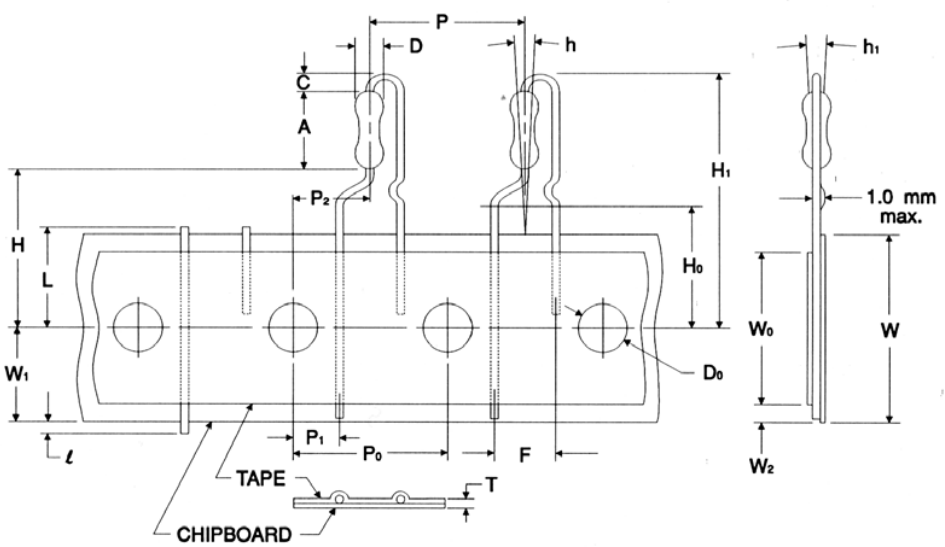
Radial Lead Taping Specification – Pana-Sert

Carbon Film & Metal Film Resistors (1/4W Body Size)

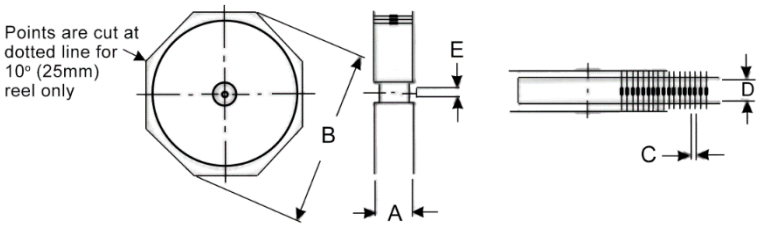


Symbol	Description	PANA-SERT	Unit
A	Resistor body length	0.256 ± 0.020 6.50 ± 0.50	inches mm
C	Height of bending	0.098 ± 0.020 2.50 ± 0.50	inches mm
D	Resistor body diameter	0.091 ± 0.008 2.30 ± 0.20	inches mm
D_0	Sprocket-hole diameter	0.157 ± 0.012 4.00 ± 0.30	inches mm
F	Resistor lead spacing	0.197 ± 0.039 5.00 ± 1.00	inches mm
H	Height to bottom of resistor	0.748 ± 0.039 19.00 ± 1.00	inches mm
H_0	Height to lead clinch	0.630 ± 0.020 16.00 ± 0.50	inches mm
H_1	Height of resistor	1.122 max. 28.50 max.	inches mm
h	Resistor alignment	0 ± 0.079 (0±5°) 0 ± 2.00 (0±5°)	inches mm
h_1	Resistor alignment	0 ± 0.079 (0±5°) 0 ± 2.00 (0±5°)	inches mm
I	Lead protrusion	0.079 max. 2.00 max.	inches mm

Symbol	Description	PANA-SERT	Unit
L	Cutout Length(1)	0.433 max. 11.00 max.	inches mm
P	Resitor pitch(1)	0.500 ± 0.039 12.70 ± 1.00	inches mm
P_0	Sprocket-hole pitch(1)	0.500 ± 0.012 12.70 ± 0.30	inches mm
P_1	Sprocket-hole center to lead center	0.152 ± 0.028 3.85 ± 0.70	inches mm
P_2	Sprocket-hole center to resistor center(1)	0.250 ± 0.051 6.35 ± 1.30	inches mm
T	Thickness (chipboard and tape)	0.028 ± 0.008 0.70 ± 0.20	inches mm
W	Chipboard width(1)	0.709 ± 0.039 18.00 ± 1.00	inches mm
W_0	Hold-down tape width	0.49 min. 12.50 min.	inches mm
W_1	Sprocket-hole position	0.354 ± 0.030 9.00 ± 0.75	inches mm
W_2	Hold-down tape position	0.118 max. 3.00 max.	inches mm

Axial Leaded Resistor
Packaging & Identification Variations

Lead-Tape Specifications: Reeled in accordance with EIA-296-F



Series	Code	A max(1)	B max	C	D(2)	Tape	Unit
ASR	1	3.917 99.50	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
ASRM	14	2.508 63.70	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	12	2.618 66.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
CD	18	2.508 63.70	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	14	2.618 66.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	12	2.736 69.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
CF	18	2.508 63.70	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	14	2.638 67.00	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	12	2.736 69.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	1	2.972 75.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	2	3.130 79.50	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
CFM	14	2.508 63.70	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	12	2.638 67.00	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
FRN	14	2.618 66.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	12	2.736 69.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	1	2.421 61.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	2	3.917 99.50	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.500 ± 0.079 63.50 ± 2.00	0.250 6.350	inches mm
MR	1	3.311 84.10	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	3	3.484 88.50	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	5	3.850 97.80	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.875 ± 0.079 73.03 ± 2.00	0.250 6.350	inches mm
	10	4.764 121.00	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	4.310 ± 0.079 109.47 ± 2.00	0.250 6.350	inches mm

Lead Tape Specifications: Reeled in accordance with EIA-296-F (cont.)							
Series	Code	A max[1]	B max	C	D[2]	Tape	Unit
MWW	1	3.563 90.50	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	3	3.736 94.90	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	5	4.094 104.00	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	10	5.118 130.00	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
RC	14	2.787 70.80	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
	12	2.756 70.00	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.350	inches mm
RNF	18	2.756 ± 0.118 70.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.197 ± 0.020 5.00 ± 0.50	2.047 ± 0.020 52.00 ± 0.50	0.250 6.350	inches mm
	14	2.756 ± 0.118 70.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.197 ± 0.020 5.00 ± 0.50	2.047 ± 0.020 52.00 ± 0.50	0.250 6.350	inches mm
	12	2.756 ± 0.118 70.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.197 ± 0.020 5.00 ± 0.50	2.047 ± 0.020 52.00 ± 0.50	0.250 6.350	inches mm
	1	2.756 ± 0.118 70.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.197 ± 0.020 5.00 ± 0.50	2.047 ± 0.020 52.00 ± 0.50	0.250 6.350	inches mm
	2	2.756 ± 0.118 70.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.197 ± 0.020 5.00 ± 0.50	2.047 ± 0.020 52.00 ± 0.50	0.250 6.350	inches mm
RNMF	14	2.756 ± 0.118 70.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.197 ± 0.020 5.00 ± 0.50	2.047 ± 0.020 52.00 ± 0.50	0.250 6.350	inches mm
	12	2.756 ± 0.118 70.00 ± 3.00	11.811 ± 0.197 300.00 ± 5.00	0.197 ± 0.020 5.00 ± 0.50	2.047 ± 0.020 52.00 ± 0.50	0.250 6.350	inches mm
RSF	12	2.736 69.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	1	2.815 71.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	2	3.524 89.50	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.500 ± 0.079 63.50 ± 2.00	0.250 6.35	inches mm
	3	3.740 95.00	12.008 305.00	0.394 ± 0.020 10.00 ± 0.50	2.874 ± 0.079 73.00 ± 2.00	0.250 6.35	inches mm
	5	4.331 110.00	12.008 305.00	0.394 ± 0.020 10.00 ± 0.50	3.465 ± 0.079 88.00 ± 2.00	0.250 6.35	inches mm
RSMF	12	2.618 66.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	1	2.736 69.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	2	2.815 71.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	3	3.524 89.50	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.500 ± 0.079 63.50 ± 2.00	0.250 6.35	inches mm
	5	3.740 95.00	12.008 305.00	0.394 ± 0.020 10.00 ± 0.50	2.874 ± 0.079 73.00 ± 2.00	0.250 6.35	inches mm
RSPF	12	2.618 66.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	1	2.736 69.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	2	2.815 71.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	3	3.524 89.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm

Lead Tape Specifications: Reeled in accordance with EIA-296-F (cont.)							
Series	Code	A max[1]	B max	C	D[2]	Tape	Unit
SP	3A	2.063 52.40	11.000 279.40	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
SPR	12	2.736 69.50	13.504 343.00	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	1	3.917 99.50	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
TMR	3	6.299 160.00	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	5	6.614 168.00	13.504 343.00	0.394 ± 0.020 10.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
WRC	1S	2.756 70.00	11.933 303.10	0.197 ± 0.020 5.00 ± 0.50	2.047 ± 0.079 52.00 ± 2.00	0.236 ± 0.039 6.00 ± 1.00	inches mm
	1	2.756 70.00	11.933 303.10	0.197 ± 0.020 5.00 ± 0.50	2.047 ± 0.079 52.00 ± 2.00	0.236 ± 0.039 6.00 ± 1.00	inches mm
	2, 2A, 3A, 4A, 5A	2.756 70.00	11.933 303.10	0.197 ± 0.020 5.00 ± 0.50	2.047 ± 0.079 52.00 ± 2.00	0.236 ± 0.039 6.00 ± 1.00	inches mm
	3B, 4B, 5B	2.756 70.00	11.933 303.10	0.197 ± 0.020 5.00 ± 0.50	2.047 ± 0.079 52.00 ± 2.00	0.236 ± 0.039 6.00 ± 1.00	inches mm
WW	H	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	1/WWS2	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	1A	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	2/WWS3	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	2A	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.063 ± 0.079 52.40 ± 2.00	0.250 6.35	inches mm
	3/WWS4	2.880 73.15	11.000 279.40	0.197 ± 0.020 5.00 ± 0.50	2.500 ± 0.079 63.50 ± 2.00	0.250 6.35	inches mm
	3A	3.740 95.00	11.000 279.40	0.394 ± 0.020 10.00 ± 0.50	2.874 ± 0.079 73.00 ± 2.00	0.250 6.35	inches mm
	4/WWS5	2.500 63.50	11.000 279.40	0.394 ± 0.020 10.00 ± 0.50	2.500 ± 0.079 63.50 ± 2.00	0.250 6.35	inches mm
	5/WWS7	3.740 95.00	11.000 279.40	0.394 ± 0.020 10.00 ± 0.50	2.874 ± 0.079 73.00 ± 2.00	0.250 6.35	inches mm
	7	5.100 129.54	11.000 279.40	0.394 ± 0.020 10.00 ± 0.50	2.874 ± 0.079 73.00 ± 2.00	0.250 6.35	inches mm
	7B/WWS10	5.100 129.54	11.000 279.40	0.394 ± 0.020 10.00 ± 0.50	2.874 ± 0.079 73.00 ± 2.00	0.250 6.35	inches mm
	10	5.100 129.54	11.000 279.40	0.394 ± 0.020 10.00 ± 0.50	2.874 ± 0.079 73.00 ± 2.00	0.250 6.35	inches mm

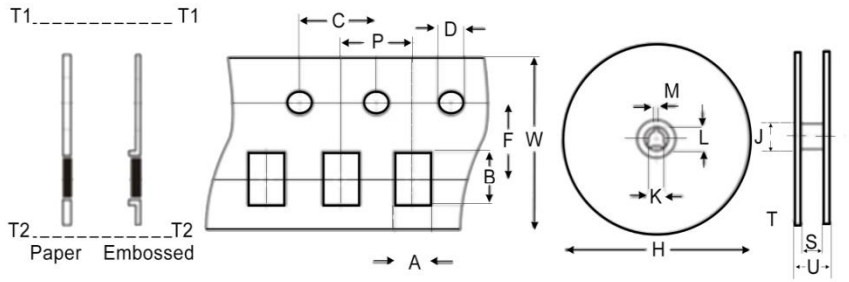
Dimension "E": This is a non-critical dimension that does not have a tolerance in the standard.
Range of diameters is from 0.547 inches (13.90 mm) to 1.500 inches (38.10 mm).

(1) Reference value only. The "A" dimension shall be governed by the overall length of the taped component.
The distance between flanges shall be 0.059 inches (1.50 mm) to 0.315 (8.00 mm) greater than the overall component.

(2) The given dimension "D" expresses the standard width spacing. A 26mm narrow spacing is available as option "N" packaging code.

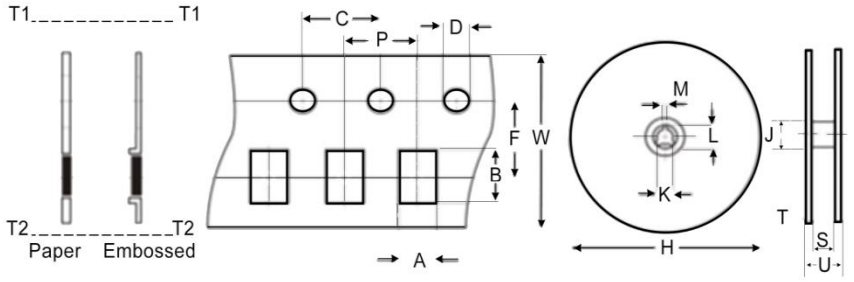
Chip Array Resistors
Packaging Specifications

RAVF10 - RAVF32 Packaging Specifications



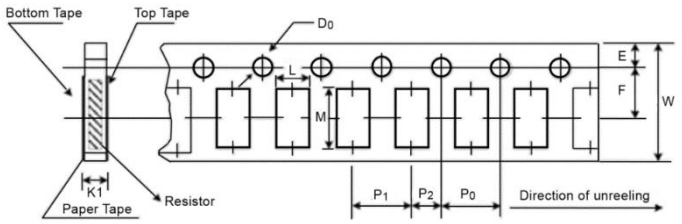
Symbol	FEATURES	RAVF102D	RAVF104D	RAVF162D	RAVF164D/RAVF328	RAVF324D	Unit
	Material Pieces/Reel	Paper - 10,000	Paper - 10,000	Paper - 5,000	Paper - 5,000	Embossed - 4,000	
A	Pocket Width	0.046 ± 0.004 1.17 ± 0.10	0.051 ± 0.008 1.30 ± 0.20	0.071 ± 0.004 1.80 ± 0.10	0.079 ± 0.008 2.00 ± 0.20	0.134 ± 0.004 3.40 ± 0.10	inches mm
B	Pocket Length	0.046 ± 0.004 1.17 ± 0.10	0.091 ± 0.008 2.30 ± 0.20	0.071 ± 0.004 1.80 ± 0.10	0.142 ± 0.008 3.60 ± 0.20	0.220 ± 0.004 5.60 ± 0.10	inches mm
C	Pin Spacing	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	inches mm
D	Pin Diameter	0.059 ± 0.004 1.50 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	0.039 ± 0.004 1.00 ± 0.10	inches mm
F	Pin-Pocket C/L	0.138 ± 0.002 3.50 ± 0.05	0.138 ± 0.002 3.50 ± 0.05	0.138 ± 0.002 3.50 ± 0.05	0.138 ± 0.002 3.50 ± 0.05	0.217 ± 0.002 5.50 ± 0.05	inches mm
H	Reel Diameter	7.008 ± 0.079 178.00 ± 2.00	7.008 ± 0.079 178.00 ± 2.00	7.008 ± 0.079 178.00 ± 2.00	7.008 ± 0.079 178.00 ± 2.00	7.008 ± 0.079 178.00 ± 2.00	inches mm
J	Hub Diameter	1.969 50.00	1.969 50.00	1.969 50.00	1.969 50.00	2.362 60.00	inches mm
K	Hole Diameter	0.512 ± 0.039 13.00 ± 1.00	0.512 ± 0.039 13.00 ± 1.00	0.512 ± 0.039 13.00 ± 1.00	0.512 ± 0.039 13.00 ± 1.00	0.512 ± 0.008 13.00 ± 0.20	inches mm
L	Key Diameter	0.827 ± 0.039 21.00 ± 1.00	0.827 ± 0.039 21.00 ± 1.00	0.827 ± 0.039 21.00 ± 1.00	0.827 ± 0.039 21.00 ± 1.00	0.827 ± 0.031 21.00 ± 0.80	inches mm
M	Key Width	0.079 ± 0.039 2.00 ± 1.00	0.079 ± 0.039 2.00 ± 1.00	0.079 ± 0.039 2.00 ± 1.00	0.079 ± 0.039 2.00 ± 1.00	0.079 ± 0.020 2.00 ± 0.50	inches mm
P	Pocket Spacing	0.079 ± 0.002 2.00 ± 0.05	0.079 ± 0.002 2.00 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	inches mm
S	Reel Inside Width	0.531 ± 0.079 13.50 ± 2.00	0.531 ± 0.079 13.50 ± 2.00	0.531 ± 0.079 13.50 ± 2.00	0.531 ± 0.079 13.50 ± 2.00	0.354 ± 0.012 9.00 ± 0.30	inches mm
T	Side Thickness	0.031 ± 0.008 0.80 ± 0.20	0.031 ± 0.008 0.80 ± 0.20	0.031 ± 0.008 0.80 ± 0.20	0.031 ± 0.008 0.80 ± 0.20	-	inches mm
T1	Strip Thickness	0.039 max 1.00 max	0.039 max 1.00 max	0.020 max 0.50 max	0.039 max 1.00 max	0.010 ± 0.002 0.25 ± 0.05	inches mm
T2	Total Thickness	0.055 max 1.40 max	0.055 max 1.40 max	0.039 max 1.00 max	0.055 max 1.40 max	0.043 max 1.10 max	inches mm
U	Reel Outside Width	-				0.449 11.40	inches mm
W	Strip Width	0.315 ± 0.008 8.00 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.472 ± 0.008 12.00 ± 0.20	inches mm

RACF16 - RACF64 Packaging Specifications



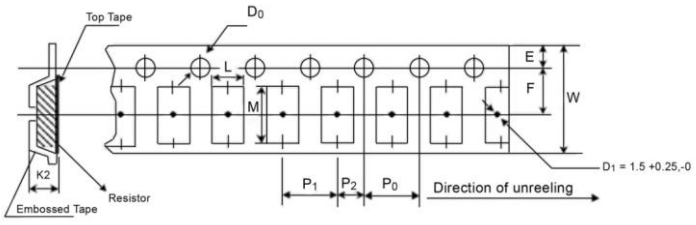
Symbol	FEATURES	RACF164D	RACF324D	RACF408M	RACF648N/RACF648R	Unit
	Material Pieces/Reel	Paper - 5,000	Embossed - 4,000	Embossed - 4,000	Embossed - 4,000	
A	Pocket Width	0.079 ± 0.008 2.00 ± 0.20	0.138 ± 0.004 3.50 ± 0.10	0.098 ± 0.004 2.50 ± 0.10	0.138 ± 0.004 3.50 ± 0.10	inches mm
B	Pocket Length	0.142 ± 0.008 3.60 ± 0.20	0.224 ± 0.004 5.70 ± 0.10	0.173 ± 0.004 4.40 ± 0.10	0.266 ± 0.004 6.75 ± 0.10	inches mm
C	Pin Spacing	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	inches mm
D	Pin Diameter	0.059 ± 0.004 1.50 ± 0.10	0.039 ± 0.004 1.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	inches mm
F	Pin-to-Pocket Center	0.138 ± 0.002 3.50 ± 0.05	0.217 ± 0.002 5.50 ± 0.05	0.217 ± 0.020 5.50 ± 0.50	0.217 ± 0.002 5.50 ± 0.05	inches mm
H	Reel Diameter	7.008 ± 0.079 178.00 ± 2.00	7.008 ± 0.079 178.00 ± 2.00	7.008 ± 0.079 178.00 ± 2.00	7.008 ± 0.079 178.00 ± 2.00	inches mm
J	Hub Diameter	1.969 50.00	2.362 ± 0.039 60.00 ± 1.00	2.362 ± 0.039 60.00 ± 1.00	2.362 ± 0.039 60.00 ± 1.00	inches mm
K	Hole Diameter	0.512 ± 0.039 13.00 ± 1.00	0.512 ± 0.008 13.00 ± 0.20	0.512 ± 0.008 13.00 ± 0.20	0.512 ± 0.008 13.00 ± 0.20	inches mm
L	Key Diameter	0.827 ± 0.039 21.00 ± 1.00	0.827 ± 0.031 21.00 ± 0.80	0.827 ± 0.031 21.00 ± 0.80	0.827 ± 0.031 21.00 ± 0.80	inches mm
M	Key Width	0.079 ± 0.039 2.00 ± 1.00	0.079 ± 0.020 2.00 ± 0.50	0.079 ± 0.020 2.00 ± 0.50	0.079 ± 0.020 2.00 ± 0.50	inches mm
P	Pocket Spacing	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	inches mm
S	Reel Inside Width	0.531 ± 0.079 13.50 ± 2.00	0.354 ± 0.012 9.00 ± 0.30	0.354 ± 0.012 9.00 ± 0.30	0.354 ± 0.012 9.00 ± 0.30	inches mm
T	Reel Side Thickness	0.031 ± 0.008 0.80 ± 0.20	-			inches mm
T1	Strip Thickness	0.020 max 0.50 max	0.010 ± 0.002 0.25 ± 0.05	0.010 ± 0.002 0.25 ± 0.05	0.010 ± 0.002 0.25 ± 0.05	inches mm
T2	Total Thickness	0.039 max 1.00 max	0.043 max 1.10 max	0.043 max 1.10 max	0.043 max 1.10 max	inches mm
U	Reel Outside Width	-	0.449 ± 0.039 11.40 ± 1.00	0.449 ± 0.039 11.40 ± 1.00	0.449 ± 0.039 11.40 ± 1.00	inches mm
W	Strip Width	0.315 ± 0.008 8.00 ± 0.20	0.472 ± 0.008 12.00 ± 0.20	0.472 ± 0.008 12.00 ± 0.20	0.472 ± 0.008 12.00 ± 0.20	inches mm

RMCS Packaging Specifications – Paper Tape



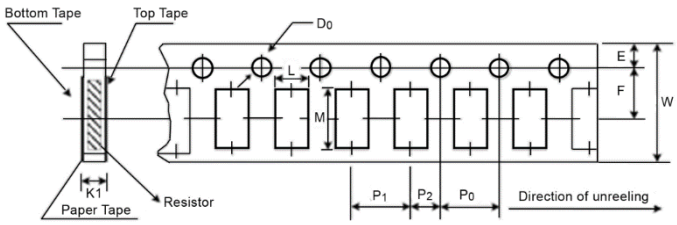
Type	L	M	W	E	F	Unit
RMCS0201	0.015 ± 0.002 0.38 ± 0.05	0.027 ± 0.002 0.68 ± 0.05	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RMCS0402	0.026 ± 0.004 0.65 ± 0.10	0.045 ± 0.004 1.15 ± 0.10	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RMCS0603	0.043 ± 0.004 1.10 ± 0.10	0.075 ± 0.004 1.90 ± 0.10	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RMCS0805	0.063 ± 0.004 1.60 ± 0.10	0.094 ± 0.008 2.40 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RMCS1206	0.075 ± 0.004 1.90 ± 0.10	0.138 ± 0.008 3.50 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RMCS1210	0.110 ± 0.004 2.80 ± 0.10	0.138 ± 0.008 3.50 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
Type	P_0	P1	P2	$ØD_0$	K1/K2	Unit
RMCS0201	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.017 ± 0.008 0.42 ± 0.20	inches mm
RMCS0402	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.018 ± 0.004 0.45 ± 0.10	inches mm
RMCS0603	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.028 ± 0.004 0.70 ± 0.10	inches mm
RMCS0805	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.033 ± 0.004 0.85 ± 0.10	inches mm
RMCS1206	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.033 ± 0.004 0.85 ± 0.10	inches mm
RMCS1210	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.033 ± 0.004 0.85 ± 0.10	inches mm

RMCS Packaging Specifications – Embossed Plastic Tape



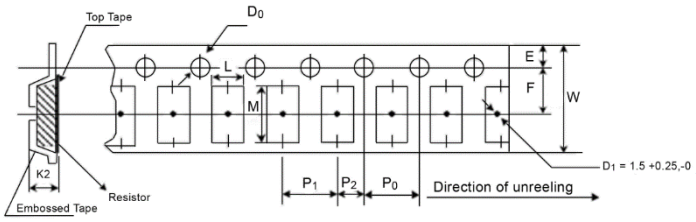
Type	L	M	W	E	F	Unit
RMCS2010	0.110 ± 0.008 2.80 ± 0.20	0.217 ± 0.008 5.50 ± 0.20	0.472 ± 0.012 12.00 ± 0.30	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	inches mm
RMCS2512	0.138 ± 0.008 3.50 ± 0.20	0.264 ± 0.008 6.70 ± 0.20	0.472 ± 0.012 12.00 ± 0.30	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	inches mm
Type	P_0	P1	P2	$ØD_0$	K1/K2	Unit
RMCS2010	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.047 - 0 1.20 - 0	inches mm
RMCS2512	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.047 - 0 1.20 - 0	inches mm

RNCS Packaging Specifications – Paper Tape



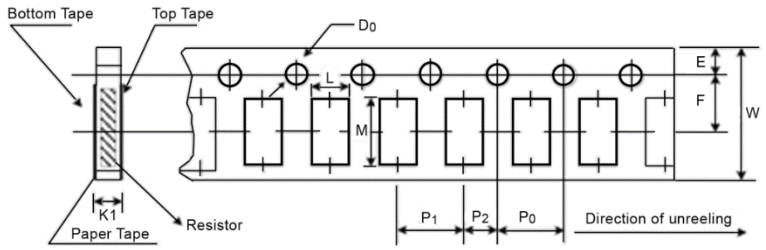
Type	L	M	W	E	F	Unit
RNCS0402	0.028 ± 0.002 0.70 ± 0.05	0.046 ± 0.002 1.16 ± 0.05	0.315 ± 0.004 8.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RNCS0603	0.043 ± 0.002 1.10 ± 0.05	0.075 ± 0.002 1.90 ± 0.05	0.315 ± 0.004 8.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RNCS0805	0.063 ± 0.002 1.60 ± 0.05	0.093 ± 0.002 2.37 ± 0.05	0.315 ± 0.004 8.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RNCS1206	0.079 ± 0.002 2.00 ± 0.05	0.140 ± 0.002 3.55 ± 0.05	0.315 ± 0.004 8.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
Type	P_0	P1	P2	$ØD_0$	K1/K2	Unit
RNCS0402	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.079 ± 0.002 2.00 ± 0.05	0.061 ± 0.002 1.55 ± 0.05	0.016 ± 0.001 0.40 ± 0.03	inches mm
RNCS0603	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.061 ± 0.002 1.55 ± 0.05	0.024 ± 0.001 0.60 ± 0.03	inches mm
RNCS0805	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.061 ± 0.002 1.55 ± 0.05	0.030 ± 0.002 0.75 ± 0.05	inches mm
RNCS1206	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.061 ± 0.002 1.55 ± 0.05	0.030 ± 0.002 0.75 ± 0.05	inches mm

RNCS Packaging Specifications – Embossed Plastic Tape



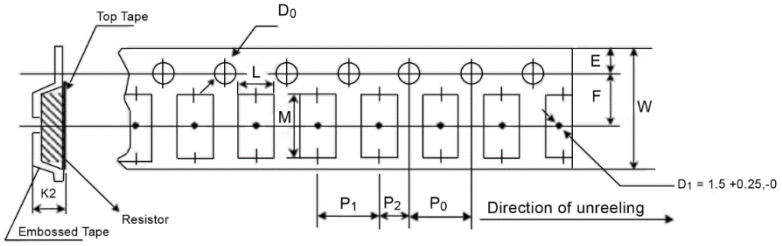
Type	L	M	W	E	F	Unit
RNCS2010	0.112 ± 0.004 2.85 ± 0.10	0.215 ± 0.004 5.45 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	inches mm
RNCS2512	0.134 ± 0.004 3.40 ± 0.10	0.262 ± 0.004 6.65 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	inches mm
Type	P_0	P1	P2	$ØD_0$	K1/K2	Unit
RNCS2010	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.061 ± 0.002 1.55 ± 0.05	0.039 ± 0.008 1.00 ± 0.20	inches mm
RNCS2512	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.002 2.00 ± 0.05	0.061 ± 0.002 1.55 ± 0.05	0.039 ± 0.008 1.00 ± 0.20	inches mm

RPC Packaging Specifications – Paper Tape



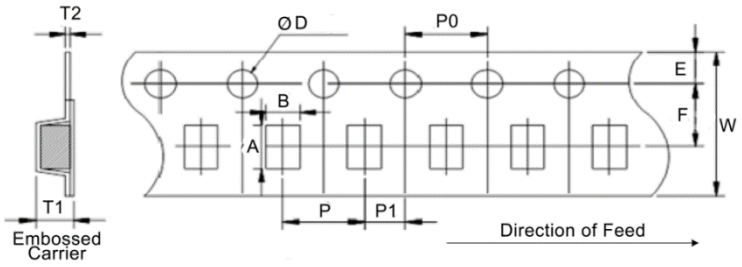
Type	L	M	W	E	F	Unit
RPC0603	0.043 ± 0.004 1.10 ± 0.10	0.075 ± 0.004 1.90 ± 0.10	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RPC0805	0.063 ± 0.004 1.60 ± 0.10	0.094 ± 0.008 2.40 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RPC1206	0.075 ± 0.004 1.90 ± 0.10	0.138 ± 0.008 3.50 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
RPC1210	0.110 ± 0.004 2.80 ± 0.10	0.138 ± 0.008 3.50 ± 0.20	0.315 ± 0.008 8.00 ± 0.20	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
Type	P_0	P1	P2	ØD0	K1/K2	Unit
RPC0603	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.394 4.00 ± 10.00	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.028 ± 0.004 0.70 ± 0.10	inches mm
RPC0805	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.394 4.00 ± 10.00	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.033 ± 0.004 0.85 ± 0.10	inches mm
RPC1206	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.394 4.00 ± 10.00	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.033 ± 0.004 0.85 ± 0.10	inches mm
RPC1210	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.394 4.00 ± 10.00	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.033 ± 0.004 0.85 ± 0.10	inches mm

RPC Packaging Specifications – Embossed Plastic Tape



Type	L	M	W	E	F	Unit
RPC2010	0.110 ± 0.008 2.80 ± 0.20	0.217 ± 0.008 5.50 ± 0.20	0.472 ± 0.012 12.00 ± 0.30	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	inches mm
RPC2512	0.138 ± 0.008 3.50 ± 0.20	0.264 ± 0.008 6.70 ± 0.20	0.472 ± 0.012 12.00 ± 0.30	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.002 5.50 ± 0.05	inches mm
Type	P_0	P1	P2	ØD0	K1/K2	Unit
RPC2010	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.394 4.00 ± 10.00	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.047 - 0 1.20 - 0	inches mm
RPC2512	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.394 4.00 ± 10.00	0.079 ± 0.002 2.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.047 - 0 1.20 - 0	inches mm

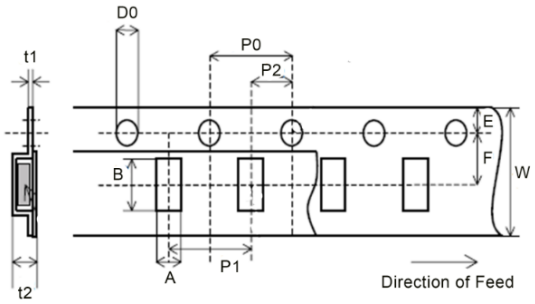
CSS Packaging Specifications – Embossed Plastic Tape



Type	A	B	W	E	F	T1	Unit
CSS1206	0.137 ± 0.004 3.48 ± 0.10	0.072 ± 0.004 1.83 ± 0.10	0.315 ± 0.006 8.00 ± 0.15	0.069 ± 0.004 1.75 ± 0.10	0.138 ± 0.004 3.50 ± 0.10	0.043 ± 0.004 1.10 ± 0.10	inches mm
CSS2010	0.215 ± 0.004 5.45 ± 0.10	0.114 ± 0.004 2.90 ± 0.10	0.472 ± 0.006 12.00 ± 0.15	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.004 5.50 ± 0.10	0.052 ± 0.004 1.33 ± 0.10	inches mm
CSS2512	0.266 ± 0.004 6.75 ± 0.10	0.138 ± 0.004 3.50 ± 0.10	0.472 ± 0.006 12.00 ± 0.15	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.004 5.50 ± 0.10	0.051 ± 0.004 1.30 ± 0.10	inches mm
CSS2725	0.281 ± 0.004 7.15 ± 0.10	0.266 ± 0.004 6.75 ± 0.10	0.472 ± 0.006 12.00 ± 0.15	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.004 5.50 ± 0.10	0.077 ± 0.004 1.95 ± 0.10	inches mm
CSS2728	0.281 ± 0.004 7.15 ± 0.10	0.303 ± 0.004 7.70 ± 0.10	0.472 ± 0.006 12.00 ± 0.15	0.069 ± 0.004 1.75 ± 0.10	0.217 ± 0.004 5.50 ± 0.10	0.057 ± 0.004 1.45 ± 0.10	inches mm
CSS4527	0.465 ± 0.004 11.80 ± 0.10	0.283 ± 0.004 7.20 ± 0.10	0.945 ± 0.006 24.00 ± 0.15	0.069 ± 0.004 1.75 ± 0.10	0.453 ± 0.004 11.50 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	inches mm

Type	T2	P	P0	P1	ΦD	Unit
CSS1206	0.008 ± 0.002 0.20 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	inches mm
CSS2010	0.009 ± 0.002 0.23 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	inches mm
CSS2512	0.008 ± 0.002 0.20 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	inches mm
CSS2725	0.010 ± 0.002 0.25 ± 0.05	0.315 ± 0.004 8.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	inches mm
CSS2728	0.010 ± 0.002 0.25 ± 0.05	0.472 ± 0.004 12.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	inches mm
CSS4527	0.012 ± 0.004 0.30 ± 0.10	0.472 ± 0.004 12.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	inches mm

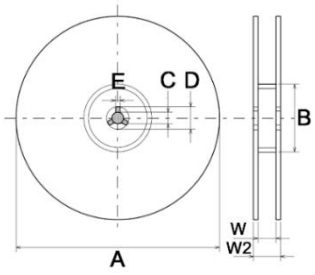
RHC Packaging Specifications – Embossed Plastic Tape



Type	A	B	W	F	E	P1	Unit
RHC2512	0.134 ± 0.004 3.40 ± 0.10	0.260 ± 0.004 6.60 ± 0.10	0.472 ± 0.008 12.00 ± 0.20	0.217 ± 0.002 5.50 ± 0.05	0.069 ± 0.004 1.75 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	Inches mm

Type	P2	P0	D0	t1	t2	Unit
RHC2512	0.079 ± 0.002 2.00 ± 0.05	0.157 ± 0.004 4.00 ± 0.10	0.061 ± 0.002 1.55 ± 0.05	0.010 ± 0.002 0.25 ± 0.05	0.039 ± 0.004 1.00 ± 0.10	Inches mm

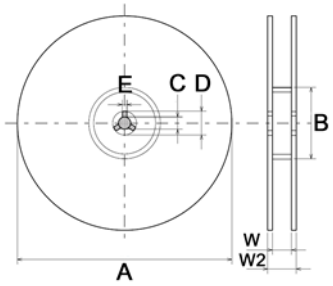
RHC Reel Specifications



Type	A	B	C	D	E	W	W2	Unit
RHC2512	7.087 ± 0.118 180.00 ± 3.00	2.362 ± 0.039 60.00 ± 1.00	0.512 ± 0.008 13.00 ± 0.20	0.827 ± 0.031 21.00 ± 0.80	0.079 ± 0.020 2.00 ± 0.50	0.512 ± 0.012 13.00 ± 0.30	0.606 ± 0.039 15.40 ± 1.00	Inches mm

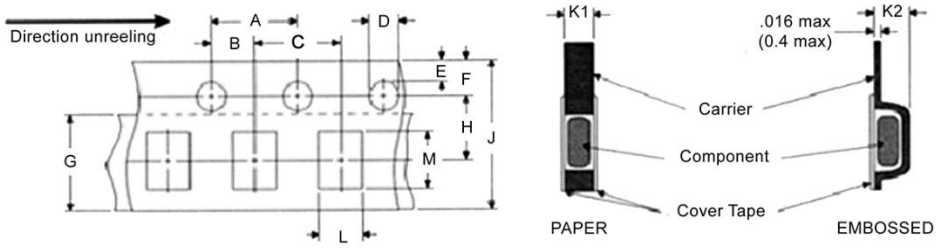
Packaging: Chips per EIA Standard RS-481

Reel Specifications



Reel Dimensions	A	B	C	D	E	W	W2	Unit
7" Paper Tape	7.008 ± 0.039 178.00 ± 1.00	2.362 ± 0.039 60.00 ± 1.00	0.531 ± 0.028 13.50 ± 0.70	0.795 ± 0.031 20.20 ± 0.80	0.059 ± 0.020 1.50 ± 0.50	0.331 +0.059/-0 8.40 +1.50/-0	0.453 ± 0.039 11.50 ± 1.00	Inches mm
Embossed Plastic Tape	7.008 ± 0.039 178.00 ± 1.00	2.362 ± 0.039 60.00 ± 1.00	0.531 ± 0.028 13.50 ± 0.70	0.795 ± 0.031 20.20 ± 0.80	0.059 ± 0.020 1.50 ± 0.50	0.531 ± 0.039 13.50 ± 1.00	0.610 ± 0.039 15.50 ± 1.00	Inches mm

Tape Specifications



A	B	C	D	E	F	G	H	J (1)	Unit
0.157 ± 0.004 4.00 ± 0.10	0.079 ± 0.004 2.00 ± 0.10	0.157 ± 0.004 4.00 ± 0.10	0.059 ± 0.004 1.50 ± 0.10	0.039 1.00	0.069 ± 0.002 1.75 ± 0.05	0.197 5.00	0.138 ± 0.002 3.50 ± 0.05	0.315 ± 0.004 8.00 ± 0.10	inches mm

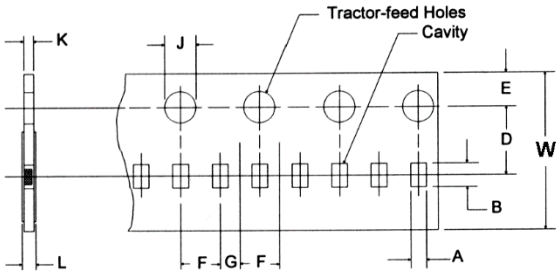
(1) For CSR, RMCF and RNCF, package size 2010 and 2512, dimensions are 0.472 ± 0.012 inches (12.00 ± 0.30 mm).

Tape Specifications (cont.)					
Type	K1	K2	L	M	Unit
CSR0402	0.018 ± 0.004 0.45 ± 0.10	-	0.026 ± 0.004 0.65 ± 0.10	0.045 ± 0.004 1.15 ± 0.10	inches mm
CSR0603, HVC0603, RGC0603, RMCF0603, RNCF0603	0.043 max 1.10 max	-	0.043 ± 0.008 1.10 ± 0.20	0.075 ± 0.008 1.90 ± 0.20	inches mm
CSR0805, FCR0805, HMC0805, HVC0805, RGC0805, RMCF0805, RNCF0805	0.043 max 1.10 max	-	0.065 ± 0.008 1.65 ± 0.20	0.094 ± 0.008 2.40 ± 0.20	inches mm
CSR1206, FCR1206, HMC1206, HVC1206, RGC1206, RMCF1206, RNCF1206, RMCF1210, RNCF1210	0.043 max 1.10 max	0.094 max 2.40 max	0.079 ± 0.004 2.00 ± 0.10	0.138 ± 0.002 3.50 ± 0.05	inches mm
FCR1210	-	0.094 max 2.40 max	0.110 ± 0.008 2.80 ± 0.20	0.142 ± 0.008 3.60 ± 0.20	inches mm
CSR2010, HVC2010, RMCF2010, RNCF2010	-	0.094 max 2.40 max	0.110 ± 0.008 2.80 ± 0.20	0.217 ± 0.008 5.50 ± 0.20	inches mm
CSR2512, HVC2512, RMCF2512, RNCF2512	-	0.094 max 2.40 max	0.150 ± 0.008 3.80 ± 0.20	0.264 ± 0.008 6.70 ± 0.20	inches mm

Note: For reel quantities, please see individual product specifications.

Chip Resistors
Packaging Specifications

Packaging Specification - 0201 and 0402 Chip Size (2mm pitch)

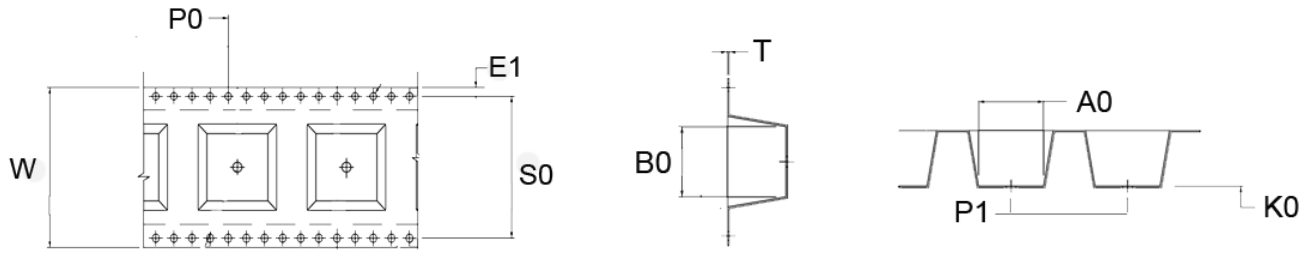


Standard Tape Packaging
2mm Pitch - 10,000 per reel
Reel diameter - 7 inches (178 mm)
Reel width - 0.315 inches (8 mm)

A	B	W	D	E	Unit
0.026 ± 0.004 0.65 ± 0.10	0.045 ± 0.004 1.15 ± 0.10	0.315 ± 0.008 8.00 ± 0.20	0.138 ± 0.002 3.50 ± 0.05	0.069 ± 0.004 1.75 ± 0.10	inches mm
F	G	J	K	L	Unit
0.079 ± 0.002 2.00 ± 0.05	0.039 ± 0.002 1.00 ± 0.05	0.059 ± 0.004 1.50 ± 0.10	0.016 ± 0.002 0.40 ± 0.05	0.020 max 0.50 max	inches mm

SMD Resistors
Packaging Specifications

SM Packaging



Product	W	P_0	E_1	T	S_0	P_1	A_0	K_0	B_0	Unit
SM2615	0.630 + 0.012 16.00 + 0.30	0.157 4.00	0.069 1.75	0.018 0.45	-	0.315 8.00	0.161 4.10	0.159 4.03	0.302 7.66	inches mm
SM4124	0.945 + 0.012 24.00 + 0.30	0.157 4.00	0.069 1.75	0.018 0.45	-	0.472 12.00	0.257 6.53	0.206 5.22	0.457 11.60	inches mm
SM6227	1.260 ± 0.012 32.00 ± 0.30	0.157 4.00	0.069 1.75	0.018 0.45	1.118 28.40	0.472 12.00	0.276 7.01	0.271 6.88	0.665 16.89	inches mm
SM8035	1.732 ± 0.012 44.00 ± 0.30	0.157 4.00	0.069 1.75	0.018 0.45	1.591 40.40	0.630 16.00	0.343 8.71	0.396 10.05	0.856 21.73	inches mm

Chip Resistors – Part Marking Instructions

1% Marking
The nominal resistance is marked on the surface of the overcoating with the use of 4 digit markings.
0201 and 0402 are not marked.

5% Marking
The nominal resistance is marked on the surface of the overcoating with the use of 3 digit markings.
0201 and 0402 are not marked.

For shared E24/E96 values, 1% tolerance product may be marked with three digit marking instead of the standard four digit marking for all other E96 values. All E24 values available in 1% tolerance are also marked with three digit marking. Standard HVC is unmarked.

Mark Instructions for 0603 1% Chip Resistor (per EIA-J)

A two-digit number is assigned to each standard R-Value (E96) as shown in the chart below.
This is followed by one alpha character which is used as a multiplier. Each letter from "Y" – "F" represents a specific multiplier as follows:

Y = 0.1	B = 100	E = 100,000
X = 1	C = 1,000	F = 1,000,000
A = 10	D = 10,000	

EXAMPLE:

Chip Marking	Explanation	Value
01B	01 means 10.0 and B = 100	10.0 x 100 = 1 K ohm
25C	25 means 17.8 and C = 1,000	17.8 x 1,000 = 17.8 K ohm
93D	93 means 90.9 and D = 10,000	90.9 x 10,000 = 909 K ohm

E96

1%	#	1%	#	1%	#	1%	#	1%	#	1%	#
10.0	01	14.7	17	21.5	33	31.6	49	46.4	65	68.1	81
10.2	02	15.0	18	22.1	34	32.4	50	47.5	66	69.8	82
10.5	03	15.4	19	22.6	35	33.2	51	48.7	67	71.5	83
10.7	04	15.8	20	23.2	36	34.0	52	49.9	68	73.2	84
11.0	05	16.2	21	23.7	37	34.8	53	51.1	69	75.0	85
11.3	06	16.5	22	24.3	38	35.7	54	52.3	70	76.8	86
11.5	07	16.9	23	24.9	39	36.5	55	53.6	71	78.7	87
11.8	08	17.4	24	25.5	40	37.4	56	54.9	72	80.6	88
12.1	09	17.8	25	26.1	41	38.3	57	56.2	73	82.5	89
12.4	10	18.2	26	26.7	42	39.2	58	57.6	74	84.5	90
12.7	11	18.7	27	27.4	43	40.2	59	59.0	75	86.6	91
13.0	12	19.1	28	28.0	44	41.2	60	60.4	76	88.7	92
13.3	13	19.6	29	28.7	45	42.2	61	61.9	77	90.9	93
13.7	14	20.0	30	29.4	46	43.2	62	63.4	78	93.1	94
14.0	15	20.5	31	30.1	47	44.2	63	64.9	79	95.3	95
14.3	16	21.0	32	30.9	48	45.3	64	66.5	80	97.6	96

General Product Information

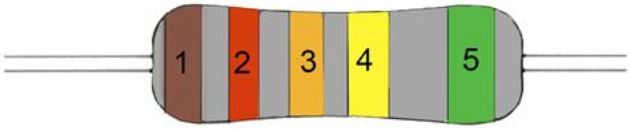
Temperature Coefficient Codes

Stackpole TC Code	MIL TC Code	Industry Std TC Code	Temperature Coefficient
M	N/A	-	±300 ppm/ºC
L	N/A	T0	±200 ppm/ºC
D	D	T1	±100 ppm/ºC
C	C	T2	±50 ppm/ºC
E	E	T9	±25 ppm/ºC
S	N/A	T10	±15 ppm/ºC
T	N/A	T13	±10 ppm/ºC
Y	N/A	T16	±5 ppm/ºC

Tolerance Codes		Resistance Values	
Stackpole/MIL Reference	Tolerance	Stackpole Standard for Nominal Values & Tolerances	
S	±40%	Series	Tolerance
N	±30%	E12	±10%
M	±20%	E24	±5%
K	±10%		±2%
J	±5%	E96	±1%
H	±3%	E192	±0.5%
G	±2%		±0.25%
F	±1%		±0.1%
D	±0.5%	Note: Non-standard ohmic values are available. Consult factory for minimum order quantities	
C	±0.25%		
B	±0.1%		
A	±0.05%		
T	±0.01%		

Component Flammability					
Product Type	Polymer Type	IEC 695-2-2	UL94V Rating	Total Polymer Mass	Oxygen Index
Carbon Films					
CF18 (CFM14)	Epoxy	Meets Specification	N/A	3 mg	N/A
CF14 (CFM12)	Epoxy	Meets Specification	N/A	15 mg	N/A
CF12	Epoxy	Meets Specification	N/A	30 mg	N/A
Metal Films					
RNF18 (RNMF14)	Epoxy	Meets Specification	N/A	3 mg	N/A
RNF14 (RNMF12)	Epoxy	Meets Specification	N/A	15 mg	N/A
RNF12	Epoxy	Meets Specification	N/A	30 mg	N/A
Metal Oxides					
RSMF12	Silicone	Meets Specification	94V-0	20 mg	46 - 48%
RSMF1 (RSF12)	Silicone	Meets Specification	94V-0	30 mg	46 - 48%
RSMF2 (RSF1)	Silicone	Meets Specification	94V-0	50 mg	46 - 48%
RSMF3 (RSF2)	Silicone	Meets Specification	94V-0	130 mg	46 - 48%
RSMF5 (RSF3)	Silicone	Meets Specification	94V-0	500 mg	46 - 48%
RSF5	Silicone		94V-0	400 mg	46 - 48%
Chip Resistors					
RMCF Series	Boro-Silicated Acid Lead Glass	Meets Specification	94V-0	N/A	N/A
Chip Networks					
RACF Series	Boro-Silicated Acid Lead Glass	Meets Specification	94V-0	N/A	N/A
RAVF Series	Boro-Silicated Acid Lead Glass	Meets Specification	94V-0	N/A	N/A

Standard Color Codes



Standard Color Codes			
Band Color	Nominal	Multiplier	Tolerance (%)
Black	0	1	-
Brown	1	10	1
Red	2	100	2
Orange	3	1K	-
Yellow	4	10K	-
Green	5	100K	0.5
Blue	6	1,000K	0.25
Violet	7	-	-
Gray	8	-	-
White	9	0.001	-
Silver	-	0.01	10
Gold	-	0.1	5

Color Band Description		
Band	Precision	General Purpose
	Have three significant-figure bands, a multiplier band and a tolerance band. Tolerances 1% or less.	Have two significant-figure bands, a multiplier band and a tolerance band. Tolerances 2% or greater.
1st Band	Nominal	Nominal
2nd Band	Nominal	Nominal
3rd Band	Nominal	Multiplier
4th Band	Multiplier	Tolerance
5th Band	Tolerance	

Resistor Glossary	
Term	Definition
Ambient temperature	The ambient temperature is the temperature in the immediate environment of the resistor.
Carbon-composition	Resistor with the resistance element formed by molding a body of carbon powder mixed with a phenolic binder.
Carbon-film	Resistor whose resistance element is carbon film deposited on a ceramic core.
Climate category	Indicates the lowest and the highest ambient temperature at which the resistors may be operated continuously.
Color-band or color code	Method of indicating value and tolerance on axial leaded resistors whose body is too small for legible alphanumerical marking.
Critical resistance	The critical resistance (Rcrit) is the resistance that can be calculated from the rated dissipation Pv occurring under operating voltage Vmax. A resistor of critical resistance will exhibit the largest drift in a style, because it is the highest value that may carry the full rated power load.
Current noise	Random low frequency electrostatic noise arising from current fluctuations in parallel with the resistor.
Current sensor	A resistive device employed to sense levels of changes in current.
Derating	The power load capability of a resistor is limited by its permissible element temperature. Since the rated power dissipation is referenced to a specific ambient temperature, higher ambient temperatures require a reduced permissible load, i.e., a derating. The derating curve indicates the permissible power load as a function of the ambient temperature.
Dielectric strength (dielectric withstanding voltage)	The ultimate breakdown voltage of the dielectric or insulation of the resistor when the voltage is applied between the case and all terminals tied together. Dielectric strength is usually specified at sea level and simulated at high altitude air pressures.

Resistor Glossary (cont.)	
Term	Definition
DIP	Dual-in-line package resistor network.
E-series	Method of deriving nominal resistance values required for each tolerance level. The series E24 is comprised of 24 values per decade and applies to 2% and 5% tolerances. The series E96 applies to 1% tolerance and E192 applies to 0.1%, 0.25% and 0.5%.
Failure rate	The failure rate indicates the statistically established maximum rate of failures at a level of confidence of 60%. The figures are derived from certified results of standard endurance tests after 1000 hours duration at the rated dissipation.
Film temperature	The temperature of the resistive film is considered in discussions about power rating and pulse load capability. The film temperature determines the drift and stability of the resistor. For resistors that feature hot spots in the resistive film, the higher temperature of the hot spot is to be considered. Since most resistors are covered with lacquer or protective coating, only the surface temperature can be measured on the outside. However, the surface temperature is almost as high as the film temperature.
Fixed resistors	Resistors whose value is set in the manufacturing process.
Insulation resistance	The DC resistance measured between all terminals connected together and the case, exterior insulation, or external hardware.
Kelvin connection	Four-terminal connection required in low-resistance measurements to eliminate the effects of contact resistance and lead resistance, as well as the effects of lead temperature, providing accurate measurements. Invented by Lord Kelvin in the 19th Century.
Maximum working voltage	The maximum voltage stress (DC or rms) that may be applied to the resistor (resistance element). A function of the materials used, the required performance, and the physical dimensions.
Metal oxide	Resistor whose resistance element is a thick film ruthenium oxide paste deposited on a cylindrical ceramic core by means of dipping or spiral-coating.
Operating voltage	The limiting element voltage Vmax is the maximum voltage that may be applied continuously to the resistor, provided its resistance value is equal to or higher than the critical resistance. The limit applies to DC voltages and to AC rms voltage of undistorted sinusoidal shape.
Power rating	Maximum power in still air that will limit the resistor internal hot-spot temperature to a satisfactory level. Power ratings must be reduced as the temperature rises, so derating curves or charts are published. These parameters are application-dependent.
Pulse load capability	The pulse load capability of a resistor is its ability to withstand transient loads that considerably exceed the rated dissipation with its peak value.
Resistance temperature characteristic (coefficient)	The magnitude of change in resistance due to temperature, expressed in percent or degree centigrade or parts-per-million per degree centigrade (PPM/C). If the resistance changes are linear over the specified temperature range, the parameter is known as the temperature "coefficient". This assumption of linearity is usually made in order to ease calculations.
Resistance tolerance	The permissible deviation of the manufactured resistance value (express in percent) from the specified nominal resistance value at standard or stated environmental conditions.
Resistor	A device that converts electrical energy to thermal energy according to Ohm's Law.
Shunt	A resistive device employed to divert most of the current in an electric circuit.
SIP	Single-in-line package resistor network.
SMD	Surface mount devices. Chips and chip arrays are examples.
Solderability	Property of the termination to accept new solder in a soldering process.
Stability	Ability of a resistor to maintain its initial resistance value of extended periods of time when subjected to any combination of electrical stresses and environmental conditions.
Temperature rise	Thermal resistance that impedes the dissipation of heat from the resistor.
Thick-film	Resistor whose resistance element consists of a ruthenium oxide (also called cermet) screen printed onto a ceramic substrate and fired at a high temperature.
Variable resistors	Resistors whose value can be adjusted (trimmed) by the user, typically by means of a dial.
Voltage coefficient	A resistor has a voltage coefficient if measurements of resistance with different voltages yield different results. The voltage coefficient is the quotient of the relative difference in resistance and the difference of measuring voltage.
Wirewound	Resistor whose resistance element consists of a wire (nickel-chromium, copper-nickel, or gold-platinum) wound around a bobbin or core.
Zero-ohm resistors	Jumpers that are manufactured into resistor bodies for ease of insertion by the user.

EIA Standard Resistor Values

Codes for fixed resistors

STANDARD RESISTANCE VALUES FOR THE 10 TO 100 DECADE
(also usable in decade multiples or sub-multiples)

Resistance Tolerance (%)																								
E192	E96	E24	E12	E6	E192	E96	E24	E12	E6	E192	E96	E24	E12	E6	E192	E96	E24	E12	E6	E192	E96	E24	E12	E6
0.10% 0.25% 0.50%	1%	2% 5%	10%	20%	0.10% 0.25% 0.50%	1%	2% 5%	10%	20%	0.10% 0.25% 0.50%	1%	2% 5%	10%	20%	0.10% 0.25% 0.50%	1%	2% 5%	10%	20%	0.10% 0.25% 0.50%	1%	2% 5%	10%	20%
10.0	10.0	10	10	10	15.8	15.8	-	-	-	24.9	24.9	-	-	-	39.2	39.2	39	39	-	62.6	-	-	-	-
10.1	-	-	-	-	16.0	-	16	-	-	25.2	-	-	-	-	39.7	-	-	-	-	63.4	63.4	-	-	-
10.2	10.2	-	-	-	16.2	16.2	-	-	-	25.5	25.5	-	-	-	40.2	40.2	-	-	-	64.2	-	-	-	-
10.4	-	-	-	-	16.4	-	-	-	-	25.8	-	-	-	-	40.7	-	-	-	-	64.9	64.9	-	-	-
10.5	10.5	-	-	-	16.5	16.5	-	-	-	26.1	26.1	-	-	-	41.2	41.2	-	-	-	65.7	-	-	-	-
10.6	-	-	-	-	16.7	-	-	-	-	26.4	-	-	-	-	41.7	-	-	-	-	66.5	66.5	-	-	-
10.7	10.7	-	-	-	16.9	16.9	-	-	-	26.7	26.7	-	-	-	42.2	42.2	-	-	-	67.3	-	-	-	-
10.9	-	-	-	-	17.2	-	-	-	-	27.1	-	27	27	-	42.7	-	-	-	-	68.1	68.1	68	68	68
11.0	11.0	11	-	-	17.4	17.4	-	-	-	27.4	27.4	-	-	-	43.2	43.2	43	-	-	69.0	-	-	-	-
11.1	-	-	-	-	17.6	-	-	-	-	27.7	-	-	-	-	43.7	-	-	-	-	69.8	69.8	-	-	-
11.3	11.3	-	-	-	17.8	17.8	-	-	-	28.0	28.0	-	-	-	44.2	44.2	-	-	-	70.6	-	-	-	-
11.4	-	-	-	-	18.0	-	18	18	-	28.4	-	-	-	-	44.8	-	-	-	-	71.5	71.5	-	-	-
11.5	11.5	-	-	-	18.2	18.2	-	-	-	28.7	28.7	-	-	-	45.3	45.3	-	-	-	72.3	-	-	-	-
11.7	-	-	-	-	18.4	-	-	-	-	29.1	-	-	-	-	45.9	-	-	-	-	73.2	73.2	-	-	-
11.8	11.8	-	-	-	18.7	18.7	-	-	-	29.4	29.4	-	-	-	46.4	46.4	-	-	-	74.1	-	-	-	-
12.0	-	12	12	-	18.9	-	-	-	-	29.8	-	-	-	-	47.0	-	47	47	47	75.0	75.0	75	-	-
12.1	12.1	-	-	-	19.1	19.1	-	-	-	30.1	30.1	30	-	-	47.5	47.5	-	-	-	75.9	-	-	-	-
12.3	-	-	-	-	19.3	-	-	-	-	30.5	-	-	-	-	48.1	-	-	-	-	76.8	76.8	-	-	-
12.4	12.4	-	-	-	19.6	19.6	-	-	-	30.9	30.9	-	-	-	48.7	48.7	-	-	-	77.7	-	-	-	-
12.6	-	-	-	-	19.8	-	-	-	-	31.2	-	-	-	-	49.3	-	-	-	-	78.7	78.7	-	-	-
12.7	12.7	-	-	-	20.0	20.0	20	-	-	31.6	31.6	-	-	-	49.9	49.9	-	-	-	79.6	-	-	-	-
12.9	-	-	-	-	20.3	-	-	-	-	32.0	-	-	-	-	50.5	-	-	-	-	80.6	80.6	-	-	-
13.0	13.0	13	-	-	20.5	20.5	-	-	-	32.4	32.4	-	-	-	51.1	51.1	51	-	-	81.6	-	-	-	-
13.2	-	-	-	-	20.8	-	-	-	-	32.8	-	-	-	-	51.7	-	-	-	-	82.5	82.5	82	82	-
13.3	13.3	-	-	-	21.0	21.0	-	-	-	33.2	33.2	33	33	33	52.3	52.3	-	-	-	83.5	-	-	-	-
13.5	-	-	-	-	21.3	-	-	-	-	33.6	-	-	-	-	53.0	-	-	-	-	84.5	84.5	-	-	-
13.7	13.7	-	-	-	21.5	21.5	-	-	-	34.0	34.0	-	-	-	53.6	53.6	-	-	-	85.6	-	-	-	-
13.8	-	-	-	-	21.8	-	-	-	-	34.4	-	-	-	-	54.2	-	-	-	-	86.6	86.6	-	-	-
14.0	14.0	-	-	-	22.1	22.1	22	22	22	34.8	34.8	-	-	-	54.9	54.9	-	-	-	87.6	-	-	-	-
14.2	-	-	-	-	22.3	-	-	-	-	35.2	-	-	-	-	55.6	-	-	-	-	88.7	88.7	-	-	-
14.3	14.3	-	-	-	22.6	22.6	-	-	-	35.7	35.7	-	-	-	56.2	56.2	56	56	-	89.8	-	-	-	-
14.5	-	-	-	-	22.9	-	-	-	-	36.1	-	36	-	-	56.9	-	-	-	-	90.9	90.9	91	-	-
14.7	14.7	-	-	-	23.2	23.2	-	-	-	36.5	36.5	-	-	-	57.6	57.6	-	-	-	92.0	-	-	-	-
14.9	-	-	-	-	23.4	-	-	-	-	37.0	-	-	-	-	58.3	-	-	-	-	93.1	93.1	-	-	-
15.0	15.0	15	15	15	23.7	23.7	-	-	-	37.4	37.4	-	-	-	59.0	59.0	-	-	-	94.2	-	-	-	-
15.2	-	-	-	-	24.0	-	24	-	-	37.9	-	-	-	-	59.7	-	-	-	-	95.3	95.3	-	-	-
15.4	15.4	-	-	-	24.3	24.3	-	-	-	38.3	38.3	-	-	-	60.4	60.4	-	-	-	96.5	-	-	-	-
15.6	-	-	-	-	24.6	-	-	-	-	38.8	-	-	-	-	61.2	-	-	-	-	97.6	97.6	-	-	-
															61.9	61.9	62	-	-	98.8	-	-	-	-