

Data Sheet

Customer :

Product : Thin Film Precision Chip Resistor - AR Series

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

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Edition : REV.F



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|---------------------|------------------|---------------------|------------------------|---------------------------|
| 27-Apr-20 | 27-Apr-20 | 27-Apr-20 | 27-Apr-20 | |
| Chun | Ben Chang | Ben Chang | | |

Thin Film Precision Chip Resistor (AR Series)

■ Features

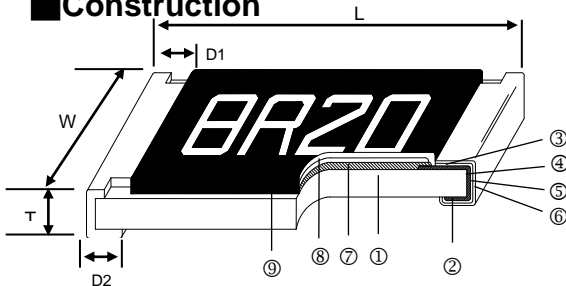
- Advanced thin film technology
- Very tight tolerance down to $\pm 0.01\%$
- Extremely low TCR down to $\pm 1\text{PPM}/^\circ\text{C}$
- Wide resistance range 1ohm ~ 3Mega ohm
- Miniature size 0201 available

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

Derating Curve



Standard Electrical Specifications

| Item Type | Power Rating at 70°C | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range | | | | | TCR (PPM/°C) | |
|--------------|----------------------|-----------------------|------------------------|-----------------------|------------------|--------------|--------|-------|-----|--------------|---------|
| | | | | | ±0.05% | ±0.1% | ±0.25% | ±0.5% | ±1% | | |
| AR01 (0201) | 1/32W | -55 ~ +155°C | 15V | 30V | — | 49.9Ω - 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 | | | | | | | | | | |
| AR12 (2512) | 1/2W | -55 ~ +155°C | 150V | 300V | 4.7Ω - 1MΩ | 1Ω - 3MΩ | | | | | ±25,±50 |

■ Lower Resistance: 1~10Ω

Special Electrical Specifications

| Item Type | 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 Type | 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% | |
| AR01 (0201) | 1/20W | -55 ~ +155°C | 25V | 50V | — | | 5KΩ - 75KΩ | | | | ±25,±50 |
| AR02 (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 (0603) | 1/10W | -55 ~ +155°C | 75V | 150V | 24.9Ω - 15KΩ | | | — | | | ±1, ±2,±3 |
| | | | | | 24.9Ω - 60KΩ | | | | | | ±5 |
| | | | | | 24.9Ω - 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 (0805) | 1/8W | -55 ~ +155°C | 150V | 300V | 24.9Ω - 30KΩ | | | — | | | ±1, ±2,±3 |
| | | | | | 24.9Ω -150KΩ | | | | | | ±5 |
| | | | | | 24.9Ω - 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 (1206) | 1/4W | -55 ~ +155°C | 200V | 400V | 24.9Ω - 49.9KΩ | | | — | | | ±1, ±2,±3 |
| | | | | | 24.9Ω - 300KΩ | | | | | | ±5 |
| | | | | | 24.9Ω - 499KΩ | 4.7Ω - 1MΩ | | | ±10,±15 | | |
| | 1Ω - 1MΩ | | | ±25,±50 | | | | | | | |
| 1/3W | -55 ~ +155°C | 200V | 400V | — | 10Ω ~1MΩ | | | | ±25,±50 | | |
| AR13 (1210) | 1/ 3W | -55 ~ +155°C | 200V | 400V | 24.9Ω - 49.9KΩ | | | — | | | ±1, ±2,±3 |
| | | | | | 24.9Ω - 300KΩ | | | | | | ±5 |
| | | | | | 24.9Ω - 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 - 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)

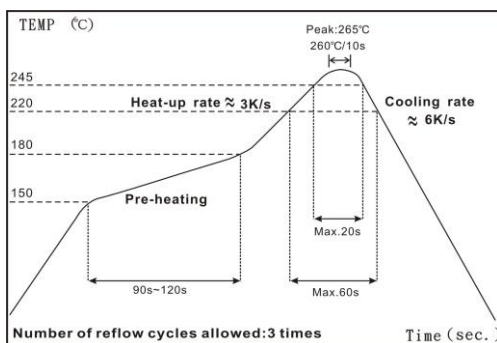
Environmental Characteristics

| Item | Requirement | | Test Method |
|--|--|--------------|--|
| | Tol. ≤ 0.05% | Tol. > 0.05% | |
| Temperature Coefficient of Resistance (T.C.R.) | As Spec. | | MIL-STD-202 Method 304 +25/-55/+25/+125/+25°C |
| Short Time Overload | ΔR±0.05% | ΔR±0.2% | JIS-C-5201-1 4.13 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 Apply 100V _{DC} for 1 minute |
| Endurance | ΔR±0.05% | ΔR±0.2% | MIL-STD-202 Method 108A 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% ≤7kΩ → ΔR±0.2% | | |
| Damp Heat with Load | ΔR±0.05% | ΔR±0.3% | MIL-STD-202 Method 103B 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 Bending amplitude 3 mm for 10 seconds 2010 2512 sizes: 2 mm Other sizes: 3 mm |
| Solderability | 95% min. coverage | | MIL-STD-202 Method 208H 245±5°C for 3 seconds |
| Resistance to Soldering Heat | ΔR±0.05% | ΔR±0.1% | MIL-STD-202 Method 210E 260±5°C for 10 seconds |
| Dielectric Withstand Voltage | By Type | | MIL-STD-202 Method 301 Max. overload voltage for 1 minute |
| Low Temperature Operation | ΔR±0.05% | ΔR±0.2% | JIS-C-5201-1 4.36 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 at +155°C for 1000 hrs |

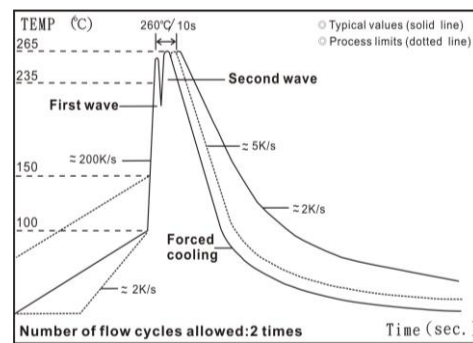
RCWV(Rated continuous working voltage)= $\sqrt{P \cdot R}$ or Max. Operating voltage whichever is lower

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

Soldering Condition



IR Reflow Soldering



Wave Soldering (Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s

■ 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 ⁰ | 10 ¹ | 10 ² | 10 ³ | 10 ⁴ | 10 ⁵ | 10 ⁶ | 10 ⁷ | 10 ⁻¹ | 10 ⁻² | 10 ⁻³ |

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 ₀ | P ₁ | P ₂ | ΦD ₀ | 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



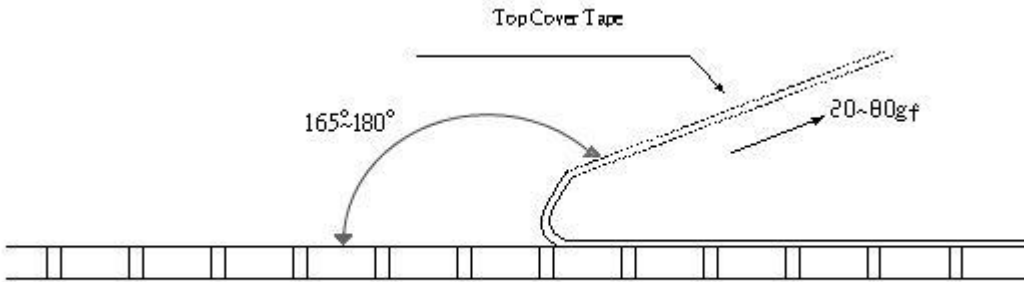
Emboss Plastic Tape Specifications



Unit: mm

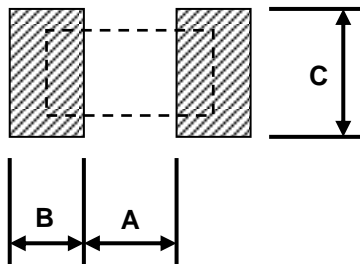
| Type | A | B | W | E | F | P ₀ | P ₁ | P ₂ | ØD ₀ | T |
|------|-----------|-----------|-----------|-----------|----------|----------------|----------------|----------------|-----------------|-----------|
| AR10 | 2.85±0.10 | 5.45±0.10 | 12.0±0.10 | 1.75±0.10 | 5.5±0.05 | 4.00±0.05 | 4.00±0.10 | 2.00±0.05 | 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) | 1.00 | 3.55 | 3.10±0.2 |

REVISION HISTORY

| <u>REVISION</u> | <u>DATE</u> | <u>CHANGE NOTIFICATION</u> | <u>DESCRIPTION</u> |
|------------------------|--------------------|-----------------------------------|--|
| Version D3 | Jan. 14, 2013 | - | <ul style="list-style-type: none">- Add resistance range for Special Electrical and High Power Rating Electrical Specifications.- Adjust the mockup. |
| Version D4 | Apr. 10, 2013 | - | <ul style="list-style-type: none">- Add "RCWV" description in Environment Characteristic Test Method. |
| Version D5 | Oct. 16, 2013 | - | <ul style="list-style-type: none">- Increase the resistance range of AR05, TCR15 product. |
| Version D6 | Oct. 17, 2014 | - | <ul style="list-style-type: none">- Correct the specification of top cover tape peel force.- Update the resistance range of AR05 (Standard) to 4.7Ω -1MΩ |
| Version D7 | Apr. 28, 2015 | - | <ul style="list-style-type: none">- Add TCR ±2ppm and ±3ppm products specification.- Increase the resistance range of the products below:<ul style="list-style-type: none">• AR02 and AR03 of Standard Electrical Specifications.• AR02, AR03 and AR05 of Special Electrical Specifications.- Correct the element of Top Electrode. |
| Version D8 | May. 02, 2016 | - | <ul style="list-style-type: none">- Modify Storage Temperature. |
| Version D9 | Aug.04, 2016 | - | <ul style="list-style-type: none">- Update items and requirements of Environmental Characteristics.- Increase the resistance range of Special Electrical Specifications products. |
| Version E | Dec.14, 2016 | - | <ul style="list-style-type: none">- Add AR02 High Power Rating Electrical Specifications. |

REVISION HISTORY

| REVISION | DATE | CHANGE NOTIFICATION | DESCRIPTION |
|-----------------|---------------|----------------------------|---|
| Version E1 | Feb. 23, 2017 | - | - Increase the resistance range of AR02 Standard Electrical Specifications. |
| Version E2 | Apr. 05, 2017 | - | - Add TCR ± 1 ppm and products specification. |
| Version E3 | Nov.10, 2017 | - | - Correct the reference standard in Environmental Characteristics. |
| Version E4 | Dec.26, 2017 | - | - Correct the reference standard in Environmental Characteristics. |
| Version E5 | Feb. 06, 2018 | - | - Correct the reference standard in Environmental Characteristics. |
| Version E6 | Jul. 24, 2018 | - | - Update Environment Characteristics item. |
| Version E7 | May. 02,2019 | - | - Increase the AR01 0.1% & 0.25% Precision resistance. |
| Version E8 | Oct. 29,2019 | - | - Increase the resistance range of Standard, Special and High Power Rating Electrical Specifications. |
| Version E9 | Jan. 07,2020 | - | <ul style="list-style-type: none"> - Define the Dimensions specifications for AR10(1/2W) and AR12(1W). - Add the part number code "N" for 1/20W Power rating. - Extend the resistance range of AR01 (Standard Electrical Specifications). - Add products specifications for AR01(1/20W) and AR10(1/2W). - Update products specifications for AR12(1W). - Define the Recommend Land Pattern for AR10(1/2W) and AR12(1W). |
| Version F | Apr. 27,2020 | - | <ul style="list-style-type: none"> - Modify the Max. Operating Voltage of AR02 from 25V to 50V. - Modify the Max. Overload Voltage of AR02 from 50V to 100V. - Correct Recommend Land Pattern Dimension A/B of AR10(1/2W) from 0.5mm/2.8mm to 1.00mm/2.70mm. |

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