

Non-magnetic metal thin film chip resistors

NRG series

Features

- Thin film chip resistors using non-magnetic materials
- Long term stability with inorganic passivation
- High precision resistance tolerance: $\pm 0.05\%$, very small TCR: $\pm 5\text{ppm}/^\circ\text{C}$
- Thin film structure enabling low noise and anti-sulfur

Applications

- Medical electronics, industrial measurement instrumentation
- equipment/devices under magnetic field



Thin film surface mount resistors

NRG series

◆ Part numbering system

NRG 2012 N - 104 - W - T1

Series code

Size: NRG1005, NRG1608, NRG2012, NRG3216

Temperature coefficient of resistance

Packaging quantity:
T5(5,000pcs) T10(10,000pcs)

Resistance tolerance

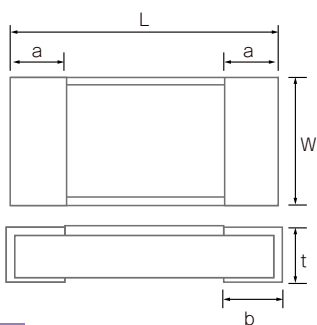
Nominal resistance value
(E-24: 3 digit, E-96: 4 digit, NRG3216: all 4 digit)

◆ Electrical Specification

| Type | Power ratings | Temperature coefficient of resistance (ppm/ $^\circ\text{C}$) | Resistance range(Ω) Resistance tolerance | | | Maximum voltage | Resistance value series | Operating temperature | Packaging quantity |
|---------|---------------|--|---|-----------------------|-----------------------|-----------------|-------------------------|--|--------------------|
| | | | $\pm 0.05\%$ (W) | $\pm 0.1\%$ (B) | $\pm 0.5\%$ (D) | | | | |
| NRG1005 | 1/16W | ± 5 (V) | $100 \leq R \leq 3k$ | | — | 75V | E-24, E-96 | $-55^\circ\text{C} \sim 155^\circ\text{C}$ | T5 T10*1 |
| | | ± 10 (N) | $47 \leq R \leq 100k$ | | | | | | |
| | | ± 25 (P) | $47 \leq R \leq 150k$ | | | | | | |
| | | ± 100 (R) | — | $10 \leq R \leq 47$ | | | | | |
| NRG1608 | 1/10W | ± 5 (V) | $100 \leq R < 5.1k$ | | | 100V | E-24, E-96 | $-55^\circ\text{C} \sim 155^\circ\text{C}$ | T5 |
| | | ± 10 (N) | $47 \leq R \leq 270k$ | | | | | | |
| | | ± 25 (P) | $47 \leq R \leq 270k$ | $47 \leq R \leq 332k$ | $47 \leq R \leq 360k$ | | | | |
| | | ± 50 (Q) | — | — | $10 \leq R < 47$ | | | | |
| NRG2012 | 1/8W | ± 5 (V) | $100 \leq R < 10.2k$ | | | 150V | E-24, E-96 | $-55^\circ\text{C} \sim 155^\circ\text{C}$ | T5 |
| | | ± 10 (N) | $47 \leq R \leq 475k$ | | | | | | |
| | | ± 25 (P) | $47 \leq R \leq 475k$ | $47 \leq R \leq 1M$ | | | | | |
| | | ± 50 (Q) | — | — | $10 \leq R < 47$ | | | | |
| NRG3216 | 1/4W | ± 5 (V) | $100 \leq R < 33.2k$ | | | 200V | E-24, E-96 | $-55^\circ\text{C} \sim 155^\circ\text{C}$ | T5 |
| | | ± 10 (N) | $47 \leq R \leq 1M$ | | | | | | |
| | | ± 25 (P) | $47 \leq R \leq 1M$ | | | | | | |
| | | ± 50 (Q) | — | — | $10 \leq R < 47$ | | | | |

*1 : Resistance tolerance $\pm 0.5\%$ (D) of NRG1005 is available only at T10

◆ Dimensions



| Type | Size (inch) | L | W | a | b | t |
|---------|-------------|-----------------|------------------------|-----------------|-----------------|------------------------|
| NRG1005 | 0402 | 1.00 ± 0.05 | 0.50 ± 0.05 | 0.20 ± 0.10 | 0.25 ± 0.05 | 0.35 ± 0.05 |
| NRG1608 | 0603 | 1.60 ± 0.20 | $0.80 + 0.25 / - 0.20$ | 0.30 ± 0.20 | 0.30 ± 0.20 | $0.40 + 0.15 / - 0.10$ |
| NRG2012 | 0805 | 2.00 ± 0.20 | $1.25 + 0.25 / - 0.20$ | 0.40 ± 0.20 | 0.40 ± 0.20 | $0.40 + 0.15 / - 0.10$ |
| NRG3216 | 1206 | 3.20 ± 0.20 | 1.60 ± 0.25 | 0.50 ± 0.25 | 0.50 ± 0.20 | $0.40 + 0.15 / - 0.10$ |

(unit : mm)

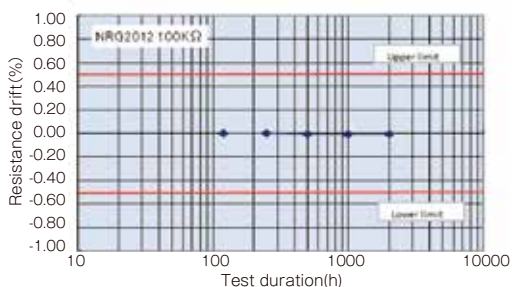
◆ Reliability specification

| Test items | Condition (test methods (MIL-PRF-55342/JIS C5201-1)) | Standard |
|--------------------------------|--|--------------|
| Short time overload | 2.5 x rated voltage, ^{*1} 5seconds | ±0.5%+0.01Ω |
| Life (biased) | 70°C, rated voltage, ^{*1} 90min on 30min off, 1000hours | ±0.5%+0.05Ω |
| High temperature high humidity | 85°C, 85%RH, 1/10 of rated power, 90min on 30min off, 1000hours | ±0.5%+0.01Ω |
| Temperature shock | -55°C (30min) ~ 125°C (30min) 1000 cycles | ±0.5%+0.01Ω |
| High temperature exposure | 155°C, no bias, 1000hours | ±0.5%+0.01Ω |
| Resistance to soldering heat | 260±5°C, 10 seconds (reflow) | ±0.05%+0.01Ω |

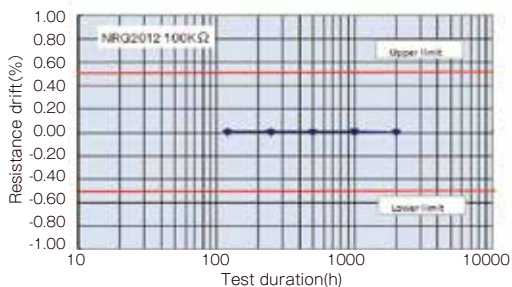
*1 Rated voltage is given by $E = \sqrt{R \times P}$ E= rated voltage (V), R=nominal resistance value(Ω), P=rated power(W)
If rated voltage exceeds maximum voltage /element, maximum voltage/element is the rated voltage.

◆ Reliability test data

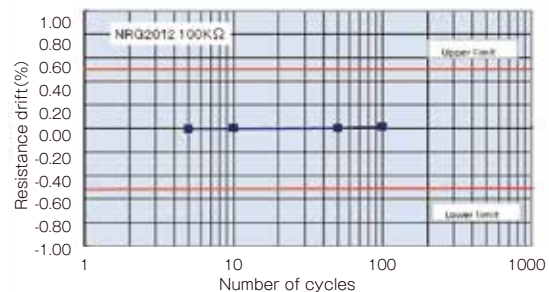
○ Biased life test



○ High temperature high humidity (biased)



○ Temperature shock



◆ Derating Curve

