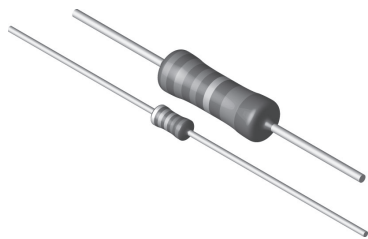


Metal Film, Standard, Professional



FEATURES

- Stable metal film on high quality ceramic
- Low temperature coefficient and tolerances
- 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)
- Excellent stability
- Force fitted metal caps retain a good electrical connection to the resistive film
- Suitable for commercial and professional applications



STANDARD ELECTRICAL SPECIFICATIONS

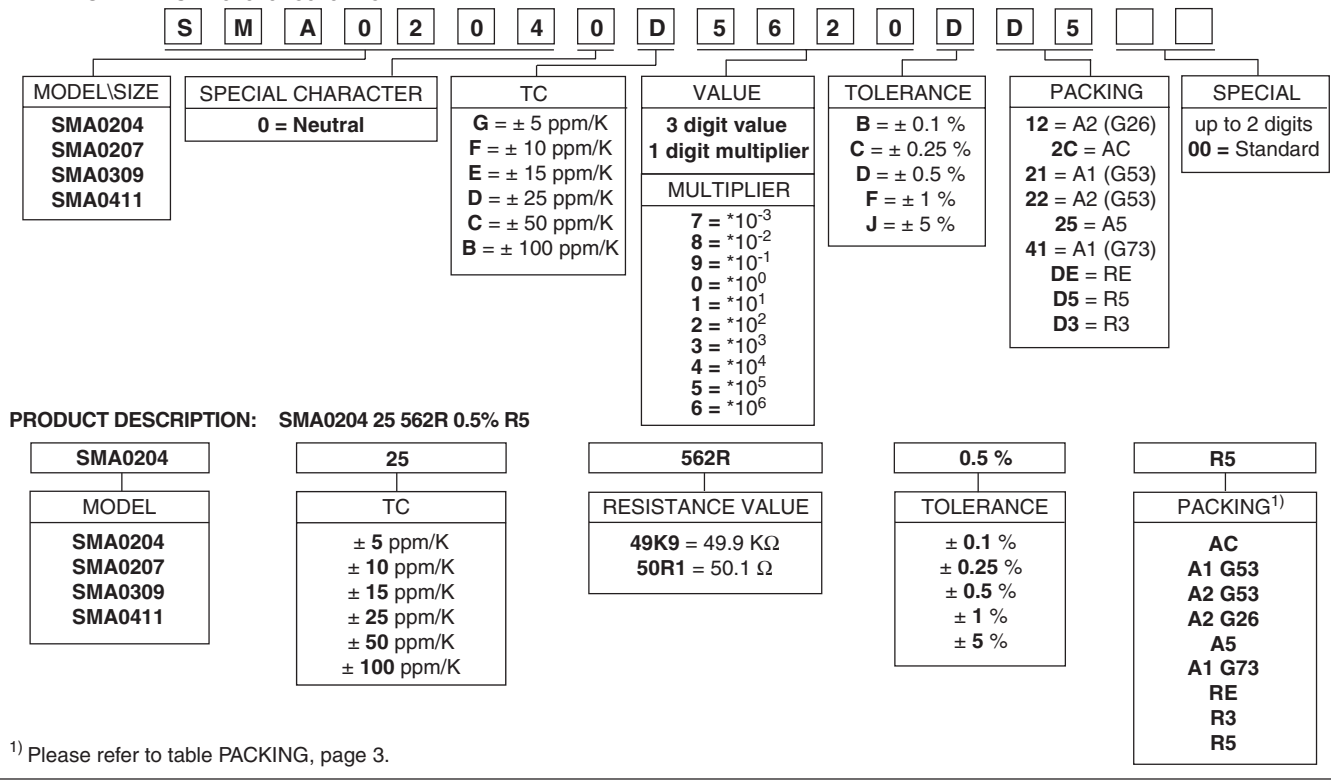
| MODEL | SIZE | POWER RATING $P_{70^{\circ}\text{C}}$ W | LIMITING ELEMENT VOLTAGE MAX. V_{\cong} | TEMPERATURE COEFFICIENT ppm/K | TOLERANCE % | RESISTANCE RANGE Ω | E-SERIES |
|----------------|------|---|---|-------------------------------------|--------------------------------------|---|----------------------------------|
| SMA0204 MK1 | 0204 | 0.4 | 250 | ± 25 | ± 0.5 | 10R - 1M0 | 24 - 192 |
| SMA0204 MK1 | 0204 | 0.4 | 250 | ± 50 | ± 0.5 ± 1 | 10R - 1M0 1R0 - 10M | 24 - 192 24 - 96 |
| SMA0204 MK1 | 0204 | 0.4 | 250 | ± 100 | ± 5 | R22 - 10M | 24 |
| SMA0204* | 0204 | 0.5 | 250 | ± 15 | $\pm 0.1, \pm 0.25, \pm 0.5$ | 51R1 - 332K | 24 - 192 |
| SMA0204* | 0204 | 0.5 | 250 | ± 25 | ± 0.1 ± 0.25 ± 0.5 | 51R1 - 332K 22R - 322K 10R - 511K | 24 - 192 24 - 192 24 - 192 |
| SMA0204* | 0204 | 0.5 | 250 | ± 50 | ± 0.5 ± 1 | 10R - 511K 1R0 - 7M5 | 24 - 192 24 - 96 |
| SMA0204* | 0204 | 0.5 | 250 | ± 100 | ± 5 | 1R0 - 7M5 | 24 |
| SMA0207 MK2 | 0207 | 0.25 | 350 | ± 5 | $\pm 0.1, \pm 0.25, \pm 0.5$ | 1K0 - 100K | 192 |
| SMA0207 MK2 | 0207 | 0.25 | 350 | ± 10 | $\pm 0.1, \pm 0.25, \pm 0.5$ | 510R - 100K | 192 |
| SMA0207 MK2 | 0207 | 0.6 | 350 | ± 15 | $\pm 0.1, \pm 0.25, \pm 0.5$ | 47R - 1M0 | 24 - 192 |
| SMA0207 MK2 | 0207 | 0.6 | 350 | ± 25 | ± 0.1 ± 0.25 ± 0.5 | 47R - 1M0 10R - 1M0 1R0 - 2M2 | 24 - 192 24 - 192 24 - 192 |
| SMA0207 MK2 | 0207 | 0.6 | 350 | ± 50 | ± 0.5 ± 1 | 1R0 - 2M2 1R0 - 10M | 24 - 96 24 - 96 |
| SMA0207 MK2 | 0207 | 0.6 | 350 | ± 100 | ± 5 | R16 - 10M | 24 |
| SMA0309 | 0309 | 0.7 | 350 | ± 50 | ± 1 | 10R - 1M0 | 24 - 96 |
| SMA0309 | 0309 | 0.7 | 350 | ± 100 | ± 5 | 10R - 1M0 | 24 |
| SMA0411 | 0411 | 1.0 | 500 | ± 15 | $\pm 0.1, \pm 0.25, \pm 0.5$ | 47R - 1M0 | 24 - 192 |
| SMA0411 | 0411 | 1.0 | 500 | ± 25 | ± 0.1 $\pm 0.25, \pm 0.5$ | 47R - 1M0 10R - 1M0 | 24 - 192 24 - 192 |
| SMA0411 | 0411 | 1.0 | 500 | ± 50 | ± 0.5 ± 1 | 10R - 1M0 1R0 - 10M | 24 - 96 24 - 96 |
| SMA0411 | 0411 | 1.0 | 500 | ± 100 | ± 5 | 1R0 - 10M | 24 |
| MK4 | 0414 | 1.0 | 500 | ± 25 | ± 0.5 | 10R - 2M4 | 24 - 192 |
| MK4 | 0414 | 1.0 | 500 | ± 50 | ± 0.5 ± 1.0 | 10R - 2M4 1R0 - 10M | 24 - 96 24 - 96 |
| MK4 | 0414 | 1.0 | 500 | ± 100 | ± 5 | R22 - 10M | 24 |
| MK5 | 0617 | 1.2 | 600 | ± 50 | ± 0.5 ± 1 | 10R - 2M4 1R0 - 5M1 | 24 - 96 24 - 96 |
| MK5 | 0617 | 1.2 | 600 | ± 100 | ± 5 | R22 - 5M1 | 24 |
| MK8 | 0922 | 1.5 | 600 | ± 50 | ± 0.5 ± 1 | 10R - 2M4 1R0 - 2M4 | 24 - 96 24 - 96 |
| MK8 | 0922 | 1.5 | 600 | ± 100 | ± 5 | R22 - 2M4 | 24 |

- Temperature coefficient $\leq 10\text{ppm}/^{\circ}\text{C}$: temperature range $-25^{\circ}\text{C}.. +85^{\circ}\text{C}$
- Limiting element voltage $\sqrt{P \times R}$
- Further values and tolerances on request
- For Zero-ohm resistors, special assembly versions, and marking please see appropriate catalog or web page.



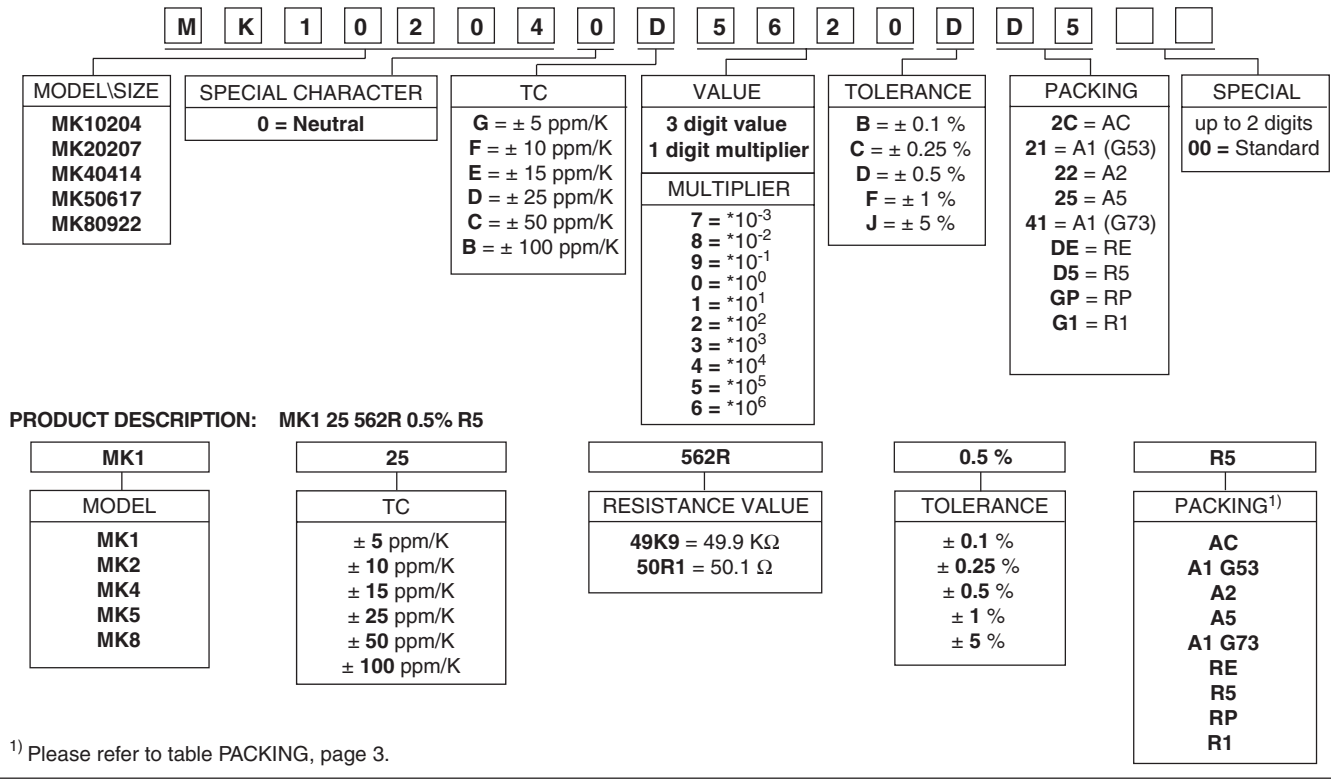
PART NUMBER AND PRODUCT DESCRIPTION SMA-SERIES

PART NUMBER: SMA02040D5620DD5



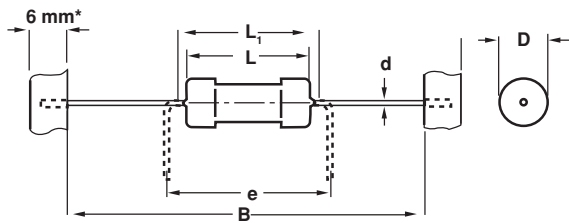
PART NUMBER AND PRODUCT DESCRIPTION MK-SERIES

PART NUMBER: MK102040D5620DD5



| PACKING | | | | | |
|---------|---------------|------|-----------------------|----------------|--------------------------------|
| MODEL | REEL | | BOX | | MIN.ORDER QTY PACKING UNITS |
| | PIECES / REEL | CODE | PIECES / BOX | CODE | |
| SMA0204 | 5000 | R5 | 2 000 500 | A2 AC | 1 |
| MK1 | 5 000 | R5 | 5 000 2 000 | A5 A2 | 1 |
| SMA0207 | 5000 | R5 | 2 000 1 000 500 | A2 A1 AC | 1 |
| MK2 | 5000 | R5 | 5 000 2 000 | A5 A2 | 1 |
| SMA0309 | 3000 | R3 | 5 000 2 000 | A5 A2 | 1 |
| SMA0411 | 2500 | RE | 1 000 500 | A1 AC | 1 |
| | 2500 | RE | 1 000 | A1 | 1 |
| MK4 | 2500 | RE | 1 000 | A1 | 1 |
| MK5 | 1500 | RP | 1 000 | A1 | 1 |
| MK8 | 1000 | R1 | 500 | AC | 1 |

DIMENSIONS



- Taping in acc. with IEC60286-1
- D and L measured in acc. with IEC60294
- d according to IEC60301

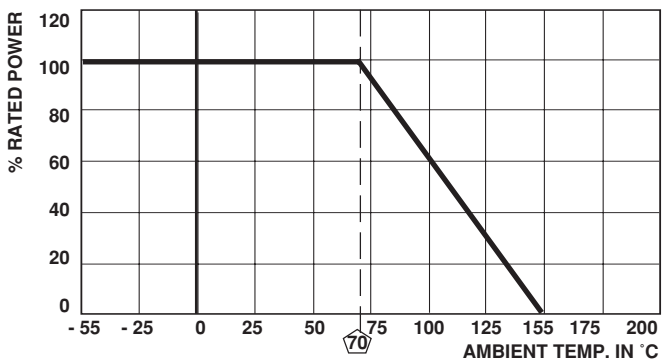
¹⁾ Also available in 26mm taping. *9mm for MK5, MK8

| MODEL | DIMENSIONS [in millimeters] | | | | | |
|-------------|-----------------------------|----------------------|--------------------|---------------------|-----|------|
| | D _{max} | L | L ₁ MAX | B | d | e |
| SMA0204/MK1 | 1.6 _{-0.3} | 3.6 _{-0.4} | 4.0 | 53 ±1 ¹⁾ | 0.5 | 5.0 |
| SMA0204 | 1.8 _{-0.25} | 3.6 _{-0.3} | 4.0 | 53 ±1 ¹⁾ | 0.5 | 5.0 |
| SMA0207/MK2 | 2.5 _{-0.3} | 6.3 _{-0.5} | 7.0 | 53 ±1 ¹⁾ | 0.6 | 7.5 |
| SMA0309 | 3.0 _{-0.4} | 8.2 _{-0.6} | 9.5 | 53 ±1 | 0.7 | 10 |
| SMA0411 | 3.7 _{-0.4} | 10.5 _{-0.6} | 12.5 | 53 ±1 | 0.7 | 12.5 |
| MK4 | 4.1 _{-0.5} | 12.0 _{-1.5} | 14.0 | 73 ±1 | 0.8 | 15 |
| MK5 | 6.0 _{-0.5} | 16.5 _{-1.5} | 18.5 | 77 ±1 | 0.8 | 17.5 |
| MK8 | 9.0 _{-0.5} | 20.0 _{-1.5} | 24.0 | 77 ±1 | 0.8 | 22.5 |

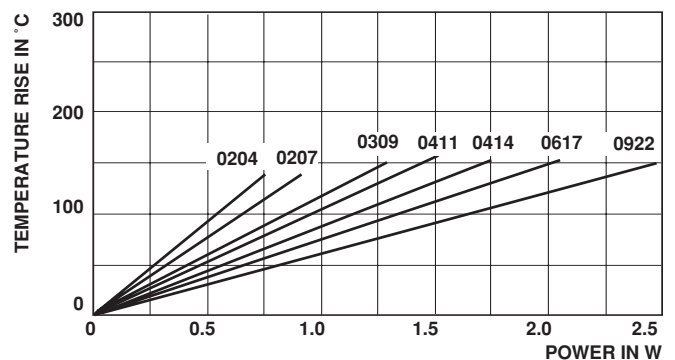


| TECHNICAL SPECIFICATIONS | | | | | | | | | |
|--|---------------------|-------------------|-----------------------|-------------|---------|---------|------|------|------|
| PARAMETER | UNIT | MK1 | SMA0204 ²⁾ | SMA0207/MK2 | SMA0309 | SMA0411 | MK4 | MK5 | MK8 |
| Rated Dissipation at 70 °C | W | 0.4 | 0.5 | 0.6 | 0.7 | 1.0 | 1.0 | 1.2 | 1.5 |
| Limiting Element Voltage ²⁾ | V _≧ | ≤250 | ≤250 | ≤350 | ≤350 | ≤500 | ≤500 | ≤600 | ≤600 |
| Insulation Voltage (1min) | V _{eff} | >500 | >500 | >700 | >700 | >700 | >500 | >500 | >500 |
| Thermal Resistance | K/W | ≤200 | ≤170 | ≤140 | ≤120 | ≤100 | ≤95 | ≤70 | ≤60 |
| Insulation Resistance | Ω | ≥10 ¹¹ | | | | | | | |
| Category Temperature Range | °C | -55 to +155 | | | | | | | |
| Failure Rate | 10 ⁻⁹ /h | <1 | | | | | | | |
| Terminal Strength, axial | N | >30 | >30 | >50 | >60 | >60 | >80 | >80 | >80 |
| Weight | g | 0.1 | 0.14 | 0.22 | 0.31 | 0.52 | 0.67 | 1.5 | 3.3 |

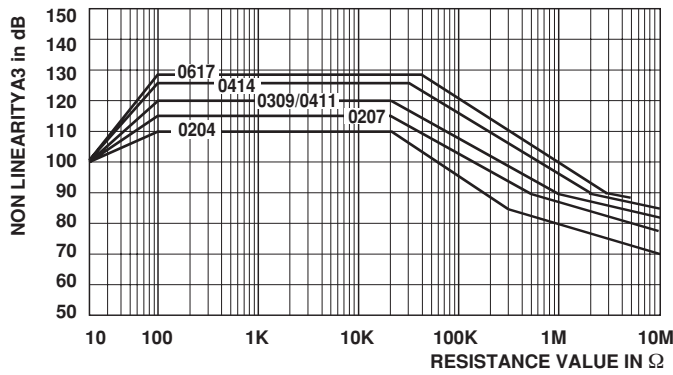
²⁾Rated Voltage $\sqrt{P \times R}$



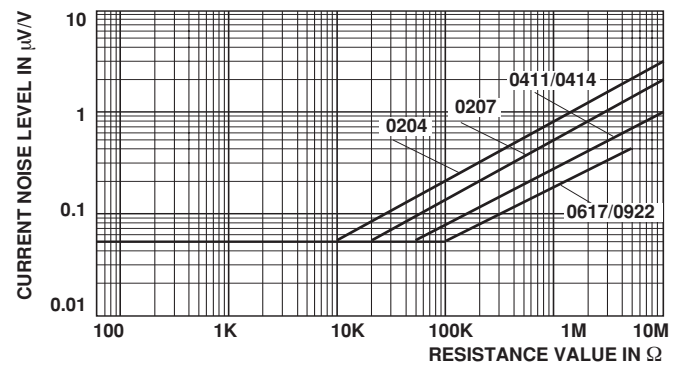
DERATING



TEMPERATURE RISE

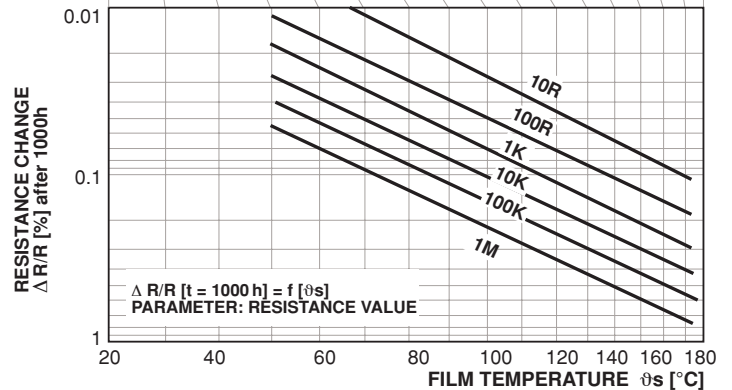
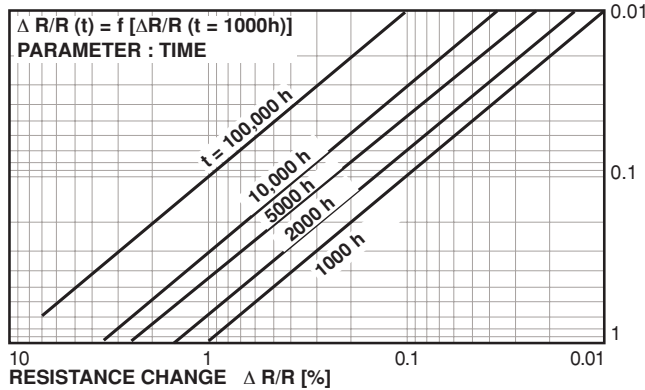
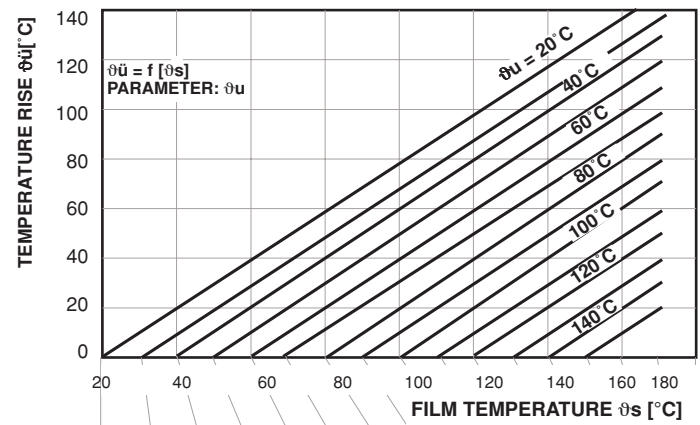
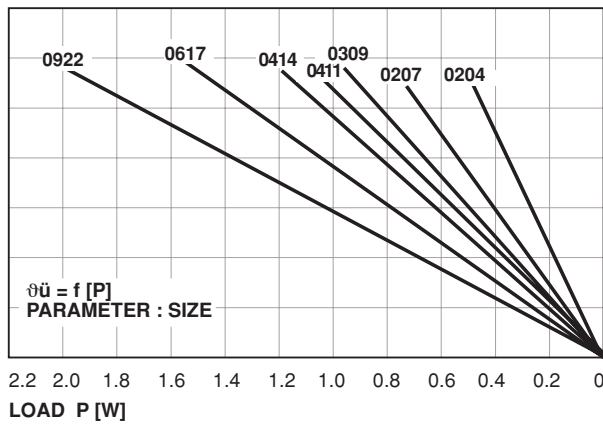


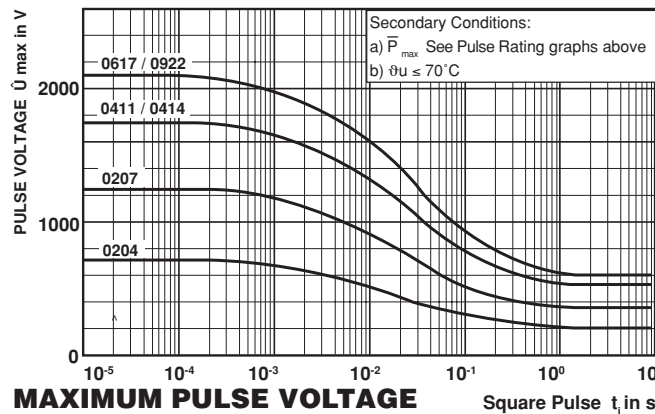
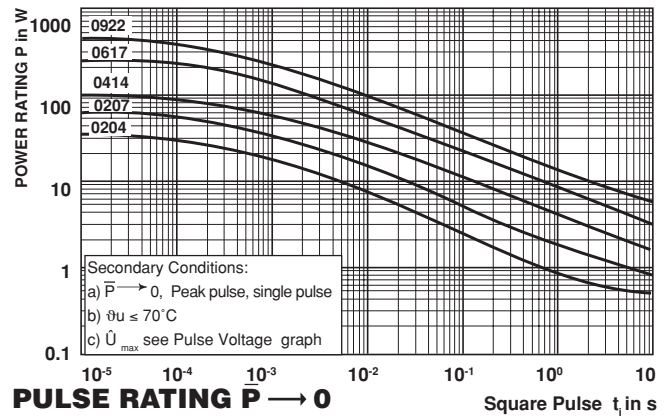
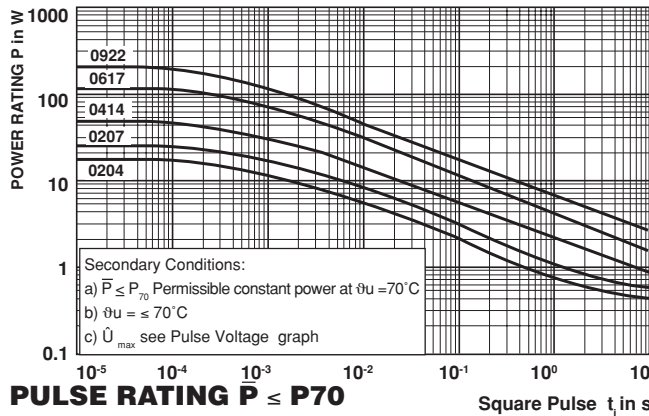
NON-LINEARITY



CURRENT NOISE

STABILITY NOMOGRAM, TYPICAL VALUES (For handling see General Information)





| PERFORMANCE | | |
|--|--|--------------------------------------|
| TEST | CONDITIONS OF TEST | REQUIREMENTS* |
| Endurance at 70°C IEC 60115-1 4.25.1 | 1000 hours at 70°C 1.5 hours "ON", 0.5 hours "OFF" 8000 hours at 70°C 1.5 hours "ON", 0.5 hours "OFF" | $\leq \pm 0.5\%$ $\leq \pm 1.0\%$ |
| Endurance at Upper Category Temperature IEC 60115-1 4.25.3 | 1000 hours at 155°C without load 8000 hours at 155°C without load | $\leq \pm 0.5\%$ $\leq \pm 1.0\%$ |
| Overload Test IEC 60115-1 4.13 | Short time overload at 6.25 x rated power 2 seconds for size 0204 and 5s for sizes ≥ 0207 | $\leq \pm 0.1\%$ |
| Thermal Shock IEC 60115-1 4.19 IEC 60068-2-14 | Rapid change between upper and lower category temperature | $\leq \pm 0.1\%$ |
| Climatic Sequence IEC 60115-1 4.23 | Dry heat, damp heat cyclic, cold, low air pressure | $\leq \pm 0.5\%$ |
| Damp Heat Steady State IEC 60115-1 4.24 IEC 60068-2-3 | 56 days at 40°C and 93% relative humidity | $\leq \pm 0.5\%$ |
| Resistance to Soldering Heat IEC 60115-1 4.18; IEC 60068-2-20 | 10 seconds at 260°C solder bath temperature | $\leq \pm 0.1\%$ |
| Robustness of Terminations IEC 60115-1 4.16 | Tensile, bending and torsion | $\leq \pm 0.1\%$ |
| Vibration IEC 60115-1 4.22 | 0.75mm or 10g, 10Hz - 500Hz 6 hours | $\leq \pm 0.1\%$ |

* for a resistance range from 10Ω to 2MΩ, limits for change of resistance at test

| APPLICABLE SPECIFICATIONS |
|--|
| <ul style="list-style-type: none"> CECC 40000 / 40100 / 40101 EN 140 000 / 140 100 |



Notice

Specifications of the products displayed herein are subject to change without notice. Vishay Intertechnology, Inc., or anyone on its behalf, assumes no responsibility or liability for any errors or inaccuracies.

Information contained herein is intended to provide a product description only. No license, express or implied, by estoppel or otherwise, to any intellectual property rights is granted by this document. Except as provided in Vishay's terms and conditions of sale for such products, Vishay assumes no liability whatsoever, and disclaims any express or implied warranty, relating to sale and/or use of Vishay products including liability or warranties relating to fitness for a particular purpose, merchantability, or infringement of any patent, copyright, or other intellectual property right.

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Vishay for any damages resulting from such improper use or sale.