

## Data Sheet

Customer :

Product : Thin Film Chip Resistor - ARG Series

Size: 0402/0603/0805/1206

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## 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<br>±50   |
| ARG03 (0603)  |      | 1/10W                | -55 ~ +155°C          | 75V                    | 150V                  | 1Ω - 1MΩ         |        |       |     | ±25<br>±50   |
| ARG05 (0805)  |      | 1/8W                 | -55 ~ +155°C          | 150V                   | 300V                  | 1Ω - 2MΩ         |        |       |     | ±25<br>±50   |
| ARG06 (1206)  |      | 1/4W                 | -55 ~ +155°C          | 200V                   | 400V                  | 1Ω - 2.49MΩ      |        |       |     | ±25<br>±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.             | <b>MIL-STD-202 Method 304</b><br>+25/-55/+25/+125/+25°C   |
| Short Time Overload                            | $\Delta R \pm 0.2\%$ | <b>JIS-C-5201-1 5.5</b><br>RCWV*2.5 or Max. overload voltage whichever is lower for 5 seconds                     |
| Insulation Resistance                          | >9999 M $\Omega$     | <b>MIL-STD-202 Method 302</b><br>Apply 100V <sub>DC</sub> for 1 minute  |
| Endurance                                      | $\Delta R \pm 0.5\%$ | <b>MIL-STD-202 Method 108A</b><br>70 $\pm$ 2°C, RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"             |
| Damp Heat with Load                            | $\Delta R \pm 0.5\%$ | <b>MIL-STD-202 Method 103B</b><br>40 $\pm$ 2°C, 90~95% R.H. RCWV for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" |
| Bending Strength                               | $\Delta R \pm 0.1\%$ | <b>JIS-C-5201-1 6.1.4</b><br>Bending amplitude 3 mm for 10 seconds  |
| Solderability                                  | 95% min. coverage    | <b>MIL-STD-202 Method 208H</b><br>245 $\pm$ 5°C for 3 seconds   |
| Resistance to Soldering Heat                   | $\Delta R \pm 0.1\%$ | <b>MIL-STD-202 Method 210E</b><br>260 $\pm$ 5°C for 10 seconds  |
| Dielectric Withstand Voltage                   | By Type              | <b>MIL-STD-202 Method 301</b><br>Max. overload voltage for 1 minute   |
| Thermal Shock                                  | $\Delta R \pm 0.2\%$ | <b>MIL-STD-202 Method 107G</b><br>-55°C ~150°C, 100 cycles  |
| Low Temperature Operation                      | $\Delta R \pm 0.5\%$ | <b>JIS-C-5201-1 7.1</b><br>1 hour, -65°C, followed by 45 minutes of RCWV  |

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 <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) |
|-------|-----------|----------|----------|---------|----------|-----------------|--------------------------|
| 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 <sub>0</sub> | P <sub>1</sub> | P <sub>2</sub> | ΦD <sub>0</sub> | 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**

| <b><u>REVISION</u></b> | <b><u>DATE</u></b> | <b><u>CHANGE NOTIFICATION</u></b> | <b><u>DESCRIPTION</u></b>  |
|------------------------|--------------------|-----------------------------------|--|
| Version A1             | May 08, 2015       | -                                 | - Correct the element of Top Electrode.  |
| Version A2             | May 02, 2016       | -                                 | - Modify Storage Temperature.<br>- Remove Material Description.  |
| Version A3             | July 19, 2016      | -                                 | - Add Resistance Range ( $\pm 0.1\%$ and $0.25\%$ )<br>- Update requirements of Environmental Characteristics. |



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