

Data Sheet

Customer :

Product : Thin Film Chip Resistor - ARG Series

Size: 0402/0603/0805/1206

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Edition : REV. A5



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|---------------------|------------------|---------------------|------------------------|---------------------------|
| 22-May-19 | 22-May-19 | 22-May-19 | | |
| Chun | Ben Chang | Ben Chang | | |

Thin Film Chip Resistor (ARG Series)

■ Features

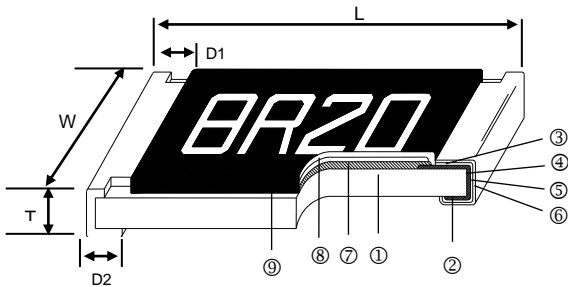
- Advanced thin film technology
- SMD Type designed for automatic insertion
- Wide resistance range 1ohm ~ 2.49Mega ohm

■ Applications

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



■ Construction



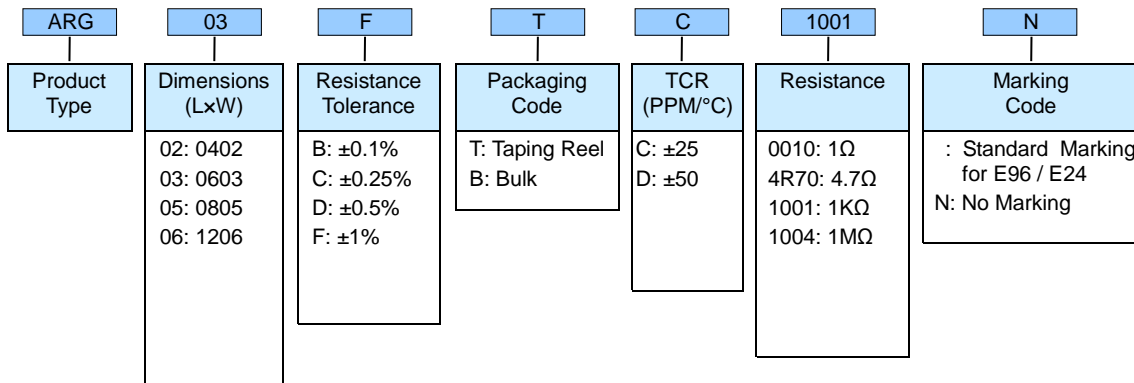
| | | |
|---------------------|----------------------|------------------|
| ① Alumina Substrate | ④ Edge Electrode | ⑦ Resistor Layer |
| ② Bottom Electrode | ⑤ Barrier Layer | ⑧ Overcoat |
| ③ Top Electrode | ⑥ External Electrode | ⑨ Marking |

■ Dimensions

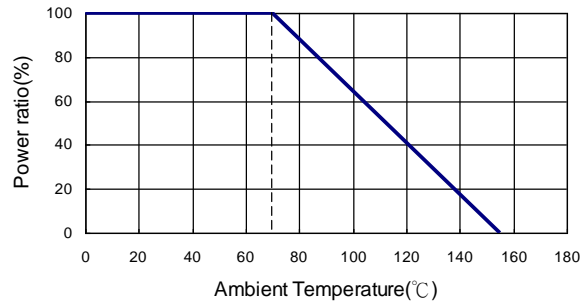
Unit: mm

| Type | Size (Inch) | L | W | T | D1 | D2 | Weight (g) (1000pcs) |
|-------|-------------|-----------|-----------|-----------|-----------|-----------|----------------------|
| ARG02 | 0402 | 1.00±0.05 | 0.50±0.05 | 0.30±0.10 | 0.20±0.10 | 0.20±0.10 | 0.54 |
| ARG03 | 0603 | 1.60±0.10 | 0.80±0.10 | 0.45±0.10 | 0.30±0.20 | 0.30±0.20 | 1.83 |
| ARG05 | 0805 | 2.00±0.15 | 1.25±0.15 | 0.50±0.10 | 0.30±0.20 | 0.40±0.20 | 4.71 |
| ARG06 | 1206 | 3.10±0.15 | 1.55±0.15 | 0.55±0.10 | 0.42±0.20 | 0.35±0.25 | 9.02 |

■ Part Numbering



Derating Curve



Standard Electrical Specifications

| Type | Item | Power Rating at 70°C | Operating Temp. Range | Max. Operating Voltage | Max. Overload Voltage | Resistance Range | | | | TCR (PPM/°C) |
|--------------|------|----------------------|-----------------------|------------------------|-----------------------|------------------|--------|-------|-----|--------------|
| | | | | | | ±0.1% | ±0.25% | ±0.5% | ±1% | |
| ARG02 (0402) | | 1/16W | -55 ~ +155°C | 50V | 100V | 4.7Ω – 255KΩ | | | | ±25 ±50 |
| ARG03 (0603) | | 1/10W | -55 ~ +155°C | 75V | 150V | 1Ω - 1MΩ | | | | ±25 ±50 |
| ARG05 (0805) | | 1/8W | -55 ~ +155°C | 150V | 300V | 1Ω - 2MΩ | | | | ±25 ±50 |
| ARG06 (1206) | | 1/4W | -55 ~ +155°C | 200V | 400V | 1Ω - 2.49MΩ | | | | ±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)

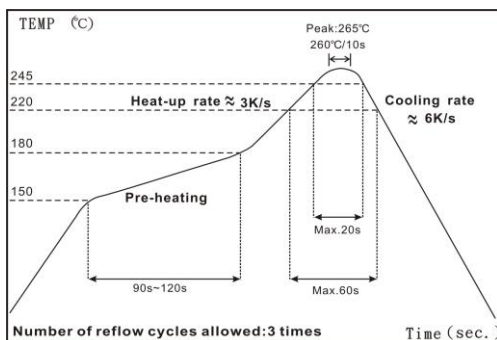
Environmental Characteristics

| Item | Requirement | Test Method |
|--|----------------------|---|
| Temperature Coefficient of Resistance (T.C.R.) | As Spec. | MIL-STD-202 Method 304 +25/-55/+25/+125/+25°C |
| Short Time Overload | $\Delta R \pm 0.2\%$ | JIS-C-5201-1 4.13 RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds |
| Insulation Resistance | >9999 MΩ | MIL-STD-202 Method 302 Apply 100V _{DC} for 1 minute |
| Endurance | $\Delta R \pm 0.5\%$ | MIL-STD-202 Method 108A 70±2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" |
| Damp Heat with Load | $\Delta R \pm 0.5\%$ | 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" |
| Bending Strength | $\Delta R \pm 0.1\%$ | JIS-C-5201-1 4.33 Bending amplitude 3 mm for 10 seconds |
| Solderability | 95% min. coverage | MIL-STD-202 Method 208H 245±5°C for 3 seconds |
| Resistance to Soldering Heat | $\Delta R \pm 0.1\%$ | 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 |
| Thermal Shock | $\Delta R \pm 0.2\%$ | MIL-STD-202 Method 107G -55°C ~150°C, 100 cycles |
| Low Temperature Operation | $\Delta R \pm 0.5\%$ | JIS-C-5201-1 4.36 1 hour, -65°C, followed by 45 minutes of RCWV |
| High Temperature Exposure | $\Delta R \pm 0.5\%$ | MIL-STD-202 Method 108 at +155°C for 1000 hrs |

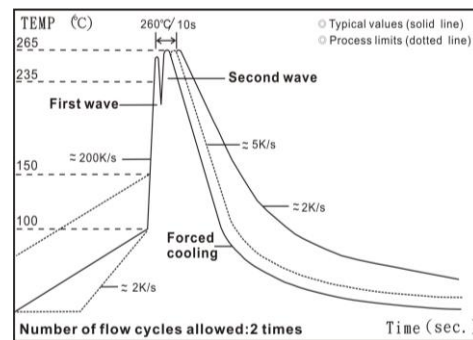
RCWV(Rated continuous working voltage)= $\sqrt{P \cdot R}$ or Max. Operating voltage whichever is lower

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

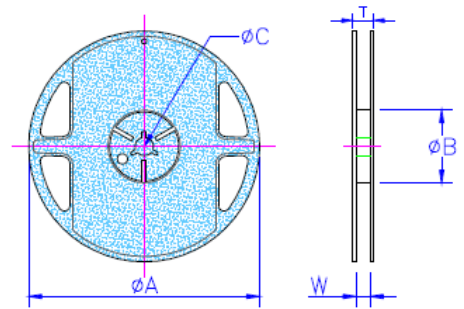
| | | | | | |
|------------|------|-------|------|--------|-------|
| Resistance | 100Ω | 2.2KΩ | 10KΩ | 49.9KΩ | 100KΩ |
| marking | 1000 | 2201 | 1002 | 4992 | 1003 |

■ Packaging

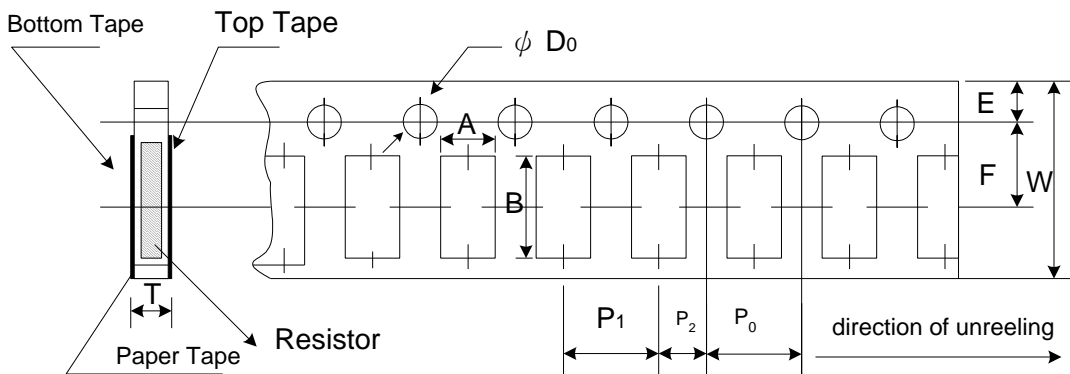
Packing Quantity & Reel Specifications

Unit :mm

| Type | ∅A | ∅B | ∅C | W | T | Paper Tape (EA) | Emboss Plastic Tape (EA) |
|-------|-----------|----------|----------|---------|----------|-----------------|--------------------------|
| ARG02 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 9.5±1.0 | 11.5±1.0 | 10,000 | - |
| ARG03 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 9.5±1.0 | 11.5±1.0 | 5,000 | - |
| ARG05 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 9.5±1.0 | 11.5±1.0 | 5,000 | - |
| ARG06 | 178.0±1.0 | 60.0+1.0 | 13.5±0.7 | 9.5±1.0 | 11.5±1.0 | 5,000 | - |



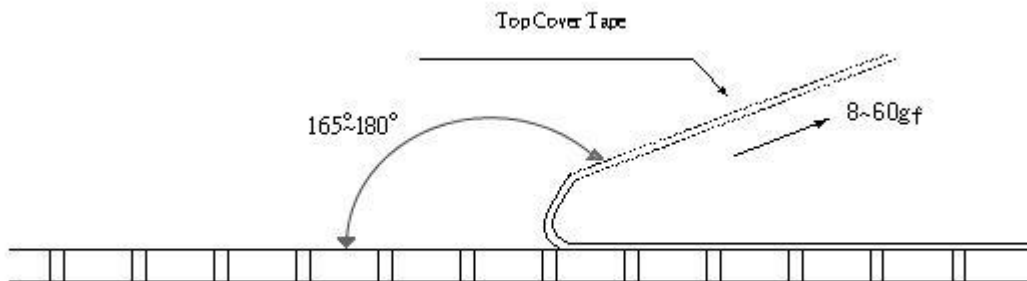
Paper Tape Specifications



Unit: mm

| Type | A | B | W | E | F | P ₀ | P ₁ | P ₂ | ∅D ₀ | T |
|-------|-----------|-----------|-----------|-----------|----------|----------------|----------------|----------------|-----------------|-----------|
| ARG02 | 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 |
| ARG03 | 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 |
| ARG05 | 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 |
| ARG06 | 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 |

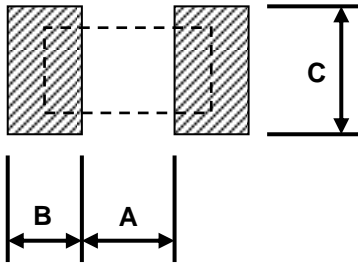
- Peel force of top cover tape
- The peel speed shall be about 300mm/min±5%
- The peel force of top cover tape shall be between 8gf to 60gf



Unit: mm

■ Recommend Land Pattern

Unit: mm



| Type | A | B | C |
|-------|------|------|----------|
| ARG02 | 0.50 | 0.50 | 0.60±0.2 |
| ARG03 | 0.80 | 1.00 | 0.90±0.2 |
| ARG05 | 1.00 | 1.00 | 1.35±0.2 |
| ARG06 | 2.00 | 1.15 | 1.70±0.2 |

REVISION HISTORY

| REVISION | DATE | CHANGE NOTIFICATION | DESCRIPTION |
|-----------------|---------------|----------------------------|--|
| Version A1 | May 08, 2015 | - | - Correct the element of Top Electrode. |
| Version A2 | May 02, 2016 | - | - Modify Storage Temperature. - Remove Material Description. |
| Version A3 | July 19, 2016 | - | - Add Resistance Range ($\pm 0.1\%$ and 0.25%) - Update requirements of Environmental Characteristics. |
| Version A4 | Nov 10, 2016 | - | - Correct the reference standard in Environmental Characteristics. |
| Version A5 | May 22, 2019 | - | - Add High Temperature Exposure in Environmental Characteristics. |