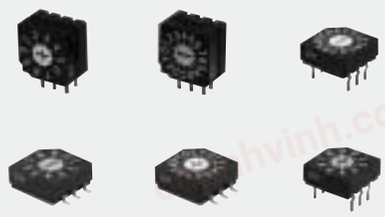
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COPAL ELECTRONICS

ROTARY CODED SWITCHES

SD-1000/2000

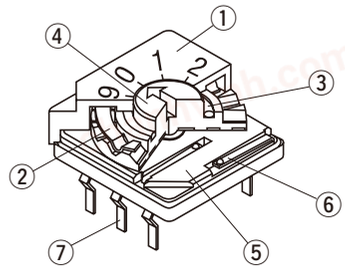
RoHS compatible



■ FEATURES

- Lead-free soldering
- Fine click with metallic spring
- Low profile of 3.9 mm makes perfect for high density board mounting applications
- Gold plated contact provides excellent reliability
- Cross and minus slot are available
- Terminal pin arrangement 3-3

INTERNAL STRUCTURE
SD-1000 / 2000 series



Part name		Material	Flammability
①	Housing	PPS (Polyphenylenesulphide)	UL-94V-0
②	Metallic spring	Stainless (SUS 301)	—
③	"O" ring	Silicone rubber	UL-94HB
④	Insert rotor	Rotor : PA (Polyamide) Pattern : Copper alloy, Gold-plated	UL-94V-0
⑤	Base	PPS (Polyphenylenesulphide)	UL-94V-0
⑥	Contact	Copper alloy, Gold-plated	—
⑦	Terminal pin		

CFCs, Halon, Carbon tetrachloride and designated bromic flame retardant PBBOs and PBBs are not used in our products.

■ PART NUMBER DESIGNATION

S D - 1 0 1 0 T B

Series name

No. of positions
1 : 16 positions
2 : 10 positions

Shape of rotor
0 : Without knob (Minus slot)
1 : With knob (with extended shaft)
2 : Without knob (Cross slot)

Code format
1 : Real code (Rotor color Yellow)
3 : Complementary code (Rotor color Red)

Setting position
0 : Top setting
1 : Side setting

Form of packaging
T : Taping (Gull wing type only)
W : Tray packaging
Blank : Bulk in vinyl bag

Shape of terminal
B : Gull wing (Top setting type only)
Blank : Through hole pin (Snap-in terminal pin)

✺ **Please refer to the LIST OF PART NUMBERS when placing orders.**

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SD-1000/2000
ROTARY CODED SWITCHES

■ LIST OF PART NUMBERS

● Binary coded decimal

Shape of rotor		Form of packaging	Binary coded decimal		Pieces in package
			Real code	Complementary code	
Top setting (Through hole pin)	Without knob (Minus slot)	Vinyl pack	SD-2010	SD-2030	25 pcs./pack
		Tray packaging	SD-2010W	SD-2030W	50 pcs./tray
	With knob	Vinyl pack	SD-2110	SD-2130	25 pcs./pack
		Tray packaging	SD-2110W	SD-2130W	50 pcs./tray
	Without knob (Cross slot)	Vinyl pack	SD-2210	SD-2230	25 pcs./pack
		Tray packaging	SD-2210W	SD-2230W	50 pcs./tray
Side setting (Through hole pin)	Without knob (Minus slot)	Vinyl pack	SD-2011	SD-2031	25 pcs./pack
		Tray packaging	SD-2011W	SD-2031W	50 pcs./tray
	With knob	Vinyl pack	SD-2111	SD-2131	25 pcs./pack
		Tray packaging	SD-2111W	SD-2131W	50 pcs./tray
	Without knob (Cross slot)	Vinyl pack	SD-2211	SD-2231	25 pcs./pack
		Tray packaging	SD-2211W	SD-2231W	50 pcs./tray
Top setting (Gull wing)	Without knob (Minus slot)	Vinyl pack	SD-2010B	SD-2030B	25 pcs./pack
		Tray packaging	SD-2010WB	SD-2030WB	50 pcs./tray
		Taping	SD-2010TB	SD-2030TB	500 pcs./reel
	Without knob (Cross slot)	Vinyl pack	SD-2210B	SD-2230B	25 pcs./pack
		Tray packaging	SD-2210WB	SD-2230WB	50 pcs./tray
		Taping	SD-2210TB	SD-2230TB	500 pcs./reel

● Binary coded hexadecimal

Shape of rotor		Form of packaging	Binary coded hexadecimal		Pieces in package
			Real code	Complementary code	
Top setting (Through hole pin)	Without knob (Minus slot)	Vinyl pack	SD-1010	SD-1030	25 pcs./pack
		Tray packaging	SD-1010W	SD-1030W	50 pcs./tray
	With knob	Vinyl pack	SD-1110	SD-1130	25 pcs./pack
		Tray packaging	SD-1110W	SD-1130W	50 pcs./tray
	Without knob (Cross slot)	Vinyl pack	SD-1210	SD-1230	25 pcs./pack
		Tray packaging	SD-1210W	SD-1230W	50 pcs./tray
Side setting (Through hole pin)	Without knob (Minus slot)	Vinyl pack	SD-1011	SD-1031	25 pcs./pack
		Tray packaging	SD-1011W	SD-1031W	50 pcs./tray
	With knob	Vinyl pack	SD-1111	SD-1131	25 pcs./pack
		Tray packaging	SD-1111W	SD-1131W	50 pcs./tray
	Without knob (Cross slot)	Vinyl pack	SD-1211	SD-1231	25 pcs./pack
		Tray packaging	SD-1211W	SD-1231W	50 pcs./tray
Top setting (Gull wing)	Without knob (Minus slot)	Vinyl pack	SD-1010B	SD-1030B	25 pcs./pack
		Tray packaging	SD-1010WB	SD-1030WB	50 pcs./tray
		Taping	SD-1010TB	SD-1030TB	500 pcs./reel
	Without knob (Cross slot)	Vinyl pack	SD-1210B	SD-1230B	25 pcs./pack
		Tray packaging	SD-1210WB	SD-1230WB	50 pcs./tray
		Taping	SD-1210TB	SD-1230TB	500 pcs./reel

✵ : Verify the above part numbers when placing orders.
✵ : Taping and tray version can be supplied only in reel or tray units.

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SD-1000/2000
ROTARY CODED SWITCHES

■ STANDARD SPECIFICATIONS

Circuit type	BCD (Real code, complementary code) BCH (Real code, complementary code)
Operating temperature range	−25 ~ 85 °C
Storage temperature range	
Sealing	Non washable
Net weight	Without knob Top setting 0.65 g With knob Top setting 0.76 g Without knob Side setting 0.95 g With knob Side setting 1.05 g

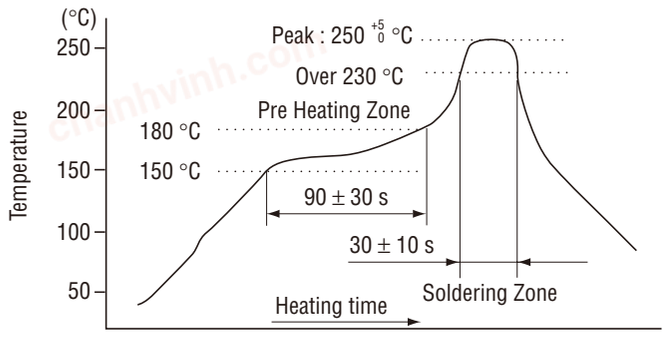
■ ELECTRICAL CHARACTERISTICS

Contact rating Non-switching Switching Minimum	DC50 V 100 mA DC5 V 100 mA DC20 mV 1 μA
Contact resistance	100 mΩ maximum
Insulation resistance	1000 MΩ (DC100 V) minimum
Dielectric strength	AC250 V, 60 s

■ ENVIRONMENTAL CHARACTERISTICS

Vibration	Amplitude 1.5 mm or Acceleration 98 m/s^2, 10-500-10 Hz, 3 directions for 2 h each
Shock	490 m/s^2, 11 ms 6 directions for 3 times each
Humidity (Steady state)	40 °C, Relative humidity 90 ~ 95 %, 240 h
Load life	20000 steps DC5 V, 100 mA
High temperature exposure	85 °C, 96 h
Low temperature exposure	−25 °C, 96 h
Thermal shock	−25 (0.5 h) ~ 85 °C (0.5 h), 5 cycles

Reflow profile for soldering heat evaluation



Reflow : two times maximum

■ MECHANICAL CHARACTERISTICS

No. of positions		16 (SD-1000), 10 (SD-2000)
Adjustment torque		4 ~ 25 mN·m {41 ~ 255 gf·cm}
Stepping angle		22.5° (SD-1000), 36° (SD-2000)
Terminal strength (Through hole pin only)		10 N {1.02 kgf} minimum
Stop strength (With knob only)		10 N {1.02 kgf}, 10 s
Solderability		245 ± 3 °C, 2 ~ 3 s
Soldering heat	Gull wing	Reflow : Peak temperature 255 °C (Please refer to the profile below.) Manual soldering : 350 ± 10 °C, 3 ~ 4 s
	Through hole pin	Flow : 260 ± 3 °C as the temperature in a pot of molten solder, immersion from head of terminal to backside of board 5 ~ 6 s, two times maximum Manual soldering : 380 ± 10 °C, 3 ~ 4 s
Shear (Gull wing only)		5 N {0.51 kgf}, 10 s
Substrate bending (Gull wing only)		Width 90 mm, bend 3 mm, 5 s, 1 time
Pull-off strength (Gull wing only)		5 N {0.51 kgf}, 10 s

{ } : Reference only

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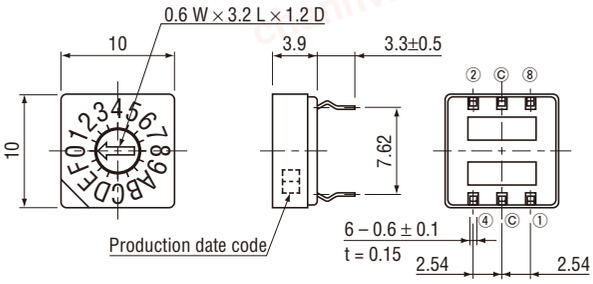
SD-1000/2000
ROTARY CODED SWITCHES

■ OUTLINE DIMENSIONS

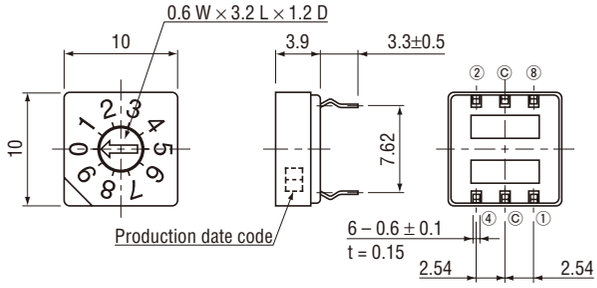
Unless otherwise specified, tolerance: ± 0.3 (Unit: mm)

<Through hole pin, Top setting>

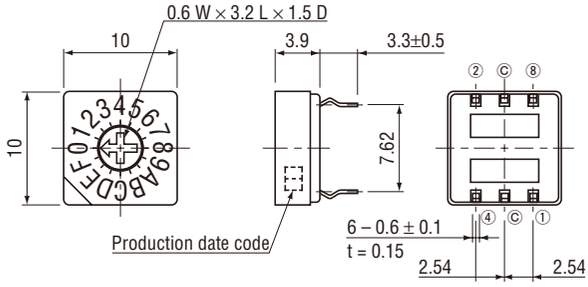
● SD-1010 (Real code)
● SD-1030 (Complementary code)



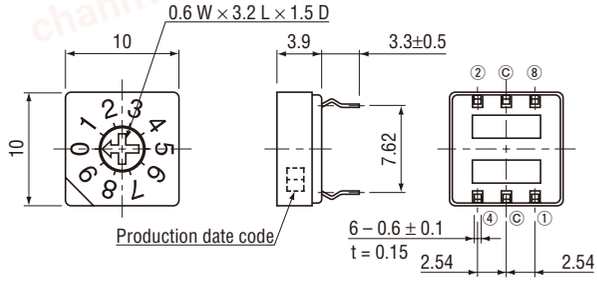
● SD-2010 (Real code)
● SD-2030 (Complementary code)



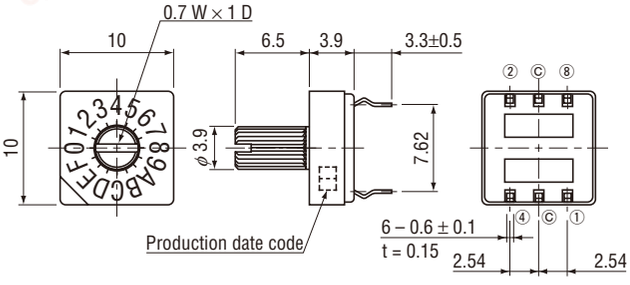
● SD-1210 (Real code)
● SD-1230 (Complementary code)



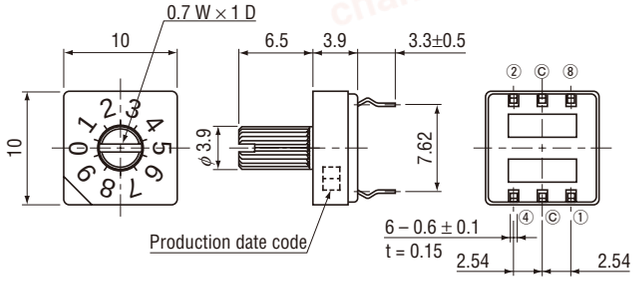
● SD-2210 (Real code)
● SD-2230 (Complementary code)



● SD-1110 (Real code)
● SD-1130 (Complementary code)



● SD-2110 (Real code)
● SD-2130 (Complementary code)



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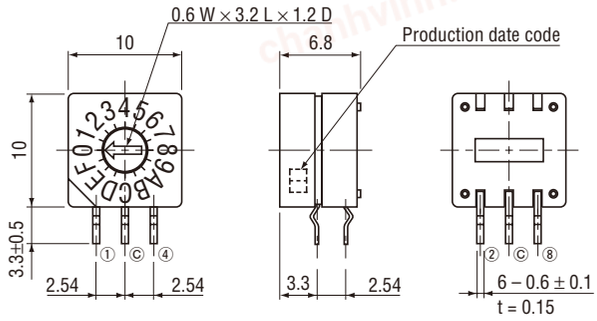
SD-1000/2000
ROTARY CODED SWITCHES

■ OUTLINE DIMENSIONS

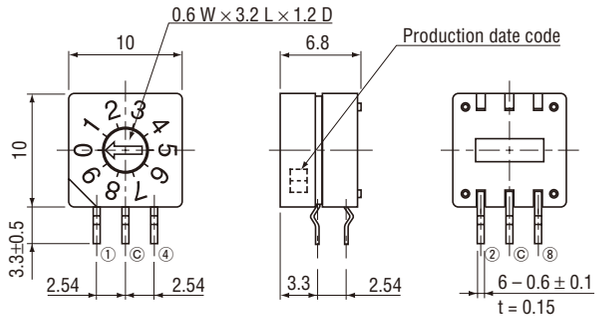
Unless otherwise specified, tolerance: ± 0.3 (Unit: mm)

<Through hole pin, Side setting>

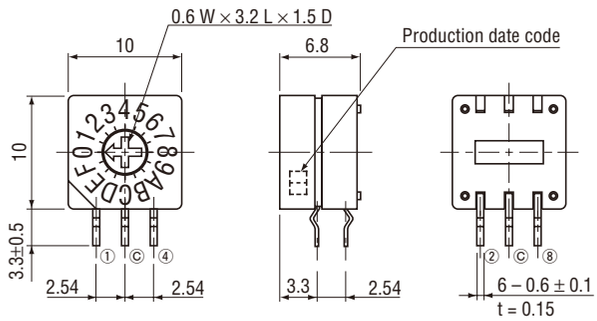
● SD-1011 (Real code)
● SD-1031 (Complementary code)



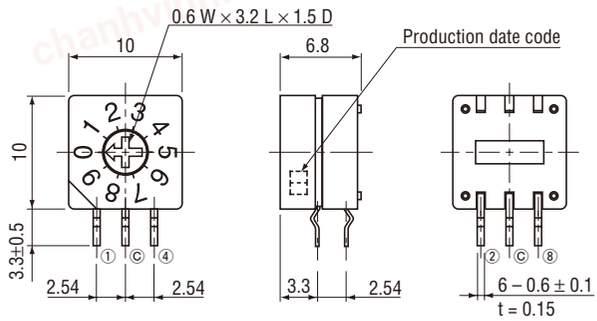
● SD-2011 (Real code)
● SD-2031 (Complementary code)



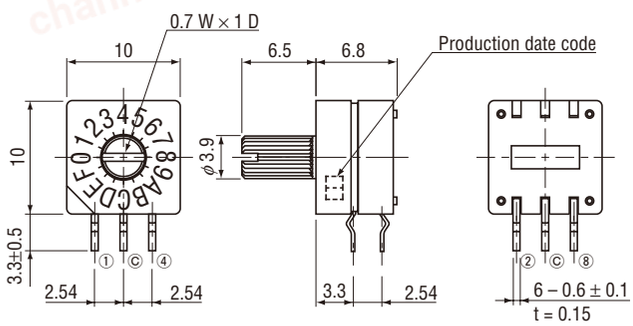
● SD-1211 (Real code)
● SD-1231 (Complementary code)



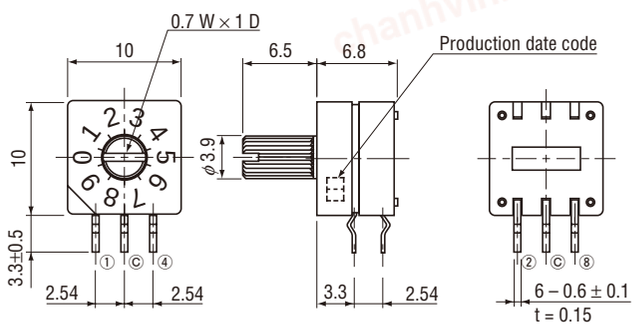
● SD-2211 (Real code)
● SD-2231 (Complementary code)



● SD-1111 (Real code)
● SD-1131 (Complementary code)



● SD-2111 (Real code)
● SD-2131 (Complementary code)



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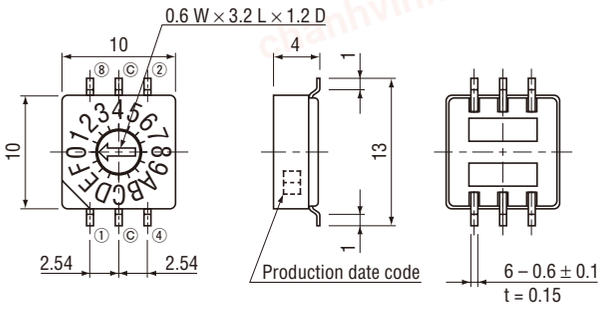
SD-1000/2000
ROTARY CODED SWITCHES

■ OUTLINE DIMENSIONS

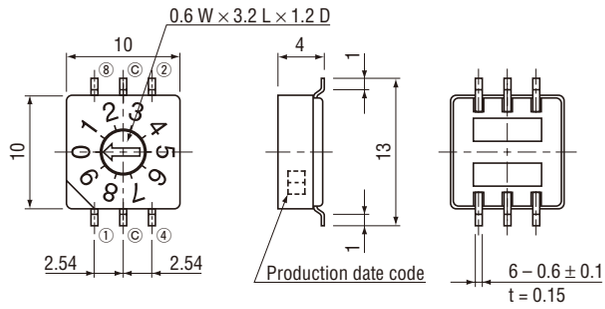
Unless otherwise specified, tolerance: ± 0.3 (Unit: mm)

<Gull wing, Top setting>

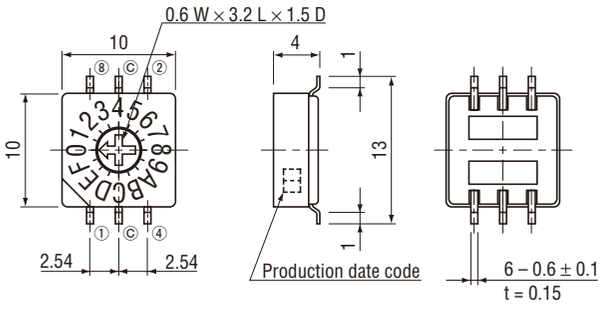
● SD-1010B (Real code)
● SD-1030B (Complementary code)



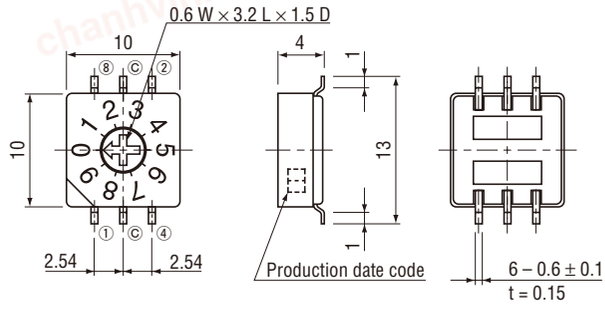
● SD-2010B (Real code)
● SD-2030B (Complementary code)



● SD-1210B (Real code)
● SD-1230B (Complementary code)



● SD-2210B (Real code)
● SD-2230B (Complementary code)



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SD-1000/2000
ROTARY CODED SWITCHES

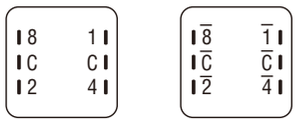
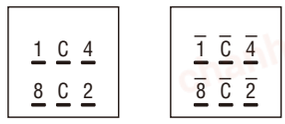
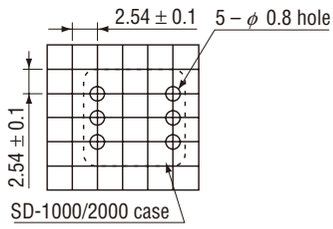
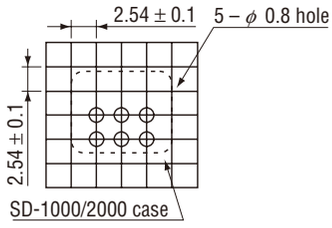
■ CODE FORMAT

No. of positions			SD-1000 series (16 positions) / SD-2000 series (10 positions)															
Position			0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
Code	Real code	8									●	●	●	●	●	●	●	●
		4					●	●	●	●					●	●	●	●
		2			●	●			●	●			●	●			●	●
		1		●		●		●		●		●		●		●		●
	Complementary code	$\overline{8}$	●	●	●	●	●	●	●	●								
		$\overline{4}$	●	●	●	●					●	●	●	●				
		$\overline{2}$	●	●			●	●			●	●			●	●		
		$\overline{1}$	●		●		●		●		●		●		●		●	

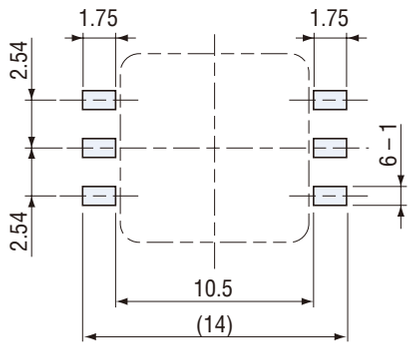
● ··· Contact closed

■ TERMINAL CONNECTION / P.C.B. THROUGH HOLE DIMENSIONS

(Unit: mm)

	Top setting	Side setting
Terminal pin layout (Bottom view)	Real code / Complementary code 	Operating face of real code / Operating face of complementary code 
P.C.B. dimensions (Bottom view)		

■ RECOMMENDED P.C.B. PAD OUTLINE DIMENSIONS



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ROTARY CODED SWITCHES

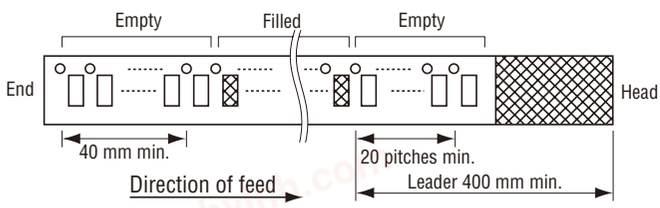
■ PACKAGING SPECIFICATIONS

<Taping packaging specifications>

- Taping version is packaged in 500 pcs. per reel.
  Orders will be accepted for units of 500 pcs., i.e., 500, 1000, 1500 pcs., etc.
- Taping version is boxed with one reel (500 pcs.).

Maximum number of consecutive missing pieces = 2
Leader length and reel dimension are shown in the dia-grams below:

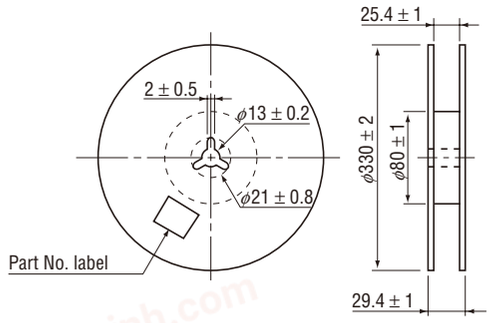
● Embossed tape dimensions



● Reel dimensions

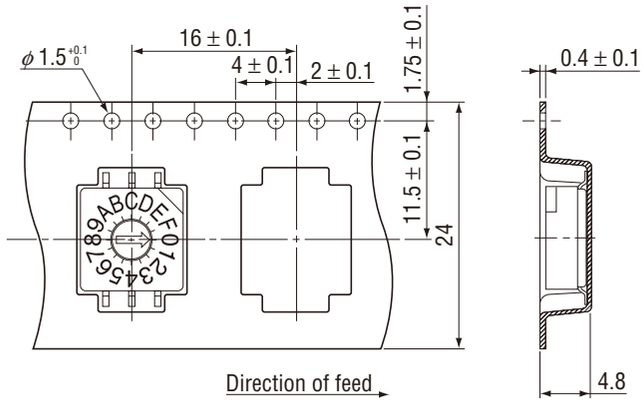
(Unit: mm)

(In accordance with EIAJ ET-7200A)



(Unit: mm)

(In accordance with EIAJ RC-1009B)



<Tray packaging specifications>

- Tray version is packaged in 50 pcs. per tray. Orders will be accepted for units of 50 pcs., i. e., 50, 100, 150 pcs. etc.
- Tray version is boxed with 10 trays.

<Vinyl pack specifications>

- The smallest unit of bulk in vinyl bag packaging is 10 pcs. per pack. Orders will be accepted for unit of minimum 10 pcs., i.e., 10, 20, 30 pcs. , etc.
- Boxing of bulk in vinyl bags is performed with 25 pcs. (standard 50 pcs.) per box.

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