

## Precision Metal Film Resistors

### RC series

- Available to EN140101 & CECC40101 release
- Resistance tolerance down to 0.05%
- Wide resistance range
- Low noise and negligible voltage coefficient
- Screened parts available for critical applications
- Temperature Coefficient of Resistance down to 5 ppm/°C
- Options for RoHS compliant and Lead bearing wire finishes



 All Pb-free parts comply with EU Directive 2011/65/EU amended by (EU) 2015/863 (RoHS3)

## Electrical Data

| Commercial               |        | RC55                     | RC65     | RC70      | Notes                       |
|--------------------------|--------|--------------------------|----------|-----------|-----------------------------|
| Power rating at 70° C    | watts  | 0.25                     | 0.5      | 1.0       |                             |
| Resistance range         | ohm    | 1R to 4M                 | 1R to 4M | 1R to 10M |                             |
| Limiting element voltage | volts  | 350                      | 350      | 500       |                             |
| Isolation voltage        | volts  | 500                      | 750      | 700       |                             |
| TCR (20 to +70° C)       | ppm/°C | 5, 10, 15, 25, 50, 100   |          |           | See resistance restrictions |
| Resistance tolerance     | %      | 0.05, 0.1, 0.25, 0.5 & 1 |          |           |                             |

| EN140101-806 Requirements |        | B                        | C         |  |                             |
|---------------------------|--------|--------------------------|-----------|--|-----------------------------|
| Power rating at 70° C     | watts  | 0.25                     | 0.5       |  |                             |
| Resistance range          | ohms   | 56R – 820K               | 56R – 1M0 |  |                             |
| Limiting element voltage  | volts  | 350                      | 350       |  |                             |
| Isolation voltage         | volts  | 500                      | 750       |  |                             |
| TCR                       | ppm/°C | 5, 10, 15, 25, 50, 100   |           |  | See resistance restrictions |
| Resistance tolerance      | %      | 0.05, 0.1, 0.25, 0.5 & 1 |           |  |                             |

| CECC 40101-004 Requirements |        | H                        | J        | K        | K         | L         |                             |
|-----------------------------|--------|--------------------------|----------|----------|-----------|-----------|-----------------------------|
| Power rating at 70° C       | watts  | 0.063                    | 0.125    | 0.25     | 0.25      | 0.5       |                             |
| Resistance range            | ohms   | 1R to 1M                 | 1R to 1M | 1R to 1M | 10R to 1M | 10R to 1M |                             |
| Limiting element voltage    | volts  | 200                      | 200      | 250      | 250       | 350       |                             |
| Isolation voltage           | volts  | 280                      | 280      | 350      | 350       | 500       |                             |
| TCR                         | ppm/°C | 15, 25, 50, 100          |          |          |           |           | See resistance restrictions |
| Resistance tolerance        | %      | 0.05, 0.1, 0.25, 0.5 & 1 |          |          |           |           |                             |

| CECC 40101-804 Requirements |        | A                        | B        | B         | C         |                             |
|-----------------------------|--------|--------------------------|----------|-----------|-----------|-----------------------------|
| Power rating at 70° C       | watts  | 0.125                    | 0.25     | 0.25      | 0.5       |                             |
| Resistance range            | ohms   | 1R to 1M                 | 1R to 1M | 10R to 1M | 10R to 1M |                             |
| Limiting element voltage    | volts  | 200                      | 250      | 250       | 350       |                             |
| Isolation voltage           | volts  | 280                      | 350      | 350       | 500       |                             |
| TCR                         | ppm/°C | 15, 25, 50, 100          |          |           |           | See resistance restrictions |
| Resistance tolerance        | %      | 0.05, 0.1, 0.25, 0.5 & 1 |          |           |           |                             |

These tables indicate the EN140101 & CECC40101 specification requirements, and these are met or exceeded by the corresponding RC series products.

|                           |         |                    |    |    |                    |
|---------------------------|---------|--------------------|----|----|--------------------|
| Standard values           |         | E24, E96 preferred |    |    | Any value to order |
| Thermal impedance         | °C/watt | 110                | 70 | 60 |                    |
| Ambient temperature range | °C      | -55 to +155        |    |    |                    |

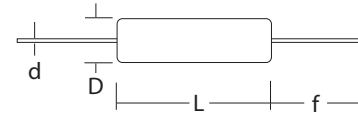
### General Note

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## RC series

### Physical Data

| Dimensions (mm) & Weight (g) |       |       |                    |       |                      |                  |         |
|------------------------------|-------|-------|--------------------|-------|----------------------|------------------|---------|
| Type                         | L max | D max | f min <sup>1</sup> | d nom | PCB mounting centres | Min. Bend Radius | Wt. nom |
| RC55                         | 7.2   | 2.5   | 30                 | 0.6   | 10.2                 | 0.6              | 0.24    |
| RC65                         | 10.0  | 3.7   | 30                 | 0.6   | 12.7                 | 0.6              | 0.40    |
| RC70                         | 15.5  | 5.5   | 30                 | 0.8   | 18.4                 | 1.2              | 1.15    |



Note 1 - dimension relates only to bulk packed product.

#### Construction

A metal film is deposited onto a high quality ceramic former. Nickel-plated steel caps are force fitted to the former and termination wires are welded to the caps.

The resistor is adjusted to value by a helical cut in the film and the body is protected with a specially formulated epoxy coating.

#### Terminations

- Material** Solder coated copper wire
- Strength** The terminations meet the requirements of IEC 68.2.21.
- Solderability** The terminations meet the requirements of IEC 115-1, Clause 4.17.3.2.

#### Marking

Type reference, TCR code, resistance value and tolerance code.

The resistance values conform to IEC 62.

#### Solvent Resistance

The body protection and marking are resistant to all normal industrial cleaning solvents suitable for printed circuits.

### Performance Data

|   |       | EN140101-806  | CECC 40101-004 | CECC 40101-804 | *Actual Performance          |         |
|---|-------|---------------|----------------|----------------|------------------------------|---------|
|   |       | Requirements  | Requirements   | Requirements   | Maximum                      | Typical |
| Load at commercial rating: 1000 hours at 70°C           | ΔR%   |               |                |                | 0.3                          | 0.1     |
| Load at EN140101 & CECC40101 ratings 1000 hours at 70°C | ΔR%   | 0.25          | 0.5            | 0.5            | **0.3                        | 0.05    |
| Dry heat: 1000 hours at 155°C                           | ΔR%   | 0.25          | 0.5            | 0.5            | **1.0                        | 0.15    |
| Shelf life: 12 months at room temperature               | ΔR%   | Not Specified | Not specified  | Not specified  | 0.1                          | 0.03    |
| Derating from rated power at 70°C                       |       | Zero at 155°C | Zero at 155°C  | 50% at 125°C   | 50% at 125°C & Zero at 155°C |         |
| Short term overload                                     | ΔR%   | 1             | 0.1            | 0.1            | 0.1                          | 0.02    |
| Climatic  | ΔR%   | 0.25          | 0.5            | 0.5            | **0.3                        | 0.1     |
| Climatic category                                       |       | 55/155/56     | 55/155/56      | 55/125/56      | 55/155/56                    |         |
| Long term damp heat                                     | ΔR%   | 0.25          | 0.5            | 0.5            | **0.5                        | 0.1     |
| Temperature rapid change                                | ΔR%   | 1             | 0.1            | 0.1            | **0.2                        | 0.05    |
| Resistance to solder heat                               | ΔR%   | 0.05          | 0.1            | 0.1            | **0.06                       | 0.03    |
| Vibration and bump                                      | ΔR%   | 0.05          | 0.1            | 0.1            | **0.06                       | 0.02    |
| Noise (in a decade of frequency)                        | μV/V  | Not Specified | Not specified  | Not specified  | 1.0                          | 0.1     |
| Voltage coefficient of resistance                       | ppm/V | Not Specified | Not specified  | Not specified  |                              | <1      |

Note: \*An 0.01 ohm addition to be added to the performance claims of all resistors <10R.  
 \*\* All products within the specified approved range meet EN140101 and CECC40101 requirements.

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## RC series

### Table of Resistance Restrictions

| TCR<br>ppm/°C    | Tolerance   |             |                                     |             |             |                                     |             |             |                                     |
|------------------|-------------|-------------|-------------------------------------|-------------|-------------|-------------------------------------|-------------|-------------|-------------------------------------|
|                  | RC55        |             |                                     | RC65        |             |                                     | RC70        |             |                                     |
|                  | 0.05%       | 0.1 - 0.25% | 0.5% <sup>3</sup> - 1% <sup>3</sup> | 0.05%       | 0.1 - 0.25% | 0.5% <sup>3</sup> - 1% <sup>3</sup> | 0.05%       | 0.1 - 0.25% | 0.5% <sup>3</sup> - 1% <sup>3</sup> |
| 5 <sup>1</sup>   | 10R to 500K | 10R to 500K | 1R to 500K                          | 10R to 500K | 10R to 500K | 1R to 500K                          | 10R to 750K | 10R to 750K | 10R to 750K                         |
| 10               | 10R to 1M   | 10R to 1M   | 1R to 1M                            | 10R to 1M   | 10R to 1M   | 1R to 1M                            | 10R to 1M   | 10R to 1M   | 1R to 1M                            |
| 15               | 10R to 1M   | 2R49 to 1M  | 1R to 1M                            | 10R to 1M   | 5R to 1M    | 1R to 1M                            | 10R to 1M   | 10R to 2M   | 1R to 2M                            |
| 25               | 10R to 1M   | 2R49 to 2M  | 1R to 2M                            | 10R to 1M   | 5R to 2M    | 1R to 2M                            | 10R to 1M   | 10R to 5M   | 1R to 5M                            |
| 50 <sup>2</sup>  | 10R to 1M   | 2R49 to 2M  | 1R to 4M                            | 10R to 1M   | 5R to 2M    | 1R to 4M                            | 10R to 1M   | 5R to 10M   | 1R to 10M                           |
| 100 <sup>2</sup> | 10R to 1M   | 1R to 2M    | 1R to 4M                            | 10R to 1M   | 1R to 2M    | 1R to 4M                            | 10R to 1M   | 1R to 10M   | 1R to 10M                           |

Note1:

1. Based on sampling. 100% screened product is available.
2. For maximum availability, where the ohmic value permits, 25ppm/°C is preferred to 50 or 100ppm/°C.
3. For maximum availability, where the ohmic value permits, 0.25% is preferred to 0.5% or 1%

## Application Notes

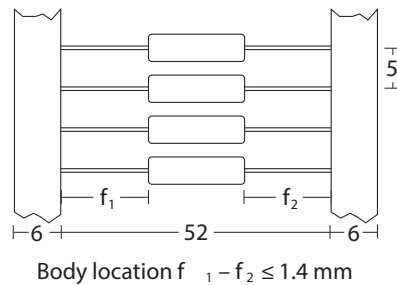
### Matched Sets

TT Electronics has many years' experience in the supply of matched sets of precision resistors.

Resistors can be supplied matched for tolerance and TCR down to ±0.02% and ±2ppm/°C.

### Packaging

RC55 and RC65 standard packing is in tape, as shown below, whilst RC70 is bulk packed. Taped resistors on reel or loose packed components can also be supplied by special request.



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## RC series

### Ordering Procedure

This product has two valid part numbers:

**European (Welwyn) Part Number: RC55V-31K6BI** (RC55 with TCR  $\pm 5\text{ppm}/^\circ\text{C}$  at 31.6 kilohms  $\pm 0.1\%$ , Pb-free)



| 1             | 2            | 3  | 4                | 5                             |                                       |         |
|---------------|--------------|--|------------------|-------------------------------|---------------------------------------|---------|
| Type          | TCR (ppm/°C) | Value  | Tolerance        | Finish, Screening & Packing   |                                       |         |
| RC55          | V = $\pm 5$  | E24 = 3/4 characters<br>E96 = 4/5 characters<br>R = ohms<br>K = kilohms<br>M = megohms | W = $\pm 0.05\%$ | I                             | Pb-free (RoHS)                        |         |
| RC65          | T = $\pm 10$ |  | B = $\pm 0.1\%$  | SC                            | Pb-free with screened TCR (5ppm only) |         |
| RC70          | Y = $\pm 15$ |  | C = $\pm 0.25\%$ | PB                            | Sn(95)Pb(5) finish                    |         |
|               | D = $\pm 25$ |  | D = $\pm 0.5\%$  | HL                            | Sn(60)Pb(40) high lead finish         |         |
|               | C = $\pm 50$ |  | F = $\pm 1\%$    | All above in Standard Packing |                                       |         |
| Z = $\pm 100$ |              |  | RC55             | Ammo                          | Up to 5000/box                        |         |
|               |              | RC65   | Up to 2500/box   |                               |                                       |         |
|               |              |  |                  | RC70                          | Bulk                                  | 250/box |

For product released to EN140101 or CECC40101, state on order the relevant number and style.

Examples: RC55Y-31K6BI EN140101-806 B  
RC55Y-31K6BI CECC40101-004 JY

For CECC 40101-804 the TCR codes T and E relate to 15 and 25ppm/°C and are coded in the MPN as Y and D respectively. Also an additional suffix-804 is added after the Finish, Screening & Packing code, and, in the case of Pb-free, this code (I) is omitted. Example: RC65Y-31K6B-804 CECC 40101-804BT

**USA (IRC) Part Number: RC55LFV3162BA** (RC55 with TCR  $\pm 5\text{ppm}/^\circ\text{C}$  at 31.6 kilohms  $\pm 0.1\%$ , Pb-free)



| 1    | 2                       | 3             | 4                                | 5                | 6       |      |                      |
|------|-------------------------|---------------|----------------------------------|------------------|---------|------|----------------------|
| Type | Termination             | TCR (ppm/°C)  | Value                            | Tolerance        | Packing |      |                      |
| RC55 | Omit for<br>Sn(95)Pb(5) | V = $\pm 5$   | 3 digits + multiplier            | A = $\pm 0.05\%$ | A       | RC55 | Ammo, up to 5000/box |
| RC65 |                         | T = $\pm 10$  | R = ohms for<br>values <100 ohms | B = $\pm 0.1\%$  |         | RC65 | Ammo, up to 2500/box |
| RC70 | LF = Pb-free            | Y = $\pm 15$  |                                  | C = $\pm 0.25\%$ | B       | RC70 | Bulk, 250/box        |
|      |                         | D = $\pm 25$  |                                  | D = $\pm 0.5\%$  |         |      |                      |
|      |                         | C = $\pm 50$  |                                  | F = $\pm 1\%$    |         |      |                      |
|      |                         | Z = $\pm 100$ |                                  |                  |         |      |                      |

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