# Metal Oxide Resistors, High Power


## FEATURES

- Rugged metal oxide film
- Lead (Pb)-free solder contacts
- Pure tin plating provides compatibility with Lead (Pb)-free and lead containing soldering processes
- Compatible with "Restriction of the use of Hazardous Substances" (RoHS) directive 2002/95/EC (issue 2004)
- High power dissipation in small size
- High temperature coating, non-inflammable

## STANDARD ELECTRICAL SPECIFICATIONS

| MODEL | SIZE | POWER RATING $P_{70°C}$ W | LIMITING ELEMENT VOLTAGE MAX. $U_{\sim}$ | TEMPERATURE COEFFICIENT ppm/K | TOL. % | RESISTANCE RANGE Ω | E-SERIES |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| WK2 | 0207 | 1.0 | 500 | ± 50 | ± 1 | 4R7 - 1M0 | 96 |
| WK2 | 0207 | 1.0 | 500 | ± 100 | ± 2<br>± 5 | 1R0 - 1M0<br>R18 - 10M | 48<br>24 |
| WK2 | 0207 | 1.0 | 500 | ± 200 | ± 5 | 0R18 - 10M | 24 |
| WR4 | 0414 | 2.0 | 500 | ± 200 | ± 2<br>± 5 | 1R0 - 1M0<br>R18 - 10M | 48<br>24 |
| WR5 | 0617 | 3.0 | 750 | ± 200 | ± 2<br>± 5 | 1R0 - 100K<br>R22 - 560K | 48<br>24 |
| WK8 | 0922 | 4.0 | 750 | ± 200 | ± 2<br>± 5 | 1R0 - 68K<br>R22 - 100K | 48<br>24 |

- Coating: green
- Marking: WR4 has colour code marking and does not have a T.C.band. WR5 and WK8 are print marked. For further information see appropriate catalog or web page.

## TECHNICAL SPECIFICATIONS

| PARAMETER | UNIT | WK2 | WR4 | WR5 | WK8 |
|---|---|---|---|---|---|
| Rated Dissipation at 70°C | W | 1.0 | 2.0 | 3.0 | 4.0 |
| Limiting Element Voltage [1] | $U_{\sim}$ | 500 | 500 | 750 | 750 |
| Insulation Voltage (1 min) | $V_{eff}$ | > 500 | > 500 | > 500 | > 500 |
| Thermal Resistance (max) | K/W | ≤140 | ≤100 | ≤70 | ≤60 |
| Insulation Resistance | Ω | $> 10^9$ | | | |
| Voltage Coefficient | 1/V | $< 10^{-7}$ | | | |
| Thermal Time Constant | s | 14 | 20 | 35 | 70 |
| Category Temperature Range [2] | °C | - 55 to + 200 | | | |
| Terminal Strength, axial | N | > 60 | > 80 | > 80 | > 80 |
| Failure Rate | $10^{-9}$/h | < 1 | | | |
| Weight | g | 0.2 | 0.7 | 1.5 | 3.5 |

[1] Rated Voltage $\sqrt{P \times R}$

[2] For values < 10R the upper limiting temperature is 155 °C. The power rating is correspondingly lower and can be calculated by $R_{th}$

## PART NUMBER AND PRODUCT DESCRIPTION WK-SERIES

**PART NUMBER: WK202070C1001FD5**

| W | K | 2 | 0 | 2 | 0 | 7 | 0 | C | 1 | 0 | 0 | 1 | F | D | 5 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| MODEL\SIZE | SPECIAL CHARACTER | TC | VALUE | TOLERANCE | PACKING | SPECIAL |
|---|---|---|---|---|---|---|
| **WK20207**<br>**WK80922** | **0 =** Neutral | **C** = ± 50 ppm/K<br>**B** = ± 100 ppm/K<br>**A** = ± 200 ppm/K | **3 digit value**<br>**1 digit multiplier** | **F** = ± 1 %<br>**G** = ± 2 %<br>**J** = ± 5 % | **22** = A2<br>**25** = A5<br>**5C** = AC<br>**D5** = R5<br>**G1** = R1 | up to 2 digits<br>**00 =** Standard |

MULTIPLIER

**7 =** $*10^{-3}$
**8 =** $*10^{-2}$
**9 =** $*10^{-1}$
**0 =** $*10^{0}$
**1 =** $*10^{1}$
**2 =** $*10^{2}$
**3 =** $*10^{3}$
**4 =** $*10^{4}$
**5 =** $*10^{5}$
**6 =** $*10^{6}$

**PRODUCT DESCRIPTION: WK2 50 1K0 1% R5**

| WK2 | 50 | 1K0 | 1 % | R5 |
|---|---|---|---|---|
| MODEL | TC | RESISTANCE VALUE | TOLERANCE | PACKING[1)] |
| **WK2**<br>**WK8** | ± **50** ppm/K<br>± **100** ppm/K<br>± **200** ppm/K | **49K9** = 49.9 KΩ<br>**50R1** = 50.1 Ω | ± **1** %<br>± **2** %<br>± **5** % | **A2**<br>**A5**<br>**AC**<br>**R5**<br>**R1** |

[1)] Please refer to table PACKING, page 3.

## PART NUMBER AND PRODUCT DESCRIPTION WR-SERIES

**PART NUMBER: WR404140A1001GDE**

| W | R | 4 | 0 | 4 | 1 | 4 | 0 | A | 1 | 0 | 0 | 1 | G | D | E | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| MODEL\SIZE | SPECIAL CHARACTER | TC | VALUE | TOLERANCE | PACKING | SPECIAL |
|---|---|---|---|---|---|---|
| **WR40414**<br>**WR50617** | **0 =** Neutral | **A** = ± 200 ppm/K | **3 digit value**<br>**1 digit multiplier** | **G** = ± 2 %<br>**J** = ± 5 % | **41** = A1 G73<br>**51** = A1 G77<br>**DE** = RE G53<br>**FE** = RE G73<br>**GP** = RP | up to 2 digits<br>**00 =** Standard |

MULTIPLIER

**7 =** $*10^{-3}$
**8 =** $*10^{-2}$
**9 =** $*10^{-1}$
**0 =** $*10^{0}$
**1 =** $*10^{1}$
**2 =** $*10^{2}$
**3 =** $*10^{3}$
**4 =** $*10^{4}$
**5 =** $*10^{5}$
**6 =** $*10^{6}$

**PRODUCT DESCRIPTION: WR4 200 1K0 2% RE**

| WR4 | 200 | 1K0 | 2 % | RE |
|---|---|---|---|---|
| MODEL | TC | RESISTANCE VALUE | TOLERANCE | PACKING[1)] |
| **WR4**<br>**WR5** | ± **200** ppm/K | **49K9** = 49.9 KΩ<br>**50R1** = 50.1 Ω | ± **2** %<br>± **5** % | **A1 (G73)**<br>**A1 (G77)**<br>**RE (G53)**<br>**RE (G73)**<br>**RP** |

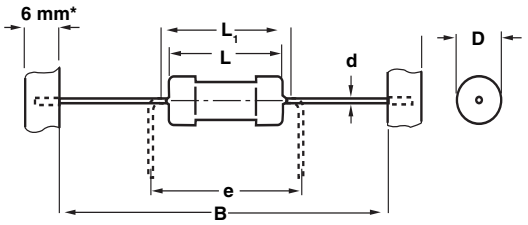
[1)] Please refer to table PACKING, page 3.

NOTE: Products can be ordered using either the Product Description or the Part Number.

## PACKING

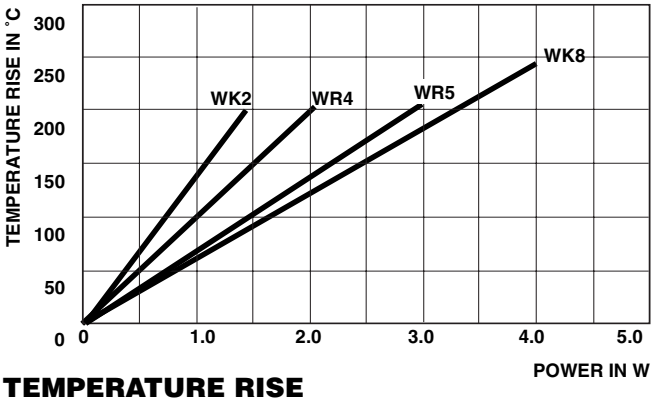
| MODEL | REEL | | | BOX | | |
|---|---|---|---|---|---|---|
| | PIECES / REEL | CODE | MIN. ORDER QTY PACKING UNITS | PIECES / BOX | CODE | MIN. ORDER QTY PACKING UNITS |
| WK2 | 5 000 | R5 | 1 | 5 000<br>2 000 | A5<br>A2 | 1<br>1 |
| WR4 | 2 500 | RE | 2 | 1 000 | A1 | 2 |
| WR5 | 1 500 | RP | 2 | 1 000 | A1 | 2 |
| WK8 | 1 000 | R1 | 2 | 5 00 | AC | 2 |

## DIMENSIONS

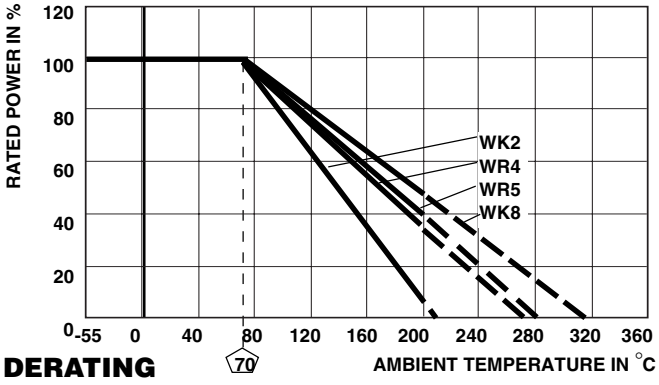



| MODEL | DIMENSIONS [in millimeters] | | | | | |
|---|---|---|---|---|---|---|
| | D | L | $L_{1max}$ | B | d | e |
| WK2 | 2.5 $_{-0.5}$ | 6.3 $_{-0.5}$ | 8.0 | 53 ±1 | 0.6 | 7.5 |
| WR4 | 4.1 $_{-0.5}$ | 12.0 $_{-1.5}$ | 16.0 | 73 ±1 | 0.8 | 15.0 |
| WR5 | 6.0 $_{-0.5}$ | 16.5 $_{-1.5}$ | 20.0 | 77 ±1 | 0.8 | 17.5 |
| WK8 | 9.0 $_{-0.5}$ | 20.0 $_{-1.5}$ | 24.0 | 77 ±1 | 0.8 | 22.5 |

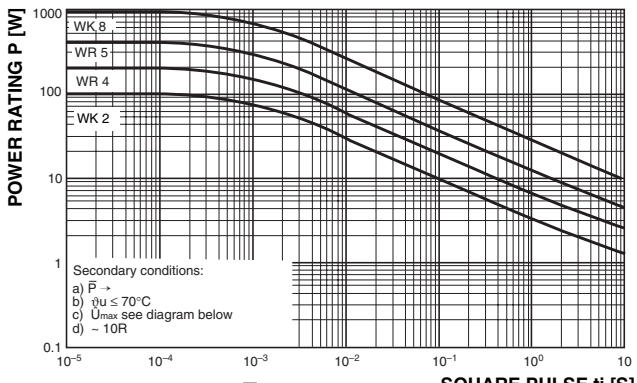
· Taping in acc. with IEC60286-1
· D and L measured in acc. with IEC60294
· d according to IEC60301
* 9mm for WR5/WK8



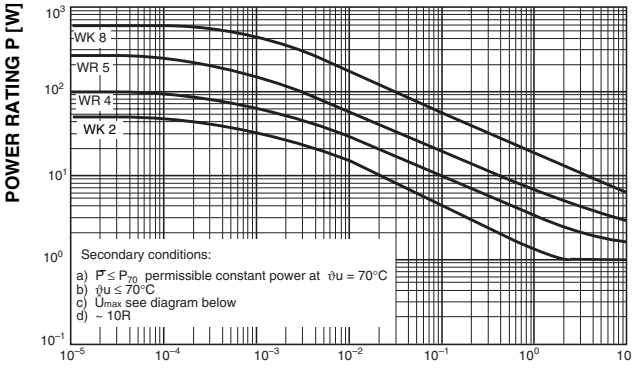

### TEMPERATURE RISE



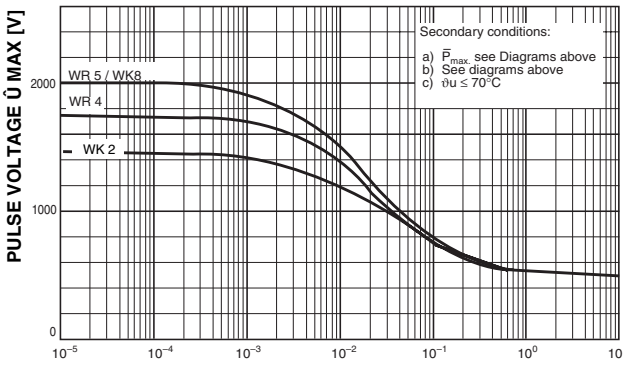

### DERATING



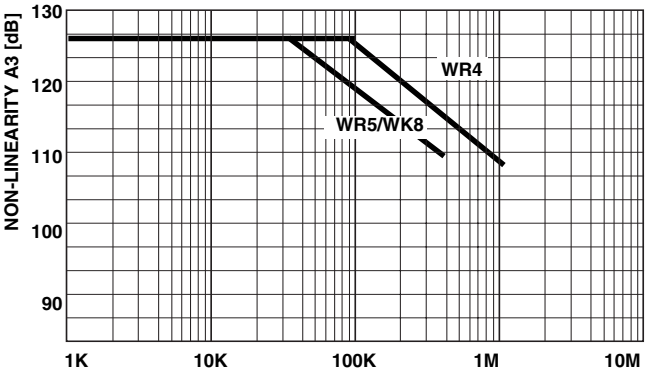

### PULSE RATING $\bar{P} \rightarrow 0$



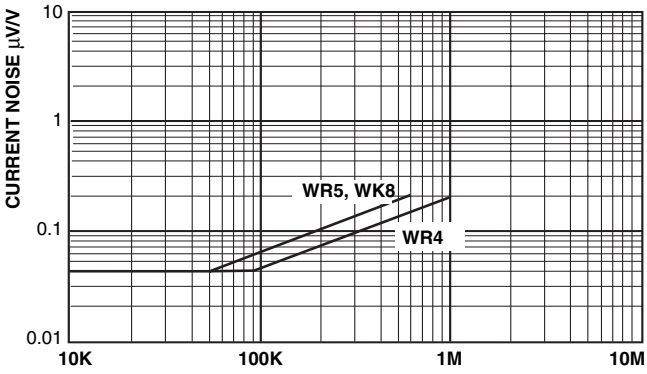

### PULSE RATING $\bar{P} \leq$ P70




**MAX. PULSE VOLTAGE**




**NON-LINEARITY**




**CURRENT NOISE**

## PERFORMANCE

| TEST | CONDITIONS OF TEST | REQUIREMENTS* |
|---|---|---|
| Rated Dissipation at 70°C<br>IEC 60115-1 4.25.1 | 1000 hours at 70˚C 1.5 hours "ON", 0.5 hours "OFF" | WK2 = ± 1.5%<br>WK4/8 = ± 2.0%<br>WR4/5 = ± 5.0% |
| Endurance at UCT<br>IEC 60115-1 4.25.3 | 1000 hours at 155°C without load | ≤ ± 1% |
| Overload Test<br>IEC 60115-1 4.13 | Short time overload 5 seconds at 2.5 x rated voltage<br>or ≤ ± twice the limiting element voltage | ≤ ± 0.25% |
| Thermal Shock<br>IEC 60115-1 4.19, IEC 60068-2-14 | Rapid change between upper and lower category temperature | ≤ ± 0.25% |
| Climatic Sequence<br>IEC 60115-1 4.23 | Dry heat, damp heat cycle, cold, low air pressure | ≤ ± 0.5% |
| Damp Heat Steady State<br>IEC 60115-1 4.24, IEC 60068-2-3 | 56 days at 40°C and 93% relative humidity | ≤ ± 1.5% |
| Resistance to Soldering Heat<br>IEC 60115-1 4.18, IEC 60068-2-20 | 10 seconds at 260°C solder bath temperature | ≤ ± 0.25% |
| Robustness of Terminations<br>IEC 60115-1 4.16 | Tensile, bending and torsion | ≤ ± 0.25% |
| Vibration<br>IEC 60115-1 4.22 | 0.75mm or 10g, 10Hz - 500Hz 6 hours | ≤ ± 0.25% |

* Limits for change of resistance at test

## APPLICABLE SPECIFICATIONS

- CECC 40000
- EN 140000 IEC 60115 - 1

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