² {50 G}		5 times each for X, Y, Z axes
	Destructive	Min. 490 m/s² {50 G}		4 times each for X, Y, Z axes
Ambient temperature		–30°C to +80°C –22°F to +176°F		
Storage temperature		–30°C to +100°C –22°F to +212°F		
Operational method		Zero-cross (Turn-ON and Turn-OFF)	—	

REFERENCE DATA

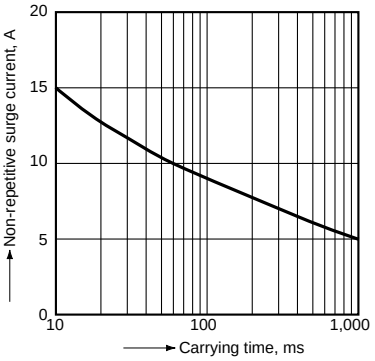
1. Load current vs. ambient temperature



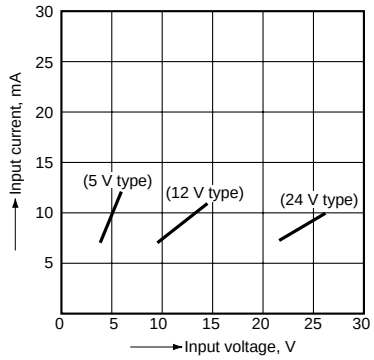
2.-(1) Non-repetitive surge current vs. carrying time (AC output)



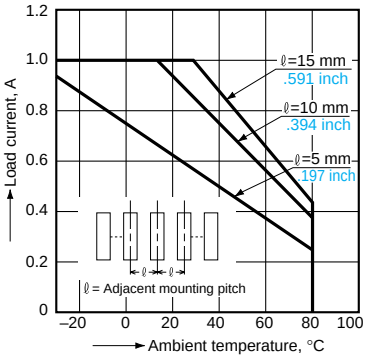
2.-(2) Non-repetitive surge current vs. carrying time (DC output)



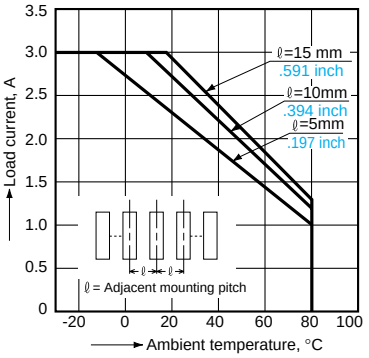
3. Input voltage vs. input current characteristics



4.-(1) Load current vs. ambient temperature characteristics for adjacent mounting (AC output)

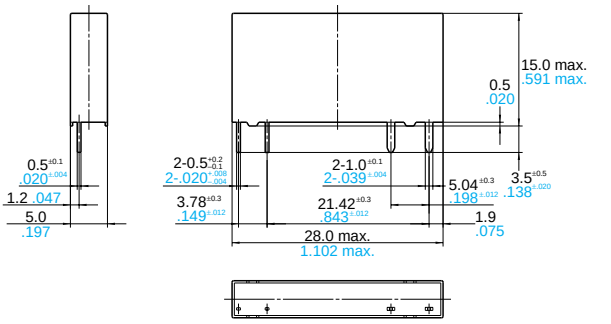


4.-(2) Load current vs. ambient temperature characteristics for adjacent mounting (DC output)



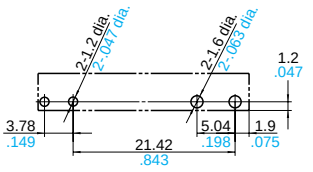
DIMENSIONS

mm inch



General tolerance: ±0.5 ±.020

Mounting hole location (Bottom view)



Tolerance: ±0.1 ±.004

Schematic

AC type

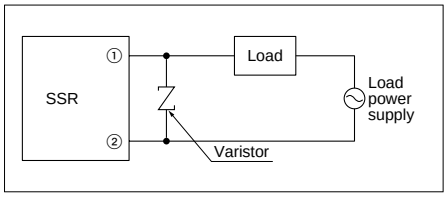
DC type

CAUTIONS FOR USE

1. Regarding output noise surge protection

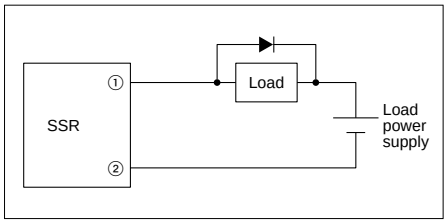
(1) AC Output Type

A high noise surge voltage applied to the SSR load circuit can cause malfunction or permanent damage to the device. If such a high surge is anticipated, use a varistor across the SSR output.



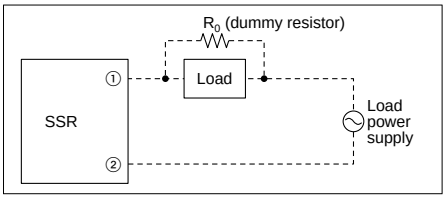
(2) DC Output Type

When the SSR is loaded with an inductive load, such as a solenoid contactor, motor, or solenoid valve, use a counter-EMF suppression diode across the load.



2. When used for the load less than rated

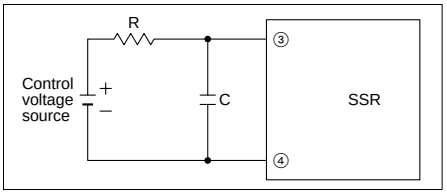
An SSR may malfunction if it is used below the specified load. In such an event, use a dummy resistor in parallel with the load.



Load specification: AC output type 20 mA
DC output type 1 mA

3. Noise and surge protection at the input side

A high noise surge voltage applied to the SSR input circuit can cause malfunction or permanent damage to the device. If such a high surge is anticipated, use C or R noise absorber in the input circuit.

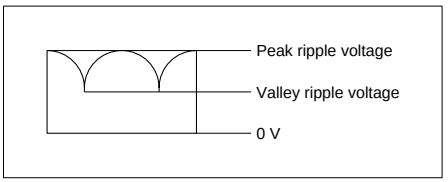


4. When the input terminals are connected with reverse polarity

Reversing the polarity may cause permanent damage to the device. Take special care to avoid polarity reversal or use a protection diode in the input circuit.

5. In the case of operating voltage containing ripple

If the SSR control voltage contains ripple, the peak of the ripple should not exceed the maximum rated control voltage, and the bottom of the ripple should exceed the minimum rated control voltage.



6. Cleaning solvents compatibility

Dip cleaning with an organic solvent is recommended for removal of solder flux, dust, etc. Select a cleaning solvent from the following table. If ultrasonic cleaning must be used, the severity of factors such as frequency, output power and cleaning solvent selected may cause loose wires and other defects. Make sure these conditions are correct before use. For details, please consult us.

Cleaning solvent		Compatibility (❍: Yes, ×: No)
Chlorine-base	• Trichlene • Chloroethlene	❍
Adueous	• Indusco • Hollis • Lonco Terg	❍
Alcohol-base	• IPA • Ethanol	❍
Others	• Thinner • Gasoline	×

7. Others

(1) If an SSR is used in close proximity to another SSR or heat-generating device, its ambient temperature may exceed the allowable level. Carefully plan SSR layout and ventilation.
(2) Soldering to SSR terminals should be completed within 5 seconds at 260°C.
(3) Terminal connections should be made by referring to the associated wiring diagram.
(4) For higher reliability, check device quality under actual operating conditions.

8. Thermal Design

SSRs used in high-reliability equipment require careful thermal design. In particular, junction temperature control has a significant effect on device function and life time. The rated load current for board-mounting SSRs is defined as the maximum current possible at an ambient temperature of 40°C (30°C) while allowing natural cooling (self cooling). If the ambient temperature exceeds 40°C (30°C), load current derating is necessary according to the load current versus ambient temperature curve. If adjacent devices act as heat sources, the SSR should be located more than 10 mm away from those devices.

Please contact .....

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