

## Array chip resistors size 4 × 0603

## ARC241/242 ARV241

### FEATURES

- 4 × 0603 sized resistors in one 1206-sized package
- Reduced reel exchange time
- Low assembly costs
- Reduced PCB area
- Reduced size of final equipment.

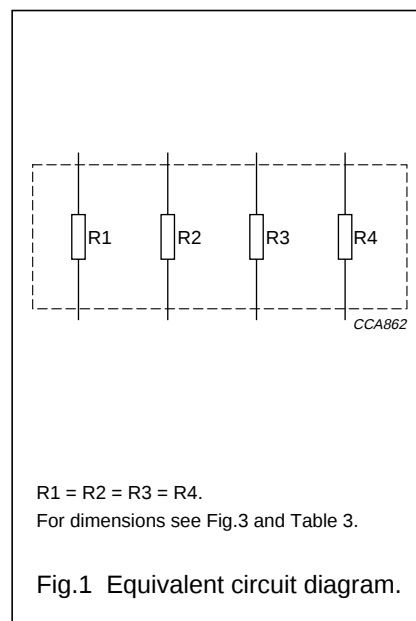
### APPLICATIONS

- Computers
- Microcomputer driven applications:
  - Portable radios
  - CD and cassette players
  - Car telephones
  - Camcorders
  - Cordless, cellular phones.

### DESCRIPTION

The resistors are constructed on a high grade ceramic body (aluminium oxide). Internal metal electrodes are added at each end and connected by a resistive paste which is applied to the top surface of the substrate. The composition of the paste is adjusted to give the approximate resistance required and the value is trimmed to within tolerance, by laser cutting of this resistive layer.

The resistive layer is covered with a protective coating and printed with the resistance value. Finally, external end terminations are added. For ease of soldering the outer layer of these end terminations is a lead/tin alloy.



### QUICK REFERENCE DATA

| DESCRIPTION                                                                    | VALUE                       |        |                             |
|--------------------------------------------------------------------------------|-----------------------------|--------|-----------------------------|
|                                                                                | ARC241                      | ARV241 | ARC242                      |
| Resistance range                                                               | 10 Ω to 1 MΩ                |        |                             |
| Resistance tolerance and E-series                                              | ±5%; E24 series             |        | ±1%; E96 series             |
| Temperature coefficient                                                        | ≤±200 × 10 <sup>-6</sup> /K |        | ≤±100 × 10 <sup>-6</sup> /K |
| Absolute maximum dissipation per resistive element at T <sub>amb</sub> = 70 °C | 0.063 W                     |        |                             |
| Maximum permissible voltage                                                    | 50 V (DC or RMS)            |        |                             |
| Climatic category (IEC 60068)                                                  | 55/155/56                   |        |                             |
| Basic specification                                                            | IEC 60115-8                 |        |                             |

### R-Array overview

| TYPE   | TERMINATION TECHNOLOGY | SIZE     | TOLERANCE (%) |
|--------|------------------------|----------|---------------|
| ARC241 | concave                | 4 × 0603 | 5             |
| ARC242 | concave                | 4 × 0603 | 1             |
| ARV241 | convex                 | 4 × 0603 | 5             |

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## ORDERING INFORMATION

**Table 1** Ordering code indicating resistor type

| TYPE              | ORDERING CODE 2350 0.. .... <sup>(1)</sup> |
|-------------------|--------------------------------------------|
|                   | PAPER TAPE ON REEL                         |
|                   | 5000 units                                 |
| ARC241            | 34 10...                                   |
| ARV241            | 35 10...                                   |
| ARC242            | 24 1....                                   |
| <b>Jumper 0 Ω</b> |                                            |
| ARC241; note 2    | 34 91001                                   |
| ARV241; note 2    | 35 91001                                   |

### Notes

1. The arrays are supplied in paper tape on reel, 5000 units
2. The jumper has a maximum resistance  $R_{\max} = 50 \text{ m}\Omega$  and a rated current  $I_R = 1 \text{ A}$ .

### Ordering code (12NC)

- The resistors have a 12-digit ordering code starting with 2350 0
- The subsequent three or four digits indicate the resistor termination style, tolerance and packaging; see Table 1.
- The remaining digits indicate the resistance value:
  - The first 2 digits for 5% or 3 digits for 1% tolerance products indicate the resistance value.
  - The last digit indicates the resistance decade in accordance with Table 2.

**Table 2** Last digit of 12NC

| RESISTANCE    | LAST DIGIT |
|---------------|------------|
| 10 to 91 Ω    | 9          |
| 100 to 910 Ω  | 1          |
| 1 to 9.1 kΩ   | 2          |
| 10 to 91 kΩ   | 3          |
| 100 to 910 kΩ | 4          |
| 1 MΩ          | 5          |

### ORDERING EXAMPLE

The ordering code of an ARC241 resistor, value 100 Ω, supplied on paper tape of 5000 units per reel is: 2350 034 10101.

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FUNCTIONAL DESCRIPTION

Product characterization

Standard values of nominal resistance are taken from the E24 or E96 series for resistors with a tolerance of ±5% or ±1%. The values of the E24/E96 series are in accordance with “IEC publication 60063”.

Limiting values

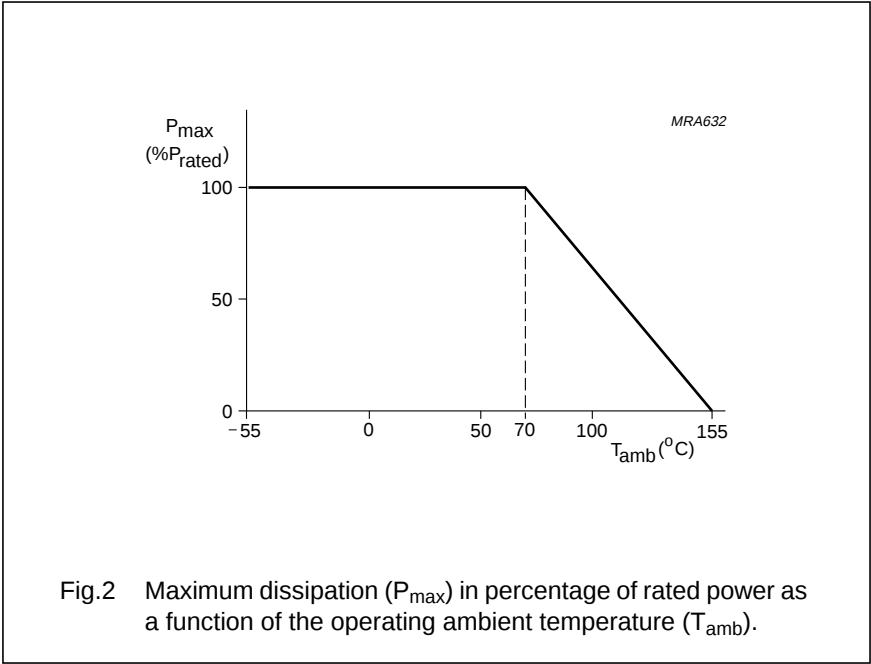
| TYPE   | LIMITING VOLTAGE <sup>(1)</sup><br>(V) | LIMITING POWER<br>(W) |
|--------|----------------------------------------|-----------------------|
| ARC241 | 50                                     | 0.063                 |
| ARC242 |                                        |                       |
| ARV241 |                                        |                       |

Note

1. This is the maximum voltage that may be continuously applied to the resistor element, see “IEC publication 60115-8”.

DERATING

The power that the resistor can dissipate depends on the operating ambient temperature; see Fig.2.



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MECHANICAL DATA

Mass per 100 units

| TYPE      | MASS (g) |
|-----------|----------|
| All types | 1.1      |

Marking

All resistors within the E24 series are marked with a 3-digit code and a 4-digit code for resistors of the E96 series, on the protective coat to designate the nominal resistance value.

3-DIGIT MARKING

For values up to 91 Ω the R is used as a decimal point. For values of 100 Ω or greater the first 2 digits apply to the resistance value and the third indicates the number of zeros to follow.

Example

| MARKING | RESISTANCE |
|---------|------------|
| 12R     | 12 Ω       |
| 124     | 120 kΩ     |
| 000     | jumper     |

4-DIGIT MARKING

For values up to 976 Ω the R is used as a decimal point. For values of 1 K or greater the first 3 digits apply to the resistance value and the fourth indicates the number of zeros to follow.

Example

| MARKING | RESISTANCE |
|---------|------------|
| 12R0    | 12 Ω       |
| 1203    | 120 kΩ     |

PACKAGE MARKING

The packaging is also marked and includes resistance value, tolerance, catalogue number, quantity, production period, batch number and source code.

Outlines

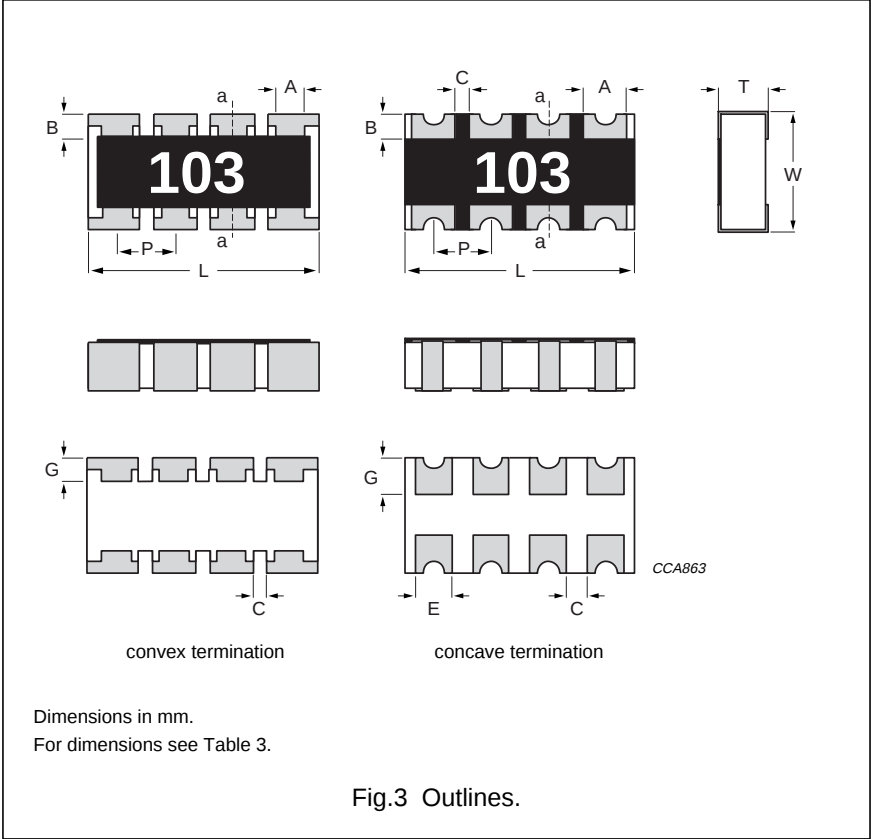


Table 3 Physical dimensions; see Fig.3

| SYMBOL | ARC241/242 |             | ARV241 |       | UNIT |
|--------|------------|-------------|--------|-------|------|
|        | VALUE      | TOL.        | VALUE  | TOL.  |      |
| L      | 3.20       | +0.20/-0.10 | 3.20   | ±0.15 | mm   |
| W      | 1.60       | +0.20/-0.10 | 1.60   | ±0.15 | mm   |
| T      | 0.60       | ±0.20       | 0.55   | ±0.10 | mm   |
| A      | 0.60       | ±0.15       | 0.40   | ±0.15 | mm   |
| B      | 0.35       | ±0.15       | 0.30   | ±0.20 | mm   |
| P      | 0.80       | ±0.15       | 0.80   | ±0.15 | mm   |
| E      | 0.50       | ±0.15       | —      | —     | mm   |
| G      | 0.50       | ±0.15       | 0.30   | ±0.15 | mm   |
| C      | 0.10       | min.        | 0.10   | min.  | mm   |

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### TESTS AND REQUIREMENTS

Essentially all tests are carried out in accordance with the schedule of "IEC publication 60115-8", category 55/155/56 (rated temperature range -55 to +155 °C; damp heat, long term, 56 days). The testing also covers the requirements specified by EIA, EIAJ and JIS.

The tests are carried out in accordance with IEC publication 60068, "Recommended basic

*climatic and mechanical robustness testing procedure for electronic components*" and under standard atmospheric conditions according to "IEC 60068-1", subclause 5.3.

Unless otherwise specified the following values apply:

Temperature: 15 °C to 35 °C

Relative humidity: 45% to 75%

Air pressure: 86 kPa to 106 kPa  
(860 mbar to 1060 mbar).

In Table 4 the tests and requirements are listed with reference to the relevant clauses of "IEC publications 60115-8 and 60068"; a short description of the test procedure is also given.

In some instances deviations from the IEC recommendations were necessary for our method of specifying.

All soldering tests are performed with mildly activated flux.

**Table 4** Test procedures and requirements

| IEC<br>60115-8<br>CLAUSE                                         | IEC<br>60068-2<br>TEST<br>METHOD | TEST                            | PROCEDURE                                                                                                                                                                        | REQUIREMENTS                                      |                                    |                                    |
|------------------------------------------------------------------|----------------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|------------------------------------|------------------------------------|
|                                                                  |                                  |                                 |                                                                                                                                                                                  | ARC241                                            | ARV241                             | ARC242                             |
| Tests in accordance with the schedule of IEC publication 60115-8 |                                  |                                 |                                                                                                                                                                                  |                                                   |                                    |                                    |
| 4.4.1                                                            |                                  | visual examination              |                                                                                                                                                                                  | no holes; clean surface;<br>no visible damage     |                                    |                                    |
| 4.4.2                                                            |                                  | dimensions (outline; see Fig.3) | gauge (mm)                                                                                                                                                                       | see Table 3                                       |                                    |                                    |
| 4.5                                                              |                                  | resistance                      | applied voltage (+0/–10%):<br>10 Ω ≤ R < 100 Ω: 0.3 V<br>100 Ω ≤ R < 1 kΩ: 1 V<br>1 kΩ ≤ R < 10 kΩ: 3 V<br>10 kΩ ≤ R < 100 kΩ: 10 V<br>100 kΩ ≤ R < 1 MΩ: 25 V<br>R ≥ 1 MΩ: 50 V | R – R <sub>nom</sub> :<br>max. ±5%                | R – R <sub>nom</sub> :<br>max. ±5% | R – R <sub>nom</sub> :<br>max. ±1% |
| 4.18                                                             | 20 (Tb)                          | resistance to soldering heat    | unmounted chips;<br>10 ±1 s; 260 ±5 °C                                                                                                                                           | no visible damage<br>ΔR/R max.: ±(0.5% +0.05 Ω)   |                                    |                                    |
| 4.29                                                             | 45 (Xa)                          | component solvent resistance    | isopropyl alcohol or H <sub>2</sub> O followed by brushing in accordance with “MIL 202 F”                                                                                        | no visible damage                                 |                                    |                                    |
| 4.17                                                             | 20 (Ta)                          | solderability                   | unmounted chips completely immersed for 2 ±0.5 s in a solder bath at 235 ±2 °C                                                                                                   | good tinning (≥95% covered);<br>no visible damage |                                    |                                    |
| 4.7                                                              |                                  | voltage proof on insulation     | maximum voltage (RMS) during 1 minute, metal block method                                                                                                                        | no breakdown or flashover                         |                                    |                                    |
| 4.13                                                             |                                  | short time overload             | room temperature;<br>P = 6.25 × P <sub>n</sub> ;<br>5 s (V ≤ 2 × V <sub>max</sub> )                                                                                              | ΔR/R max.: ±(1% +0.05 Ω)                          |                                    |                                    |

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| IEC<br>60115-8<br>CLAUSE                                                   | IEC<br>60068-2<br>TEST<br>METHOD | TEST                                    | PROCEDURE                                                                                                                                                                             | REQUIREMENTS                                                                                                              |        |                                                  |
|----------------------------------------------------------------------------|----------------------------------|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------|--------|--------------------------------------------------|
|                                                                            |                                  |                                         |                                                                                                                                                                                       | ARC241                                                                                                                    | ARV241 | ARC242                                           |
| 4.33                                                                       |                                  | bending                                 | resistors mounted on a 90 mm glass epoxy resin PCB (FR4), bending: 5 mm                                                                                                               | no visible damage                                                                                                         |        |                                                  |
|                                                                            |                                  |                                         |                                                                                                                                                                                       | $\Delta R/R$ max.:<br>$\pm(1\% + 0.05 \Omega)$                                                                            |        | $\Delta R/R$ max.:<br>$\pm(0.5\% + 0.05 \Omega)$ |
| 4.19                                                                       | 14 (Na)                          | rapid change of temperature             | 30 minutes at LCT and 30 minutes at UCT; 5 cycles                                                                                                                                     | no visible damage                                                                                                         |        |                                                  |
|                                                                            |                                  |                                         |                                                                                                                                                                                       | $\Delta R/R$ max.: $\pm(0.5\% + 0.05 \Omega)$                                                                             |        |                                                  |
| 4.24.2                                                                     | 3 (Ca)                           | damp heat (steady state)                | 56 days; 40 $\pm$ 2 °C; 93 $\pm$ 2/–3% RH; loaded with 0.01 P <sub>n</sub>                                                                                                            | $\Delta R/R$ max.:<br>$\pm(3\% + 0.1 \Omega)$                                                                             |        | $\Delta R/R$ max.:<br>$\pm(1\% + 0.05 \Omega)$   |
| 4.25.1                                                                     |                                  | endurance                               | 1000 $\pm$ 48/–0 hours; 70 $\pm$ 2 °C; loaded with P <sub>n</sub> or V <sub>max</sub> ; 1.5 hours on and 0.5 hours off                                                                | $\Delta R/R$ max.:<br>$\pm(2\% + 0.1 \Omega)$                                                                             |        | $\Delta R/R$ max.:<br>$\pm(1\% + 0.05 \Omega)$   |
| 4.23.2                                                                     | 27 (Ba)                          | endurance at upper category temperature | 1000 $\pm$ 48/–0 hours; no load                                                                                                                                                       | $\Delta R/R$ max.: $\pm(2\% + 0.1 \Omega)$                                                                                |        | $\Delta R/R$ max.:<br>$\pm(1\% + 0.05 \Omega)$   |
| 4.8.4.2                                                                    |                                  | temperature coefficient                 | at 20/LCT/20 °C and 20/UCT/20 °C                                                                                                                                                      | $\leq \pm 200 \times 10^{-6}/K$                                                                                           |        | $\leq \pm 100 \times 10^{-6}/K$                  |
| Other tests in accordance with IEC 60115 clauses and IEC 60068 test method |                                  |                                         |                                                                                                                                                                                       |                                                                                                                           |        |                                                  |
| 4.17                                                                       | 20 (Ta)                          | solderability (after ageing)            | 8 hours steam or 16 hours 155 °C; unmounted chips completely immersed for 2 $\pm$ 0.5 s in a solder bath at 235 $\pm$ 2 °C                                                            | good tinning ( $\geq$ 95% covered); no damage                                                                             |        |                                                  |
| 4.6.1.1                                                                    |                                  | insulation resistance                   | voltage (DC) after 1 minute, metal block method: 10 V                                                                                                                                 | R <sub>ins</sub> min.: 10 <sup>3</sup> MΩ                                                                                 |        |                                                  |
| 4.12                                                                       |                                  | noise                                   | IEC publication 60195 (measured with Quantech-equipment)<br><br>R $\leq$ 100 Ω<br>100 Ω < R $\leq$ 1 kΩ<br>1 kΩ < R $\leq$ 10 kΩ<br>10 kΩ < R $\leq$ 100 kΩ<br>100 kΩ < R $\leq$ 1 MΩ | max. 0.316 μV/V (–10 dB)<br>max. 1 μV/V (0 dB)<br>max. 3 μV/V (9.54 dB)<br>max. 6 μV/V (15.56 dB)<br>max. 10 μV/V (20 dB) |        |                                                  |

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| IEC<br>60115-8<br>CLAUSE | IEC<br>60068-2<br>TEST<br>METHOD | TEST                                         | PROCEDURE                                                                                                                              | REQUIREMENTS              |        |                            |
|--------------------------|----------------------------------|----------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------|---------------------------|--------|----------------------------|
|                          |                                  |                                              |                                                                                                                                        | ARC241                    | ARV241 | ARC242                     |
| Other applicable tests   |                                  |                                              |                                                                                                                                        |                           |        |                            |
|                          | (JIS) C<br>5202 7.5              | resistance to<br>damp heat<br>(steady state) | 1000 +48/−0 hours;<br>40 ±2 °C; 93 +2/−3% RH;<br>loaded with P <sub>n</sub> or V <sub>max</sub> ;<br>1.5 hours on and 0.5 hours<br>off | ΔR/R max.: ±(3% +0.1 Ω)   |        | ΔR/R max.:<br>±(2% +0.1 Ω) |
|                          |                                  | leaching                                     | unmounted chips 60 ±1 s;<br>260 ±5 °C                                                                                                  | good tinning; no leaching |        |                            |