

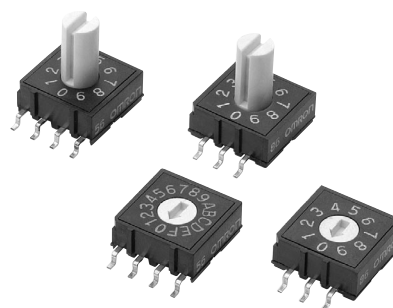
## Surface-mounting Rotary DIP Switch

## A6RS

### Low-cost, Surface-mounting Rotary DIP Switches

- Temperature-resistant resin allows use in peak reflow temperatures of 260°C.
- Series includes flat and extended-shaft models.
- Two different types of terminal arrangement are available to allow flexibility in the circuit design.



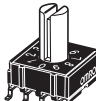
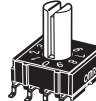
RoHS Compliant (Refer to page 3 for details.)



**NEW**

## Ordering Information

### List of Models

Type and color of rotor			Top-actuated, flat (white)		Top-actuated, extended shaft (white)	
			Stick	Embossed taping	Stick	Embossed taping
						
Number of positions	Terminal arrangement	Output code	Quantity per stick	Quantity per package	Quantity per stick	Quantity per package
10	4 × 1	Real code	48	750	A6RS-101RS	250
	3 × 3	Real code			A6RS-102RS	
16	4 × 1	Real code			A6RS-161RS	
	3 × 3	Real code			A6RS-162RS	
	4 × 1	Real code			A6RS-101RF-P	
	3 × 3	Real code			A6RS-102RF-P	
16	4 × 1	Real code			A6RS-161RF-P	
	3 × 3	Real code			A6RS-162RF-P	

**Note:** Orders must be made in integral multiples of the quantities given for each package (stick: 48, embossed taping: 250 or 750).

## Specifications

### Ratings/Characteristics

Rating	25 mA at 24 VDC
Ambient operating temperature	–25 to 80°C at 60% max. (with no icing or condensation)
Ambient operating humidity	35% to 95% (at 5 to 35°C)
Insulation resistance	100 MΩ min. (at 250 VDC)
Contact resistance	200 mΩ max. (initial value)
Dielectric strength	250 VAC for 1 minute between terminals of the same polarity
Vibration resistance	Malfunction: 10 to 55 Hz, 1.5-mm double amplitude
Shock resistance	Malfunction: Approx. 300 m/s <sup>2</sup>
Electrical life expectancy	5,000 steps min.
Operating torque	1.96 × 10 <sup>–2</sup> N·m max.
Weight	4×1, top-actuated: 0.64 g 3×3, top-actuated: 0.62 g (Add 0.13 g for the extended-shaft version of each model.)

### Output Codes

#### 10-position Models

Code	Real code			
Position	1	2	4	8
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	
8				●
9	●			●

#### 16-position Models

Code	Real code			
Position	1	2	4	8
0				
1	●			
2		●		
3	●	●		
4			●	
5	●		●	
6		●	●	
7	●	●	●	
8				●
9	●			●
A		●		●
B	●	●		●
C			●	●
D	●		●	●
E		●	●	●
F	●	●	●	●

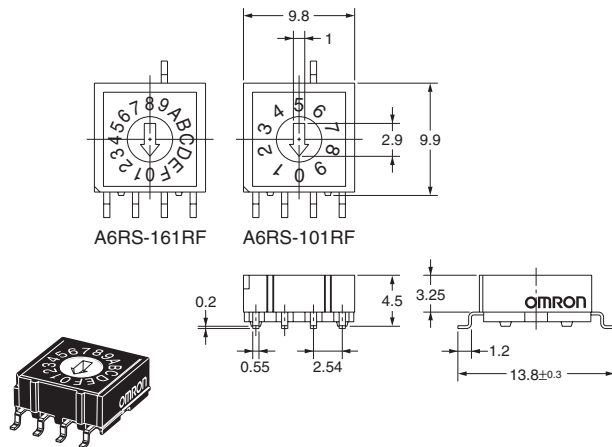
**Note:** “●” indicates that the internal switch is ON.

## Dimensions

- Note:** 1. All units are in millimeters unless otherwise indicated.  
2. A tolerance of  $\pm 0.4$  mm applies to the above dimensions unless otherwise specified.

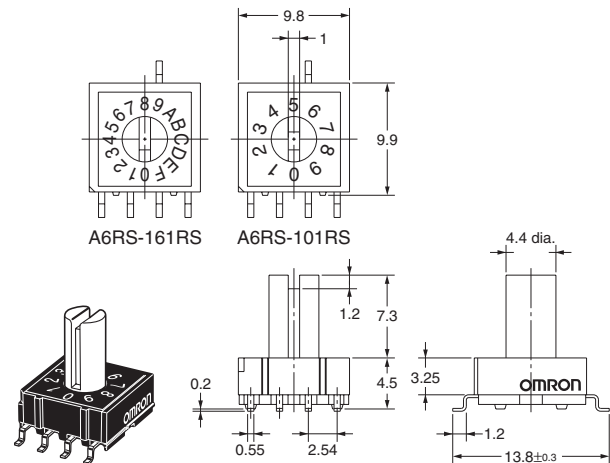
### Top-actuated Flat Models with $4 \times 1$ Terminal Arrangement

A6RS-101RF, A6RS-101RF-P, A6RS-161RF, A6RS-161RF-P



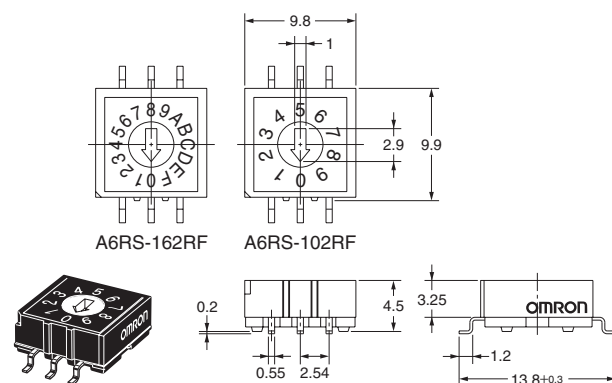
### Top-actuated Extended-shaft Models with $4 \times 1$ Terminal Arrangement

A6RS-101RS, A6RS-101RS-P, A6RS-161RS, A6RS-161RS-P



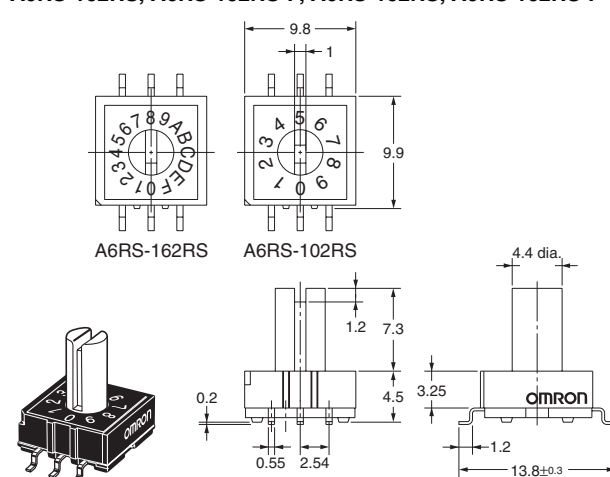
### Top-actuated Flat Models with $3 \times 3$ Terminal Arrangement

A6RS-102RF, A6RS-102RF-P, A6RS-162RF, A6RS-162RF-P



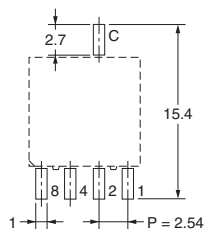
### Top-actuated Extended-shaft Models with $3 \times 3$ Terminal Arrangement

A6RS-102RS, A6RS-102RS-P, A6RS-162RS, A6RS-162RS-P

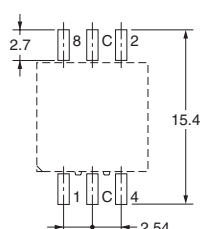


## ■ PCB Cutout Dimensions (Top View)

$4 \times 1$  Terminal Arrangement



$3 \times 3$  Terminal Arrangement



# Precautions

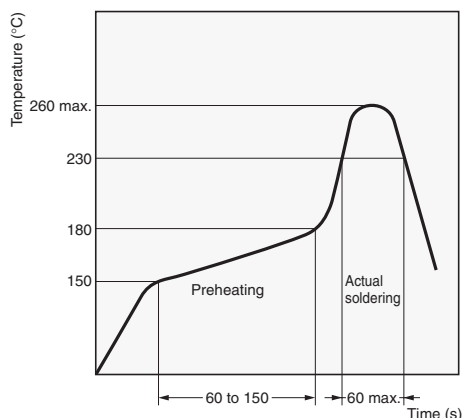
## ■ Precautions for safe use

**Note:** Refer to *Safety Precautions* in the *DIP Switches* (Cat. No. X040) for details on general safety precautions.

## ■ Precautions for Correct Use

### Soldering

- Make sure that Surface-mounting Rotary DIP Switches are set to 0 before soldering. Misalignment may result in reducing the operating load capacity.
- Observe the following conditions for reflow soldering the A6RS. (Measurement location: Top of Switch)



### Washing

The A6RS cannot be washed. Attempting to wash it may result in malfunction due to flux and foreign matter from the PCB flowing into the A6RS together with the cleaning fluid.

### RoHS Compliant

The "RoHS Compliant" designation indicates that the listed models do not contain the six hazardous substances covered by the RoHS Directive.

Reference: The following standards are used to determine compliance for the six substances.

- Lead: 1,000 ppm max.
- Mercury: 1,000 ppm max.
- Cadmium: 100 ppm max.
- Hexavalent chromium: 1,000 ppm max.
- PBB: 1,000 ppm max.
- PBDE: 1,000 ppm max.

### Environment for Storage and Use

To prevent discoloration of the terminals and other problems during storage, do not store the A6RS in locations subject to the following conditions.

1. High temperatures or humidity
2. Corrosive gases
3. Direct sunlight

Also, the A6RS is not waterproof or splash-resistant. Do not install or use the A6RS in locations that are subject to contact with water.

Do not subject the A6RS to freezing or condensation.

### Using Flux

The type of flux or the amount or method in which it is applied, including its use in reflow soldering, can have adverse effects on Switch performance. Assess the proper flux, conditions, and methods prior to using it.

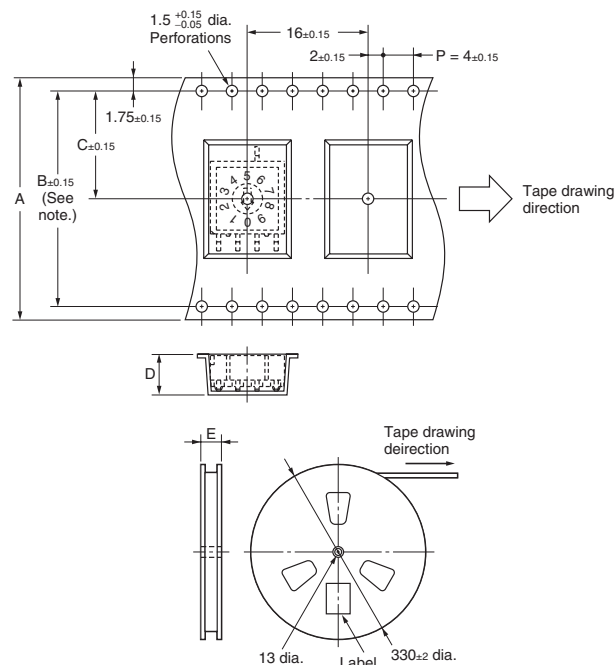
### Handling

Do not apply excessive operating force to the Switch. Otherwise the Switch may be damaged or deformed, and the switch mechanism may malfunction as a result. Do not apply an operating force exceeding 9.8 N.

Set rotary-type DIP Switches with a flat-blade screwdriver that fits into the screwdriver groove. Using a screwdriver of inappropriate dimensions, or using a tool other than a flat-blade screwdriver may cause damage to the groove that may make the Switch impossible to operate.

Extended-shaft models can also be manually set, but be sure not to apply an excessive amount of force to the Switch when setting it.

### Packing Specifications



**Note:** The perforations on the bottom of the diagram are not present on the flat type.  
The shape of pockets are not the same for each type.

Applicable models	A6RS-□RF-P
Standards	Conforms to JEI-TA
Package quantity	750 per reel

Applicable models	A6RS-□RS-P
Standards	Conforms to JEI-TA
Package quantity	250 per reel

Dimensions	Models	A6RS-□RF-P	A6RS-□RS-P
A		24	32
B $\pm 0.15$		---	28.4
C $\pm 0.15$		11.5	14.2
D		(5.4 to 5.5)	(12.2 to 12.5)
E		(29)	(37)

**ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.**

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Cat. No. A165-E1-01A **In the interest of product improvement, specifications are subject to change without notice.**

## **OMRON Corporation**

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0607 (1006)

# Safety Precautions

## ■ Cautions

Use the DIP Switch within the rated voltage and current ranges, otherwise the DIP Switch may have a shortened life expectancy, radiate heat, or burn out. This particularly applies to the instantaneous voltages and currents when switching.

## ■ Correct Use

### Circuit Design

Although the minimum current is 10  $\mu$ A (3.5 VDC), contact reliability may need to be improved in some cases. This is particularly true when switching causes an increase in instantaneous current, such as in C-MOS IC applications. Do not let the peak current exceed the rated value here or any other time.

Only BCD/hexadecimal 1-2-4-8 code is available for A6C/A6CV/A6R/A6RV models. If BCD/hexadecimal 1-2-4-8 complement code is required, make the appropriate provisions in the circuit.

### Mounting

Normally the default striker setting is OFF for slide-type DIP Switches and the default rotor setting is 0 for Rotary DIP Switches. Do not change these settings when mounting, soldering, washing or drying Switches. In rare cases, the striker may be deformed by heat generated during soldering.

#### 1. Automatic Insertion Machine

Use a body stopper system for the chute stopper of automatic insertion machines. When mounting Switches using an insertion machine incorporating a half-lead stopper, make sure the machine will not deform the terminals of the Switch, or improper insertion may result. Check actual mounting conditions prior to using a half-lead stopper system.

A printed circuit board that is 1.2 to 1.6 mm thick is recommended.

Holes on the PCB should be at least 0.9 mm in diameter for automatic insertion.

#### 2. Manual or IC Socket Insertion

Commercially available insertion tools are recommended for mounting ICs on PCBs.

Terminal pitch, dimensions and other features are identical to that of standard ICs for IC socket compatibility (except for the A6S-H and A6H).

Align the terminals so they slide in simultaneously when the Switch is inserted into socket holes or into mounting holes pre-drilled at the specified dimensions. Apply downward force on the Switch until the terminals are properly seated on the PCB.

Do not try to remove a Switch by inserting a screwdriver between it and the PCB, and then twisting the screwdriver to peel the Switch off. Use a commercially available inserter/remover to remove the Switch.

### Soldering

Observe the following conditions when soldering the DIP Switch.

#### 1. General Precautions for Soldering

Make sure that the striker of slide-type DIP Switches is set fully to either ON or OFF. (For A6E and A6ER models, however, set the Switch to OFF before soldering.) Make sure that Rotary DIP Switches are correctly set to 0. Misalignment may result in reduced sensitivity due to the soldering heat.

Before soldering the Switch on a PCB, make sure there is no unnecessary space between the Switch and the PCB.

Before soldering the Switch on a multilayer PCB, conduct a test to make sure the Switch will not be deformed by soldering heat on the pattern or land of the multilayer PCB.

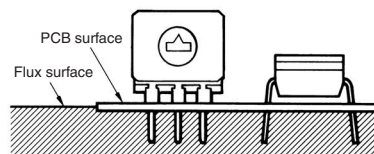
#### 2. Automatic Soldering Bath (Except A6S-H/A6H)

Soldering temperature: 260°C max.

Soldering time: 5 s max. for a 1.6-mm thick, single-side PCB

Do not use an automatic soldering bath or manual soldering for A6S-H or A6H models.

Confirm in advance that flux will not bubble up onto the side of the PCB to which the Switch is mounted. Depending on the type of Switch, the flux may have an adverse effect if it enters the Switch.

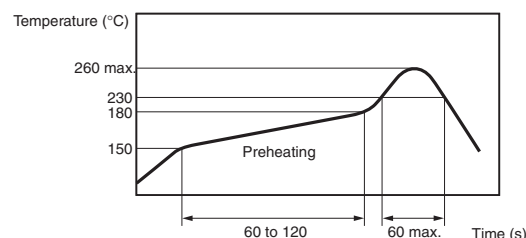


The A6S-H and A6H are designed specifically for reflow soldering. Do not use an automatic soldering bath or manual soldering for these models.

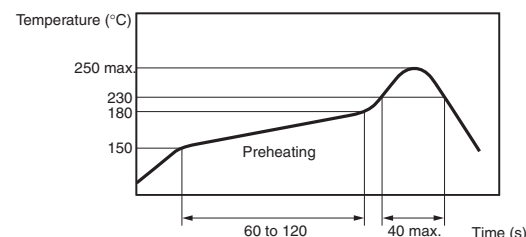
#### 3. Reflow Soldering

Observe the following conditions for reflow soldering the A6S-H and A6H models. (Measurement location: Top of Switch)

##### A6S-H Soldering Conditions



##### A6H Soldering Conditions



Do not use reflow soldering for any models other than the A6S-H and A6H. Otherwise the plastic case may melt or deform.

The soldering conditions and the temperature around the Switch may vary with the type of reflow bath. Check the temperature profile and confirm soldering conditions as well as the amount of heat applied to the Switch prior to soldering.

#### 4. Manual Soldering (Except A6S-H/A6H)

Soldering temperature: 350°C at the tip of the soldering iron.

Soldering time: 3 s max. for a 1.6-mm thick, single-side PCB

Do not solder the Switch more than twice including any rectification soldering. An interval of five minutes is required between the first and second soldering.

#### 5. Using Flux

Making mistakes in the type of flux or in the amount or method in which it is applied can cause flux to enter the interior of the Switch, with adverse effects on Switch performance. Assess the proper flux, conditions, and methods prior to using it.

## Washing

### 1. Washable and Non-washable Models

The models for which washing are possible are shown in the following table.

<b>Washable</b>	A6A, A6C, A6CV, A6D, A6DR, A6T (with seal tape), A6S-H (with seal tape), A6H (with seal tape)
<b>Non-washable</b>	A6R, A6RV, A6T (standard/raised actuator), A6S-H (standard/raised actuator), A6E, A6ER

### 2. Washing Procedure

Ultrasonic cleaning is not available for slide-type DIP Switches with seal tape. These models may be wiped or dipped into washing agents for one minute maximum.

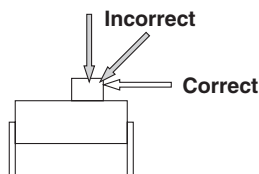
Slide-type DIP Switches with seal tape can be washed as long as the seal tape is not removed or pasted before washing. Non-compliance here will cause the quality of the seal to decline.

Washing equipment incorporating more than one washing bath can be used to clean washable models, provided that the washable models are cleaned for one minute maximum per bath and the total cleaning time does not exceed three minutes.

## Handling

### 1. Slide-type DIP Switch operation

Do not apply excessive operating force to the Switch. Otherwise the Switch may be damaged or deformed, and the switch mechanism may malfunction as a result. Apply an operating force not exceeding 9.8 N. (Operate each pole separately.) Apply the operating load from the side of the striker. Do not apply a load from an angle or from above the striker. Doing so may deform the Switch contact.



Set slide-type DIP Switches with a tiny, rounded object, such as the tip of a ball-point pen or a small screwdriver. Do not set the DIP Switch using tweezers or any other sharp object that may damage it. Do not set the DIP Switch using the point of a mechanical pencil, or lead powder or fragments may fall into the Switch and internal circuit board, causing the DIP Switch to malfunction and reducing the dielectric strength of the circuit board.

### 3. Washing Agents

Apply alcohol-based solvents to clean washable models. Do not apply water or any other agents to clean any washable models, as such agents may degrade the materials or performance of the Switch.

### 4. Washing Precautions

Do not impose any external force on washable models while washing.

Do not clean washable models immediately after soldering. The cleaning agent may be absorbed into the incomplete seal through respiration as the Switch cools. Wait for at least three minutes after soldering before cleaning.

Do not use washable Switches submerged in water or in locations exposed to water.

Although raised-type and piano-type strikers can be operated by fingertip, do not push too hard or too fast because this will deform or damage the striker.

When setting or operating the A6H, use narrow-headed tweezers or similar implement (without a sharp end), to enable smooth, horizontal operation. Pushing the striker at an angle, or applying excessive load from above may damage or deform the striker and thereby prevent operation.

### 2. Rotary DIP Switch Operation

Set rotary-type DIP Switches with a flat-blade screwdriver that fits into the screwdriver groove. Using a screwdriver of inappropriate dimensions, or using a tool other than a flat-blade screwdriver may cause damage to the groove that may make the Switch impossible to operate.

Insert the flat-blade screwdriver vertically to operate the Switch. The Switch may be damaged if the screwdriver is inserted at an angle.

Do not use excessive force to operate the Switch, or it may damage or deform the Switch.

### 3. Setting

Set the Switch to the correct position before use. An incorrectly aligned position may result in incorrect signals.

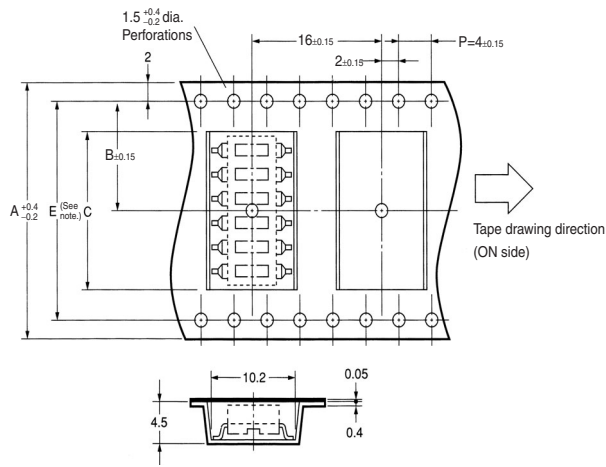
### Rotary DIP Switch Operation

Item	A6R/A6RV	A6A		A6C/A6CV
	Top/Side operation, flat type	Standard type, flat type	Shaft type, wheel type	Top/Side operation type
Screwdriver groove	 Depth: 1.0	 Depth: 0.9	 Depth: 0.9	 Depth: 1.0
Applicable screwdriver: A	1.8 to 2.1	3.5 to 3.8		2.0 to 2.4
Applicable screwdriver: B	0.7 to 0.8	0.4 to 0.5		0.5 to 0.6
Part names				

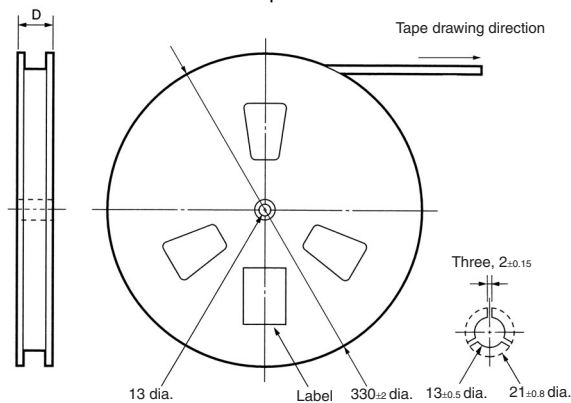
**Note:** All units are in millimeters unless otherwise indicated.

## ■ Packing specifications

- A6S-H models with embossed tapping specifications are shown below.



**Note:** The perforations along both sides are for Switches with 7 poles or more. The perforations on the bottom of the diagram are not provided on Switches with 6 poles or less.



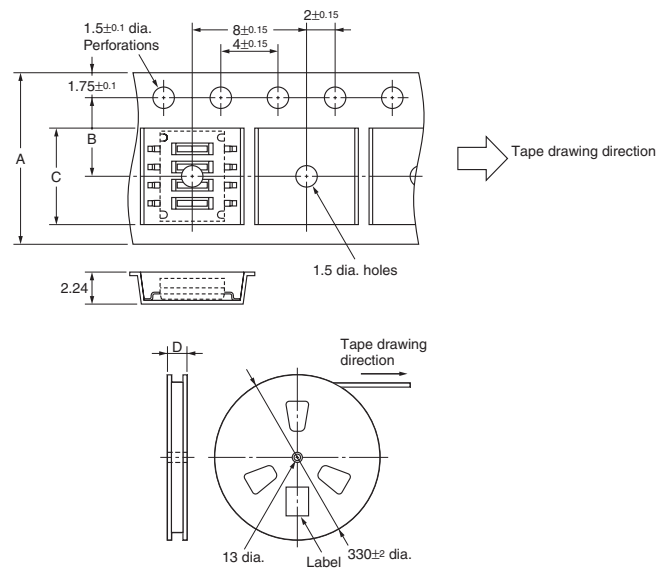
<b>Applicable models</b>	A6S-□102-PH
<b>Standard</b>	Conforms to JEITA.
<b>Package quantity</b>	900 per reel

<b>Applicable models</b>	A6S-□10□-PMH
<b>Standard</b>	Conforms to JEITA.
<b>Package quantity</b>	400 per reel

**Note:** The dimensions and quantity of A6S-□104-PH/PMH and 1-pole models are different. Enquire for details separately.

No. of poles	2	3	4	5	6	7	8	9	10
$A \pm 0.4$	16	24	24	24	24	32	32	44	44
$B \pm 0.15$	7.5	11.5	11.5	11.5	11.5	14.2	14.2	20.2	20.2
$C$	6.6	9.1	11.6	14.2	16.7	19.2	21.7	24.3	26.8
$D$	(22)	(30)	(30)	(30)	(30)	(38)	(38)	(50)	(50)
$E$	---	---	---	---	---	28.4	28.4	40.4	40.4

- A6H models with embossed tapping specifications are shown below.



<b>Applicable models</b>	A6H-□102-P
<b>Standard</b>	Conforms to JEITA.
<b>Package quantity</b>	4,000 per reel

<b>Applicable models</b>	A6H-□10□-PM
<b>Standard</b>	Conforms to JEITA.
<b>Package quantity</b>	500 per reel

No. of poles	2	4	6	8	10
$A \pm 0.3$	12	12	24	24	24
$B \pm 0.13$	5.5	5.5	11.5	11.5	11.5
$C$	(4.2)	(6.6)	(9.2)	(11.7)	(14.4)
$D$	(18)	(18)	(30)	(30)	(30)