



# THE DATASHEET OF AR03BTCX4991

## Data Sheet

Customer :

Product : Thin Film Precision Chip Resistor - AR Series

Size: 0201/0402/0603/0805/1206/1210/2010/2512

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| 10-Feb-22           | 10-Feb-22        | 10-Feb-22           | 10-Feb-22              |                           |
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## Thin Film Precision Chip Resistor (AR Series)



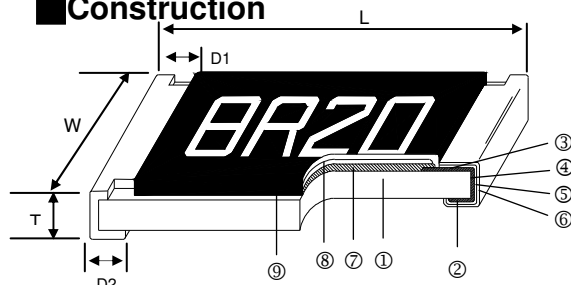
### ■ Features

- Advanced thin film technology
- Very tight tolerance down to  $\pm 0.01\%$
- Extremely low TCR down to  $\pm 1\text{PPM}/^\circ\text{C}$
- Wide resistance range 1ohm ~ 3Mega ohm
- Miniature size 0201 available

### ■ Applications

- Medical Equipment
- Testing / Measurement Equipment
- Printer Equipment
- Automatic Equipment Controller
- Converters
- Communication Device, Cell Phone, GPS, PDA

### ■ Construction



|                     |                      |                  |
|---------------------|----------------------|------------------|
| ① Alumina Substrate | ④ Edge Electrode     | ⑦ Resistor Layer |
| ② Bottom Electrode  | ⑤ Barrier Layer      | ⑧ Overcoat       |
| ③ Top Electrode     | ⑥ External Electrode | ⑨ Marking        |

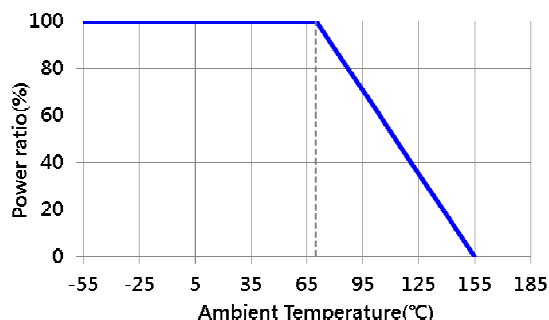
### ■ Dimensions

Unit: mm

| Type               | Size (Inch) | L               | W               | T               | D1              | D2              | Weight (g) (1000pcs) |
|--------------------|-------------|-----------------|-----------------|-----------------|-----------------|-----------------|----------------------|
| AR01               | 0201        | $0.58 \pm 0.05$ | $0.29 \pm 0.05$ | $0.23 \pm 0.05$ | $0.12 \pm 0.05$ | $0.15 \pm 0.05$ | 0.14                 |
| AR02               | 0402        | $1.00 \pm 0.05$ | $0.50 \pm 0.05$ | $0.30 \pm 0.05$ | $0.20 \pm 0.10$ | $0.20 \pm 0.10$ | 0.54                 |
| AR03               | 0603        | $1.55 \pm 0.10$ | $0.80 \pm 0.10$ | $0.45 \pm 0.10$ | $0.30 \pm 0.20$ | $0.30 \pm 0.20$ | 1.83                 |
| AR05               | 0805        | $2.00 \pm 0.15$ | $1.25 \pm 0.15$ | $0.55 \pm 0.10$ | $0.30 \pm 0.20$ | $0.40 \pm 0.20$ | 4.71                 |
| AR06               | 1206        | $3.05 \pm 0.15$ | $1.55 \pm 0.15$ | $0.55 \pm 0.10$ | $0.42 \pm 0.20$ | $0.35 \pm 0.25$ | 9.02                 |
| AR13               | 1210        | $3.10 \pm 0.15$ | $2.40 \pm 0.15$ | $0.55 \pm 0.10$ | $0.40 \pm 0.20$ | $0.55 \pm 0.25$ | 10                   |
| AR10               | 2010        | $4.90 \pm 0.15$ | $2.40 \pm 0.15$ | $0.55 \pm 0.10$ | $0.60 \pm 0.30$ | $0.50 \pm 0.25$ | 23.61                |
| AR10(1/2W)         | 2010(1/2W)  | $4.90 \pm 0.15$ | $2.40 \pm 0.15$ | $0.55 \pm 0.10$ | $0.60 \pm 0.30$ | $2.20 \pm 0.25$ | 26.68                |
| AR12               | 2512        | $6.30 \pm 0.15$ | $3.10 \pm 0.15$ | $0.55 \pm 0.10$ | $0.60 \pm 0.30$ | $0.50 \pm 0.25$ | 38.06                |
| AR12(1W)1~100Ω     | 2512(1W)    | $6.30 \pm 0.15$ | $3.10 \pm 0.15$ | $0.55 \pm 0.10$ | $0.60 \pm 0.30$ | $0.50 \pm 0.25$ | 44.65                |
| AR12(1W)101Ω above | 2512(1W)    | $6.30 \pm 0.15$ | $3.10 \pm 0.15$ | $0.55 \pm 0.10$ | $0.60 \pm 0.30$ | $2.50 \pm 0.25$ | 44.65                |

### ■ Part Numbering

| AR           | 03                                                                                           | T                                                                                                         | T                         | B                                                                                                                | Y                                                                                                                                    | 1001                                             | N                                                 |
|--------------|----------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------|---------------------------|------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------------|
| Product Type | Dimensions (L×W)                                                                             | Resistance Tolerance                                                                                      | Packaging Code            | TCR (PPM/°C)                                                                                                     | Power Rating                                                                                                                         | Resistance                                       | Marking Code                                      |
|              | 01: 0201<br>02: 0402<br>03: 0603<br>05: 0805<br>06: 1206<br>13: 1210<br>10: 2010<br>12: 2512 | T: $\pm 0.01\%$<br>A: $\pm 0.05\%$<br>B: $\pm 0.1\%$<br>C: $\pm 0.25\%$<br>D: $\pm 0.5\%$<br>F: $\pm 1\%$ | T: Taping Reel<br>B: Bulk | 5: $\pm 1$<br>X: $\pm 2$<br>O: $\pm 3$<br>S: $\pm 5$<br>B: $\pm 10$<br>N: $\pm 15$<br>C: $\pm 25$<br>D: $\pm 50$ | : Standard<br>N: 1/20W<br>Y: 1/16W<br>X: 1/10W<br>W: 1/8W<br>M: 1/6W<br>P: 1/5W<br>V: 1/4W<br>O: 1/3W<br>U: 1/2W<br>Q: 3/4W<br>T: 1W | 0010: 1Ω<br>4R70: 4.7Ω<br>1001: 1KΩ<br>1004: 1MΩ | : Standard Marking for E96 / E24<br>N: No Marking |

**Derating Curve**

**Standard Electrical Specifications**

| Item<br>Type | Power<br>Rating<br>at 70°C | Operating<br>Temp. Range | Max.<br>Operating<br>Voltage | Max.<br>Overload<br>Voltage | Resistance Range |            |        |       |     | TCR<br>(PPM/°C) |
|--------------|----------------------------|--------------------------|------------------------------|-----------------------------|------------------|------------|--------|-------|-----|-----------------|
|              |                            |                          |                              |                             | ±0.05%           | ±0.1%      | ±0.25% | ±0.5% | ±1% |                 |
| AR01 (0201)  | 1/32W                      | -55 ~ +155°C             | 15V                          | 30V                         | —                | 22Ω - 75KΩ |        |       |     | ±25, ±50        |
| AR02 (0402)  | 1/16W                      | -55 ~ +155°C             | 50V                          | 100V                        | 49.9Ω - 12KΩ     | 4Ω - 511KΩ |        |       |     | ±25, ±50        |
| AR03 (0603)  | 1/16W                      | -55 ~ +155°C             | 50V                          | 100V                        | 4.7Ω - 332KΩ     | 1Ω - 1MΩ   |        |       |     | ±25, ±50        |
| AR05 (0805)  | 1/10W                      | -55 ~ +155°C             | 100V                         | 200V                        | 4.7Ω - 1MΩ       | 1Ω - 2MΩ   |        |       |     | ±25, ±50        |
| AR06 (1206)  | 1/8W                       | -55 ~ +155°C             | 150V                         | 300V                        | 4.7Ω - 1MΩ       | 1Ω - 2.5MΩ |        |       |     | ±25, ±50        |
| AR13 (1210)  | 1/4W                       |                          |                              |                             |                  |            |        |       |     |                 |
| AR10 (2010)  | 1/4W                       | -55 ~ +155°C             | 150V                         | 300V                        | 4.7Ω - 1MΩ       | 1Ω - 3MΩ   |        |       |     | ±25, ±50        |
| AR12 (2512)  | 1/2W                       |                          |                              |                             |                  |            |        |       |     |                 |

■ Lower Resistance: 1~10Ω

**Special Electrical Specifications**

| Type        | Item  | Power Rating at 70°C | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range |               |       |        |          |           | TCR (PPM/°C) |
|-------------|-------|----------------------|-----------------------|------------------------|-----------------------|------------------|---------------|-------|--------|----------|-----------|--------------|
|             |       |                      |                       |                        |                       | ±0.01%           | ±0.05%        | ±0.1% | ±0.25% | ±0.5%    | ±1%       |              |
| AR02 (0402) | 1/16W | -55 ~ +155°C         | 50V                   | 100V                   | 49.9Ω - 4.99KΩ        |                  |               | —     |        |          | ±1, ±2,±3 |              |
|             |       |                      |                       |                        | 49.9Ω - 20KΩ          |                  |               |       |        |          | ±5        |              |
|             |       |                      |                       |                        | 49.9Ω - 20KΩ          |                  | 49.9Ω - 100KΩ |       |        |          | ±10, ±15  |              |
| AR03 (0603) | 1/16W | -55 ~ +155°C         | 50V                   | 100V                   | 24.9Ω - 15KΩ          |                  |               | —     |        |          | ±1, ±2,±3 |              |
|             |       |                      |                       |                        | 24.9Ω - 60KΩ          |                  |               |       |        |          | ±5        |              |
|             |       |                      |                       |                        | 24.9Ω - 100KΩ         | 4.7Ω-332KΩ       | 4.7Ω - 511KΩ  |       |        |          | ±10, ±15  |              |
| AR05 (0805) | 1/10W | -55 ~ +155°C         | 100V                  | 200V                   | 24.9Ω - 30KΩ          |                  |               | —     |        |          | ±1, ±2,±3 |              |
|             |       |                      |                       |                        | 24.9Ω - 150KΩ         |                  |               |       |        |          | ±5        |              |
|             |       |                      |                       |                        | 24.9Ω - 200KΩ         | 4.7Ω – 1MΩ       |               |       |        | ±10, ±15 |           |              |
| AR06 (1206) | 1/8W  | -55 ~ +155°C         | 150V                  | 300V                   | 24.9Ω - 49.9KΩ        |                  |               | —     |        |          | ±1, ±2,±3 |              |
|             |       |                      |                       |                        | 24.9Ω - 300KΩ         |                  |               |       |        |          | ±5        |              |
|             |       |                      |                       |                        | 24.9Ω - 499KΩ         | 4.7Ω – 1.5MΩ     |               |       |        | ±10, ±15 |           |              |
| AR13 (1210) | 1/ 4W | -55 ~ +155°C         | 150V                  | 300V                   | 24.9Ω - 49.9KΩ        |                  |               | —     |        |          | ±1, ±2,±3 |              |
|             |       |                      |                       |                        | 24.9Ω - 300KΩ         |                  |               |       |        |          | ±5        |              |
|             |       |                      |                       |                        | 24.9Ω - 499KΩ         | 4.7Ω - 1MΩ       |               |       |        | ±10, ±15 |           |              |
| AR10 (2010) | 1/4W  | -55 ~ +155°C         | 150V                  | 300V                   | 24.9Ω - 100KΩ         |                  |               | —     |        |          | ±1, ±2,±3 |              |
|             |       |                      |                       |                        | 24.9Ω - 300KΩ         |                  |               |       |        |          | ±5        |              |
|             |       |                      |                       |                        | 24.9Ω - 499KΩ         | 4.7Ω - 1MΩ       |               |       |        | ±10, ±15 |           |              |
| AR12 (2512) | 1/2W  | -55 ~ +155°C         | 150V                  | 300V                   | 24.9Ω - 100KΩ         |                  |               | —     |        |          | ±1, ±2,±3 |              |
|             |       |                      |                       |                        | 24.9Ω - 300KΩ         |                  |               |       |        |          | ±5        |              |
|             |       |                      |                       |                        | 24.9Ω - 499KΩ         | 4.7Ω - 1MΩ       |               |       |        | ±10, ±15 |           |              |

**High Power Rating Electrical Specifications**

| Item<br>Type   | Power<br>Rating<br>at 70°C | Operating<br>Temp.<br>Range | Max.<br>Operating<br>Voltage | Max.<br>Overload<br>Voltage | Resistance Range |              |              |               |         |          | TCR<br>(PPM/°C) |
|----------------|----------------------------|-----------------------------|------------------------------|-----------------------------|------------------|--------------|--------------|---------------|---------|----------|-----------------|
|                |                            |                             |                              |                             | ±0.01%           | ±0.05%       | ±0.1%        | ±0.25%        | ±0.5%   | ±1%      |                 |
| AR01<br>(0201) | 1/20W                      | -55 ~ +155°C                | 25V                          | 50V                         | —                |              |              | 22Ω - 75KΩ    |         |          | ±25,±50         |
| AR02<br>(0402) | 1/10W                      | -55 ~ +155°C                | 50V                          | 100V                        | 49.9Ω - 4.99KΩ   |              |              | —             |         |          | ±1, ±2,±3       |
|                |                            |                             |                              |                             | 49.9Ω - 20KΩ     |              |              |               |         |          | ±5              |
|                |                            |                             |                              |                             | 49.9Ω - 12KΩ     |              |              | 49.9Ω - 100KΩ |         |          | ±10, ±15        |
|                |                            |                             |                              |                             | —                | 49.9Ω - 12KΩ |              | 4.7Ω ~255KΩ   |         |          | ±25,±50         |
| AR03<br>(0603) | 1/10W                      | -55 ~ +155°C                | 75V                          | 150V                        | 24.9Ω - 15KΩ     |              |              | —             |         |          | ±1, ±2,±3       |
|                |                            |                             |                              |                             | 24.9Ω - 60KΩ     |              |              |               |         |          | ±5              |
|                |                            |                             |                              |                             | 24.9Ω -<br>100KΩ | 4.7Ω - 332KΩ | 4.7Ω - 511KΩ |               |         | ±10,±15  |                 |
|                | 1Ω -1MΩ                    |                             |                              | ±25,±50                     |                  |              |              |               |         |          |                 |
|                | 1/6W                       | -55 ~ +155°C                | 100V                         | 150V                        | —                | 10Ω - 332KΩ  |              |               |         |          | ±25,±50         |
| AR05<br>(0805) | 1/8W                       | -55 ~ +155°C                | 150V                         | 300V                        | 24.9Ω - 30KΩ     |              |              | —             |         |          | ±1, ±2,±3       |
|                |                            |                             |                              |                             | 24.9Ω -150KΩ     |              |              |               |         |          | ±5              |
|                |                            |                             |                              |                             | 24.9Ω -<br>200KΩ | 4.7Ω -511KΩ  | 4.7Ω -1MΩ    |               |         | ±10, ±15 |                 |
|                | 1Ω - 1MΩ                   |                             |                              | ±25,±50                     |                  |              |              |               |         |          |                 |
|                | 1/4W                       | -55 ~ +155°C                | 150V                         | 300V                        | —                | 10Ω - 499KΩ  |              |               |         |          | ±25,±50         |
| AR06<br>(1206) | 1/4W                       | -55 ~ +155°C                | 200V                         | 400V                        | 24.9Ω - 49.9KΩ   |              |              | —             |         |          | ±1, ±2,±3       |
|                |                            |                             |                              |                             | 24.9Ω - 300KΩ    |              |              |               |         |          | ±5              |
|                |                            |                             |                              |                             | 24.9Ω -<br>499KΩ | 4.7Ω - 1MΩ   |              |               | ±10,±15 |          |                 |
|                | 1Ω - 1MΩ                   |                             |                              | ±25,±50                     |                  |              |              |               |         |          |                 |
|                | 1/3W                       | -55 ~ +155°C                | 200V                         | 400V                        | —                | 10Ω ~1MΩ     |              |               |         |          | ±25,±50         |
| AR13<br>(1210) | 1/ 3W                      | -55 ~ +155°C                | 200V                         | 400V                        | 24.9Ω – 49.9KΩ   |              |              | —             |         |          | ±1, ±2,±3       |
|                |                            |                             |                              |                             | 24.9Ω - 300KΩ    |              |              |               |         |          | ±5              |
|                |                            |                             |                              |                             | 24.9Ω -<br>499KΩ | 4.7Ω - 1MΩ   |              |               | ±10,±15 |          |                 |
|                |                            |                             |                              |                             |                  | 1Ω - 1MΩ     |              |               | ±25,±50 |          |                 |
| AR10(2010)     | 1/3W                       | -55 ~ +155°C                | 200V                         | 400V                        | 24.9Ω - 49.9KΩ   |              |              | —             |         |          | ±1, ±2,±3       |
|                |                            |                             |                              |                             | 24.9Ω - 300KΩ    |              |              |               |         |          | ±5              |
|                |                            |                             |                              |                             | 24.9Ω -<br>499KΩ | 4.7Ω - 1MΩ   |              |               | ±10,±15 |          |                 |
|                | 1Ω - 1MΩ                   |                             |                              | ±25,±50                     |                  |              |              |               |         |          |                 |
|                | 1/2W                       | -55 ~ +155°C                | 200V                         | 400V                        | 24.9Ω - 2KΩ      | 4.7Ω –1MΩ    |              | 1Ω –1MΩ       |         |          | ±10,±15,±25,±50 |
| AR12(2512)     | 3/4W                       | -55 ~ +155°C                | 200V                         | 400V                        | 24.9Ω - 2KΩ      | 4.7Ω – 2KΩ   |              | 1Ω – 2KΩ      |         |          | ±10,±15,±25,±50 |
|                | 1W                         | -55 ~ +155°C                | 200V                         | 400V                        | 24.9Ω - 2KΩ      | 4.7Ω –1MΩ    |              | 1Ω –1MΩ       |         |          | ±10,±15,±25,±50 |

 Operating Voltage= $\sqrt{P \cdot R}$  or Max. operating voltage listed above, whichever is lower.

 Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$  or Max. overload voltage listed above, whichever is lower.

■Viking is capable of manufacturing the optional spec based on customer's requirement.

(Lower Resistance:1~10Ω ; High Power Rating)

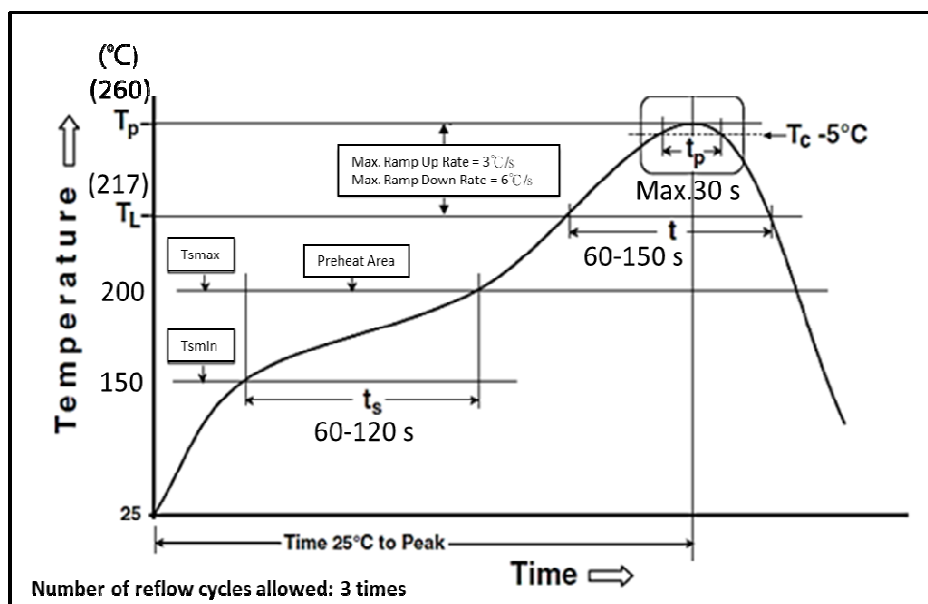
**■ Environmental Characteristics**

| Item                                           | Requirement                         |              | Test Method                                                                                           |
|------------------------------------------------|-------------------------------------|--------------|-------------------------------------------------------------------------------------------------------|
|                                                | Tol. ≤ 0.05%                        | Tol. > 0.05% |                                                                                                       |
| Temperature Coefficient of Resistance (T.C.R.) | As Spec.                            |              | MIL-STD-202 Method 304<br>+25/-55/+25/+125/+25°C                                                      |
| Short Time Overload                            | ΔR±0.05%                            | ΔR±0.2%      | JIS-C-5201-1 4.13<br>RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds               |
|                                                | ΔR±0.2% for high power rating       |              |                                                                                                       |
| Insulation Resistance                          | >9999 MΩ                            |              | MIL-STD-202 Method 302<br>Apply 100V <sub>DC</sub> for 1 minute                                       |
| Endurance                                      | ΔR±0.05%                            | ΔR±0.2%      | MIL-STD-202 Method 108A<br>70±2°C, RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hrs “OFF”              |
|                                                | ΔR±0.5% for high power rating       |              |                                                                                                       |
|                                                | 0201: >7kΩ →ΔR±0.5%<br>≤7kΩ→ΔR±0.2% |              |                                                                                                       |
| Damp Heat with Load                            | ΔR±0.05%                            | ΔR±0.3%      | MIL-STD-202 Method 103B<br>40±2°C, 90~95% R.H. RCWV for 1000 hrs with 1.5 hrs “ON” and 0.5 hrs “OFF”  |
|                                                | ΔR±0.5% for high power rating       |              |                                                                                                       |
| Bending Strength                               | ΔR±0.05%                            | ΔR±0.1%      | JIS-C-5201-1 4.33<br>Bending amplitude 3 mm for 60 seconds<br>2010 2512 sizes: 2 mm Other sizes: 3 mm |
| Solderability                                  | 95% min. coverage                   |              | MIL-STD-202 Method 208H<br>245±5°C for 3 seconds                                                      |
| Resistance to Soldering Heat                   | ΔR±0.05%                            | ΔR±0.1%      | MIL-STD-202 Method 210E<br>260±5°C for 10 seconds                                                     |
| Dielectric Withstand Voltage                   | By Type                             |              | MIL-STD-202 Method 301<br>Max. overload voltage for 1 minute                                          |
| Low Temperature Operation                      | ΔR±0.05%                            | ΔR±0.2%      | JIS-C-5201-1 4.36<br>1 hour, -65°C, followed by 45 minutes of RCWV                                    |
|                                                | ΔR±0.5% for high power rating       |              |                                                                                                       |
| High Temperature Exposure                      | ΔR±0.5%                             |              | MIL-STD-202 Method 108<br>at +155°C for 1000 hrs                                                      |

RCWV(Rated continuous working voltage)=  $\sqrt{P \cdot R}$  or Max. Operating voltage whichever is lower

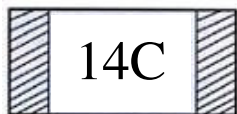
■ **Storage Temperature: 15~28°C; Humidity < 80%RH**

■ **Shelf Life: 2 years from production date.**

**■ Soldering Condition(IPC/JEDEC J-STD-020)**


## ■ Marking

0603 3digit marking



3digit marking for Example: 14C=13K7Ω 13C=13K3Ω

68B=4K99Ω 68X=49.9Ω

Marking Table

| Code       | E96             |                 | Code            | E96             |                 | Code            | E96             |                 | Code             | E96              |                  |
|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|
| 01         | 100             |                 | 25              | 178             |                 | 49              | 316             |                 | 73               | 562              |                  |
| 02         | 102             |                 | 26              | 182             |                 | 50              | 324             |                 | 74               | 576              |                  |
| 03         | 105             |                 | 27              | 187             |                 | 51              | 332             |                 | 75               | 590              |                  |
| 04         | 107             |                 | 28              | 191             |                 | 52              | 340             |                 | 76               | 604              |                  |
| 05         | 110             |                 | 29              | 196             |                 | 53              | 348             |                 | 77               | 619              |                  |
| 06         | 113             |                 | 30              | 200             |                 | 54              | 357             |                 | 78               | 634              |                  |
| 07         | 115             |                 | 31              | 205             |                 | 55              | 365             |                 | 79               | 649              |                  |
| 08         | 118             |                 | 32              | 210             |                 | 56              | 374             |                 | 80               | 665              |                  |
| 09         | 121             |                 | 33              | 215             |                 | 57              | 383             |                 | 81               | 681              |                  |
| 10         | 124             |                 | 34              | 221             |                 | 58              | 392             |                 | 82               | 698              |                  |
| 11         | 127             |                 | 35              | 226             |                 | 59              | 402             |                 | 83               | 715              |                  |
| 12         | 130             |                 | 36              | 232             |                 | 60              | 412             |                 | 84               | 732              |                  |
| 13         | 133             |                 | 37              | 237             |                 | 61              | 422             |                 | 85               | 750              |                  |
| 14         | 137             |                 | 38              | 243             |                 | 62              | 432             |                 | 86               | 768              |                  |
| 15         | 140             |                 | 39              | 249             |                 | 63              | 442             |                 | 87               | 787              |                  |
| 16         | 143             |                 | 40              | 255             |                 | 64              | 453             |                 | 88               | 806              |                  |
| 17         | 147             |                 | 41              | 261             |                 | 65              | 464             |                 | 89               | 825              |                  |
| 18         | 150             |                 | 42              | 267             |                 | 66              | 475             |                 | 90               | 845              |                  |
| 19         | 154             |                 | 43              | 274             |                 | 67              | 487             |                 | 91               | 866              |                  |
| 20         | 158             |                 | 44              | 280             |                 | 68              | 499             |                 | 92               | 887              |                  |
| 21         | 162             |                 | 45              | 287             |                 | 69              | 511             |                 | 93               | 909              |                  |
| 22         | 165             |                 | 46              | 294             |                 | 70              | 523             |                 | 94               | 931              |                  |
| 23         | 169             |                 | 47              | 301             |                 | 71              | 536             |                 | 95               | 953              |                  |
| 24         | 174             |                 | 48              | 309             |                 | 72              | 549             |                 | 96               | 976              |                  |
| Code       | A               | B               | C               | D               | E               | F               | G               | H               | X                | Y                | Z                |
| Multiplier | 10 <sup>0</sup> | 10 <sup>1</sup> | 10 <sup>2</sup> | 10 <sup>3</sup> | 10 <sup>4</sup> | 10 <sup>5</sup> | 10 <sup>6</sup> | 10 <sup>7</sup> | 10 <sup>-1</sup> | 10 <sup>-2</sup> | 10 <sup>-3</sup> |

0603 3digit marking for E24

Example: 101=100Ω 102=1KΩ

|     |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |    |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|
| E24 | 10 | 11 | 12 | 13 | 15 | 16 | 18 | 20 | 22 | 24 | 27 | 30 | 33 | 36 | 39 | 43 | 47 | 51 | 56 | 62 | 68 | 75 | 82 | 91 |
|-----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|

0805~2512 4digit marking

Example

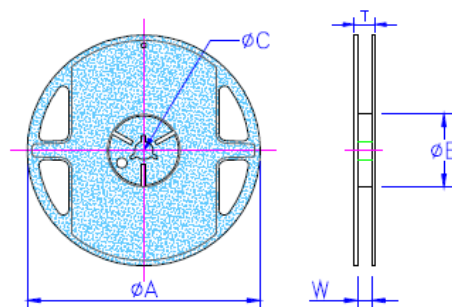
|            |      |       |      |        |       |
|------------|------|-------|------|--------|-------|
| Resistance | 100Ω | 2.2KΩ | 10KΩ | 49.9KΩ | 100KΩ |
| marking    | 1000 | 2201  | 1002 | 4992   | 1003  |

## ■ Packaging

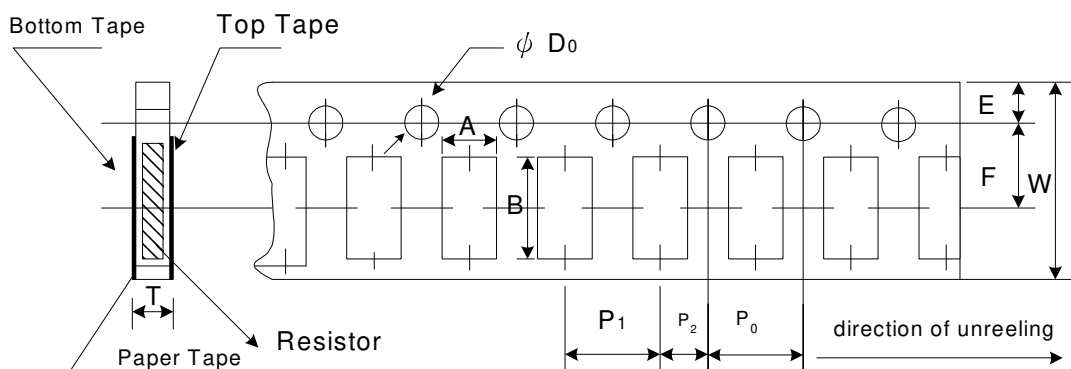
### Packing Quantity & Reel Specifications

Unit : mm

| Type | ØA        | ØB       | ØC       | W        | T        | Paper Tape (EA) | Emboss Plastic Tape (EA) |
|------|-----------|----------|----------|----------|----------|-----------------|--------------------------|
| AR01 | 178.0±1.0 | 60.0±1.0 | 13.5±0.7 | 9.5±1.0  | 11.5±1.0 | 10,000          | -                        |
| AR02 | 178.0±1.0 | 60.0±1.0 | 13.5±0.7 | 9.5±1.0  | 11.5±1.0 | 10,000          | -                        |
| AR03 | 178.0±1.0 | 60.0±1.0 | 13.5±0.7 | 9.5±1.0  | 11.5±1.0 | 5,000           | -                        |
| AR05 | 178.0±1.0 | 60.0±1.0 | 13.5±0.7 | 9.5±1.0  | 11.5±1.0 | 5,000           | -                        |
| AR06 | 178.0±1.0 | 60.0±1.0 | 13.5±0.7 | 9.5±1.0  | 11.5±1.0 | 5,000           | -                        |
| AR13 | 178.0±1.0 | 60.0±1.0 | 13.5±0.7 | 9.5±1.0  | 11.5±1.0 | 5,000           | -                        |
| AR10 | 178.0±1.0 | 60.0±1.0 | 13.5±0.7 | 13.5±1.0 | 15.5±1.0 | -               | 4,000                    |
| AR12 | 178.0±1.0 | 60.0±1.0 | 13.5±0.7 | 13.5±1.0 | 15.5±1.0 | -               | 4,000                    |



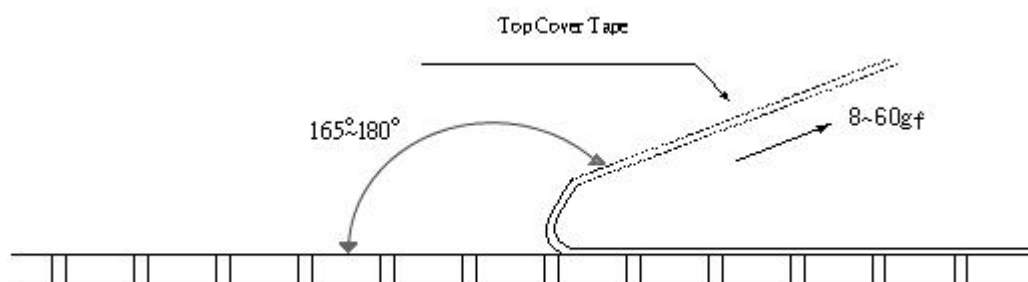
### Paper Tape Specifications



Unit: mm

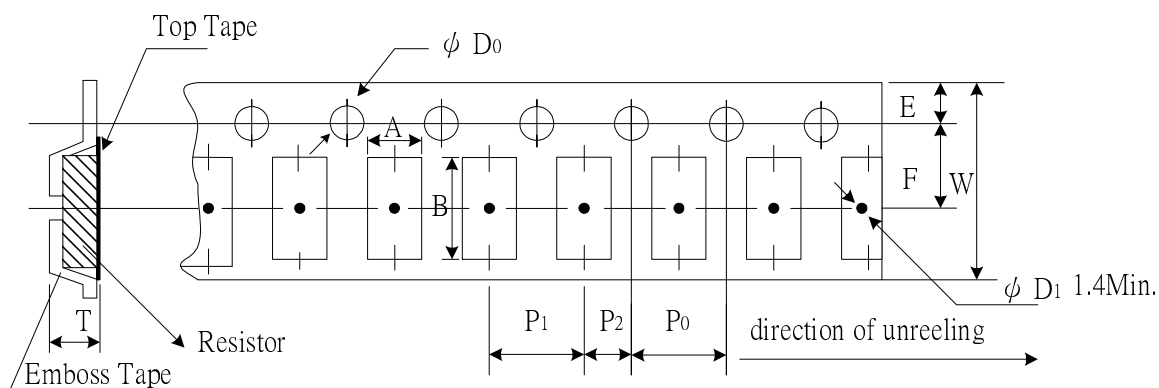
| Type | A         | B         | W         | E         | F        | P <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> | ΦD <sub>0</sub> | T         |
|------|-----------|-----------|-----------|-----------|----------|----------------|----------------|----------------|-----------------|-----------|
| AR01 | 0.40±0.05 | 0.70±0.05 | 8.00±0.10 | 1.75±0.05 | 3.5±0.05 | 4.00±0.10      | 2.00±0.05      | 2.00±0.05      | 1.55±0.03       | 0.42±0.02 |
| AR02 | 0.70±0.05 | 1.16±0.05 | 8.00±0.10 | 1.75±0.05 | 3.5±0.05 | 4.00±0.10      | 2.00±0.05      | 2.00±0.05      | 1.55±0.05       | 0.40±0.03 |
| AR03 | 1.10±0.05 | 1.90±0.05 | 8.00±0.10 | 1.75±0.05 | 3.5±0.05 | 4.00±0.10      | 4.00±0.10      | 2.00±0.05      | 1.55±0.05       | 0.60±0.03 |
| AR05 | 1.60±0.05 | 2.37±0.05 | 8.00±0.10 | 1.75±0.05 | 3.5±0.05 | 4.00±0.10      | 4.00±0.10      | 2.00±0.05      | 1.55±0.05       | 0.75±0.05 |
| AR06 | 2.00±0.05 | 3.55±0.05 | 8.00±0.10 | 1.75±0.05 | 3.5±0.05 | 4.00±0.10      | 4.00±0.10      | 2.00±0.05      | 1.55±0.05       | 0.75±0.05 |
| AR13 | 2.75±0.05 | 3.40±0.05 | 8.00±0.10 | 1.75±0.05 | 3.5±0.05 | 4.00±0.05      | 4.00±0.10      | 2.00±0.05      | 1.60±0.10       | 0.75±0.05 |

- Peel force of top cover tape
- The peel speed shall be about 300mm/min±5%
- The peel force of top cover tape shall be between 8gf to 60gf





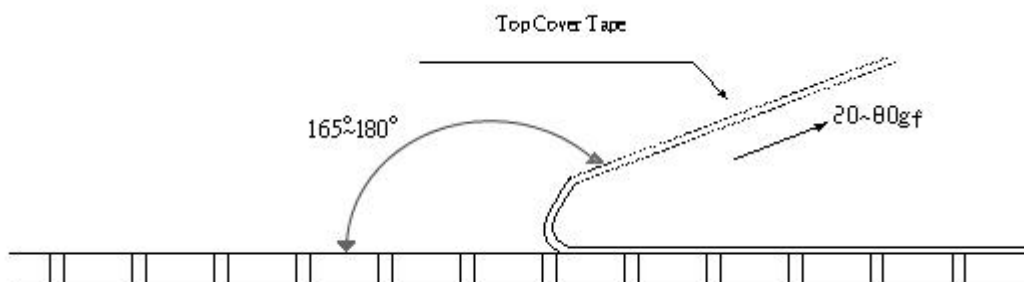
Emboss Plastic Tape Specifications



Unit: mm

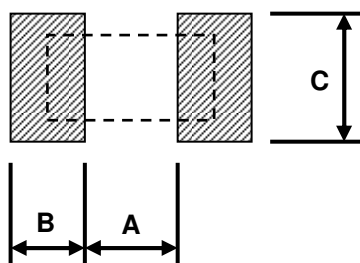
| Type | A         | B         | W         | E         | F        | P <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> | ØD <sub>0</sub> | T         |
|------|-----------|-----------|-----------|-----------|----------|----------------|----------------|----------------|-----------------|-----------|
| AR10 | 2.85±0.10 | 5.45±0.10 | 12.0±0.10 | 1.75±0.10 | 5.5±0.05 | 4.00±0.05      | 4.00±0.10      | 2.00±0.05      | 1.50±0.10       | 1.00±0.20 |
| AR12 | 3.40±0.10 | 6.65±0.10 | 12.0±0.10 | 1.75±0.10 | 5.5±0.05 | 4.00±0.05      | 4.00±0.10      | 2.00±0.05      | 1.50±0.10       | 1.00±0.20 |

- Peel force of top cover tape
- The peel speed shall be about 300mm/min±5%
- The peel force of top cover tape shall be between 20gf to 80gf



■ Recommend Land Pattern

Unit: mm



| Type                | A    | B    | C        |
|---------------------|------|------|----------|
| AR01                | 0.25 | 0.30 | 0.40±0.2 |
| AR02                | 0.50 | 0.50 | 0.60±0.2 |
| AR03                | 0.80 | 1.00 | 0.90±0.2 |
| AR05                | 1.00 | 1.00 | 1.35±0.2 |
| AR06                | 2.00 | 1.15 | 1.70±0.2 |
| AR13                | 2.00 | 1.15 | 2.50±0.2 |
| AR10                | 3.60 | 1.40 | 2.50±0.2 |
| AR10(1/2W)          | 1.00 | 2.70 | 2.50±0.2 |
| AR12                | 4.90 | 1.60 | 3.10±0.2 |
| AR12(1W) 1~100Ω     | 4.90 | 1.60 | 3.10±0.2 |
| AR12(1W) 101Ω above | 1.00 | 3.55 | 3.10±0.2 |

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