

FEATURES

- SURFACE MOUNT IN SIZES 0102 (0805), 0204 (1406) AND 0207 (2410)
- AVAILABLE IN PRECISION TOLERANCE AND TC (TO $\pm 0.1\%$ TOL. AND ± 10 PPM TC)
- ALL SIZES ARE AVAILABLE IN TAPE/REEL FOR AUTOMATIC MOUNTING
- SAC REFLOW SOLDERABLE (+260°C FOR 3 SECONDS)
- AVAILABLE IN ZERO OHM JUMPER



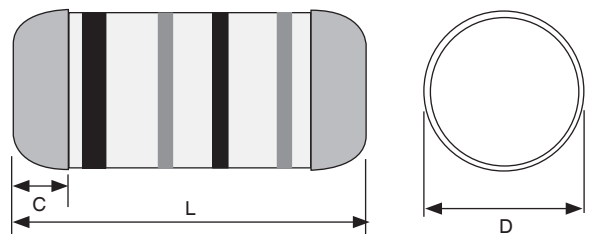
STANDARD POWER SPECIFICATIONS

| Type | Size | Power Rating at 70°C | Max. *1 Working Voltage | Max. *2 Overload Voltage | Resistance Tolerance Code | Temperature Coefficient (ppm/°C) | Resistance Range (Ω)*3 | Resistance Values | Operating Temperature Range |
|----------|-------------|----------------------|-------------------------|--------------------------|--|----------------------------------|---------------------------------|------------------------------------|-----------------------------|
| NFR0102W | 0102 (0805) | 0.125W | 150V | 300V | $\pm 0.1\%$ (B) $\pm 0.25\%$ (C) $\pm 0.5\%$ (D) $\pm 1\%$ (F) | ± 15 (N) | 100 ~ 56K | E-24 & E-96 | -55°C ~ +155°C |
| | | | | | $\pm 0.1\%$ (B) $\pm 0.25\%$ (C) $\pm 0.5\%$ (D) $\pm 1\%$ (F) $\pm 5\%$ (J) | ± 25 (C) | 100 ~ 100K | E-24 & E-96 E-24 | |
| | | | | | ± 0.5 (D) $\pm 1\%$ (F) $\pm 5\%$ (J) | ± 50 (D) | 1.0 ~ 1M | E-24 & E-96 E-24 | |
| | | | | | $\pm 5\%$ (J) | ± 100 (E) | 1.0 ~ 1M | E-24 | |
| | | | | | $\pm 5\%$ (J) | ± 100 (E) | 0.22 ~ 2M | E-24 | |
| | | | | | $\pm 0.1\%$ (B) $\pm 0.25\%$ (C) $\pm 0.5\%$ (D) $\pm 1\%$ (F) | ± 10 (B) | 10 ~ 20K | E-24 & E-96 | |
| NFR0204V | 0204 (1406) | 0.25W | 200V | 400V | $\pm 0.1\%$ (B) $\pm 0.25\%$ (C) $\pm 0.5\%$ (D) $\pm 1\%$ (F) | ± 10 (B) | 10 ~ 20K | E-24 & E-96 | |
| | | | | | $\pm 0.1\%$ (B) $\pm 0.25\%$ (C) $\pm 0.5\%$ (D) $\pm 1\%$ (F) | ± 15 (N) | 10 ~ 300K | E-24 & E-96 | |
| | | | | | ± 0.1 (B) $\pm 0.25\%$ (C) $\pm 0.5\%$ (D) $\pm 1\%$ (F) $\pm 5\%$ (J) | ± 25 (C) | 10 ~ 1M | E-24 & E-96 E-24 & E-96 E-24 | |
| | | | | | $\pm 0.1\%$ (B) $\pm 0.25\%$ (C) $\pm 0.5\%$ (D) $\pm 1\%$ (F) $\pm 5\%$ (J) | ± 25 (C) | 10 ~ 4.7M | E-24 & E-96 E-24 & E-96 E-24 | |
| | | | | | $\pm 0.1\%$ (B) $\pm 0.25\%$ (C) $\pm 0.5\%$ (D) $\pm 1\%$ (F) $\pm 5\%$ (J) | ± 25 (C) | 10 ~ 4.7M | E-24 & E-96 E-24 & E-96 E-24 | |
| | | | | | $\pm 0.1\%$ (B) $\pm 0.25\%$ (C) $\pm 0.5\%$ (D) $\pm 1\%$ (F) | ± 50 (D) | 10 ~ 1M | E-24 & E-96 | |
| | | | | | $\pm 0.25\%$ (C) $\pm 0.5\%$ (D) $\pm 1\%$ (F) $\pm 5\%$ (J) | ± 50 (D) | 1.0 ~ 1M | E-24 & E-96 E-24 & E-96 E-24 | |
| | | | | | $\pm 0.1\%$ (B) $\pm 0.25\%$ (C) $\pm 0.5\%$ (D) $\pm 1\%$ (F) $\pm 5\%$ (J) | ± 50 (D) | 0.2 ~ 10M | E-24 & E-96 E-24 & E-96 E-24 | |
| | | | | | $\pm 1\%$ (F) $\pm 5\%$ (J) | ± 100 (E) | 0.2 ~ 10M | E-24 & E-96 E-24 | |
| | | | | | $\pm 1\%$ (F) $\pm 5\%$ (J) | ± 100 (E) | 0.1 ~ 10M | E-24 & E-96 E-24 & E-96 | |
| | | | | | $\pm 1\%$ (F) $\pm 5\%$ (J) | ± 100 (E) | 0.1 ~ 10M | E-24 & E-96 E-24 | |

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DIMENSIONS (mm)

| Type | Size | L | D | C |
|---------|------|---------------|-----------------|----------|
| NFR0102 | 0102 | 2.0 \pm 0.1 | 1.30 \pm 0.05 | 0.5 min. |
| NFR0204 | 0204 | 3.5 \pm 0.2 | 1.40 \pm 0.15 | 0.5 min. |
| NFR0207 | 0207 | 5.9 \pm 0.2 | 2.20 \pm 0.20 | 0.5 min. |



STANDARD POWER SPECIFICATIONS

| Type | Size | Power Rating at 70°C | Max. *1 Working Voltage | Max. *2 Overload Voltage | Resistance Tolerance Code | Temperature Coefficient (ppm/°C) | Resistance Range (Ω)*3 | Resistance Values | Operating Temperature Range |
|----------|-------------|----------------------|-------------------------|--------------------------|--|----------------------------------|------------------------|-------------------|-----------------------------|
| NFR0207U | 0207 (2410) | 0.50W | 300V | 500V | ±0.1%(B) ±0.25%(C) ±0.5%(D) ±1%(F) | ±10 (B) | 10 ~ 20K | E-24 & E-96 | -55°C ~ +155°C |
| | | | | | ±0.1%(B) ±0.25%(C) ±0.5%(D) ±1%(F) | ±15 (N) | 10 ~ 300K | E-24 & E-96 | |
| | | | | | ±0.1 (B) ±0.25% (C) ±0.5% (D) ±1% (F) | ±25 (C) | 10 ~ 1M | E-24 & E-96 | |
| | | | | | | | 10 ~ 4.7M | E-24 & E-96 | |
| | | | | | | | 10 ~ 4.7M | E-24 | |
| | | | | | ±0.1%(B) ±0.25%(C) ±0.5%(D) ±1%(F) | ±50 (D) | 10 ~ 1M | E-24 & E-96 | |
| | | | | | | | 0.2 ~ 10M | E-24 & E-96 | |
| | | | | | | | 0.2 ~ 10M | E-24 | |
| | | | | | | | 0.1 ~ 10M | E-24 & E-96 | |
| | | | | | | | 0.1 ~ 10M | E-24 | |
| | | | | | ±1%(F) ±5%(J) | ±100 (E) | 0.1 ~ 10M | E-24 & E-96 | |
| | | | | | | | 0.1 ~ 10M | E-24 | |

HIGH POWER SPECIFICATIONS

| Type | Size | Power Rating at 70°C | Max. *1 Working Voltage | Max. *2 Overload Voltage | Resistance Tolerance Code | Temperature Coefficient (ppm/°C) | Resistance Range (Ω)*3 | Resistance Values | Operating Temperature Range |
|----------|-------------|----------------------|-------------------------|--------------------------|---|----------------------------------|------------------------|-------------------|-----------------------------|
| NFR0102P | 0102 (0805) | 0.20W | 200V | 400V | ±0.1%(B) ±0.25%(C) ±0.5%(D) ±1%(F) | ±15 (N) | 100 ~ 56K | E-24 & E-96 | -55°C ~ +155°C |
| | | | | | ±0.1%(B) ±0.25%(C) ±0.5%(D) ±1%(F) | ±25 (C) | 100 ~ 100K | E-24 & E-96 | |
| | | | | | | | ±5%(J) | E-24 | |
| | | | | | | | ±0.5 (D) ±1% (F) | ±50 (D) | |
| | | | | | ±5%(J) | E-24 | | | |
| | | | | | ±5%(J) | ±100 (E) | 0.51 ~ 2.0M | E-24 | |
| NFR0204G | 0204 (1406) | 0.40W | 200V | 400V | ±0.1%(B) ±0.25%(C) ±0.5%(D) ±1%(F) | ±15 (N) | 10 ~ 100K | E-24 & E-96 | |
| | | | | | ±0.1%(B) ±0.25%(C) ±0.5%(D) ±1%(F) | ±25 (C) | 10 ~ 1.0M | E-24 & E-96 | |
| | | | | | | | ±5%(J) | E-24 | |
| | | | | | | | ±0.1% (B) | ±50 (D) | 10 ~ 1.0M |
| | | | | | ±0.25 (C) ±0.5 (D) ±1% (F) | 1.0 ~ 1.0M | | | |
| | | | | | ±1% (F) | ±100 (E) | 0.2 ~ 1.0M | E-24 & E-96 | |
| | | | | | ±5% (J) | | E-24 | | |
| | | | | | ±1% (F) | | 0.1 ~ 1.0M | E-24 & E-96 | |
| | | | | | ±5% (J) | E-24 | | | |

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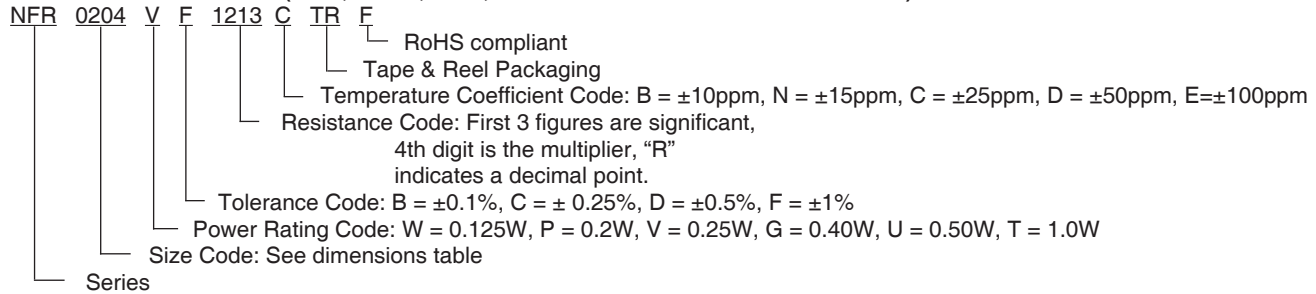
HIGH POWER SPECIFICATIONS

| Type | Size | Power Rating at 70°C | Max. *1 Working Voltage | Max. *2 Overload Voltage | Resistance Tolerance Code | Temperature Coefficient (ppm/°C) | Resistance Range (Ω)*3 | Resistance Values | Operating Temperature Range |
|------------|-------------|----------------------|-------------------------|--------------------------|---------------------------|----------------------------------|------------------------|-------------------|-----------------------------|
| NFR0207T | 0207 (2410) | 1.0W | 350V | 700V | ±0.1% (B) | ±15 (N) | 10 ~ 100K | E-24 & E-96 | |
| | | | | | ±0.25% (C) | | | | |
| | | | | | ±0.5% (D) | | | | |
| | | | | | ±1% (F) | ±25 (C) | 10 ~ 1.0M | E-24 & E-96 | |
| | | | | | ±0.1% (B) | | | | |
| | | | | | ±0.25% (C) | | | | |
| | | | | | ±0.5% (D) | ±50 (D) | 1.0 ~ 1.0M | E-24 & E-96 | |
| | | | | | ±1% (F) | | | | |
| ±5% (J) | 0.2 ~ 1.0M | E-24 & E-96 | | | | | | | |
| ±0.1% (B) | | | | | | | | | |
| ±0.25% (C) | ±100 (E) | 0.1 ~ 1.0M | E-24 & E-96 | | | | | | |
| ±0.5% (D) | | | | | | | | | |
| ±1% (F) | E-24 | | | | | | | | |
| ±5% (J) | | | | | | | | | |

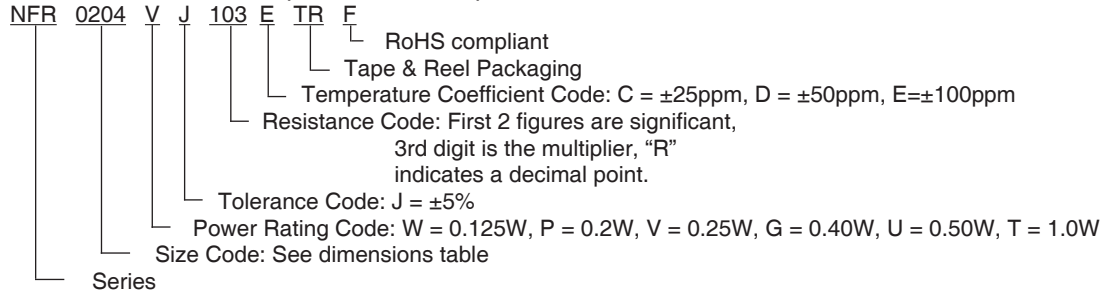
ZERO OHM JUMPER SPECIFICATIONS

| Type | Size | Maximum Current | Maximum Resistance | Operating Temperature Range |
|--------------|------|-----------------|----------------------|-----------------------------|
| NFR0204ZOTRF | 0204 | Max. current 2A | Max. resistance 15mΩ | -55°C ~ +155°C |
| NFR0207ZOTRF | 0207 | Max. current 4A | Max. resistance 15mΩ | |

PART NUMBER SYSTEM (0.1%, 0.25%, 0.5%, 1% TOLERANCE E-24 & E-96 VALUES)



PART NUMBER SYSTEM (5% E-24 VALUES)



Note *1 - Maximum allowable continuous Working Voltage for all resistors is the lower of the two values:

“Maximum Working Voltage” as specified above or the result of the following formula

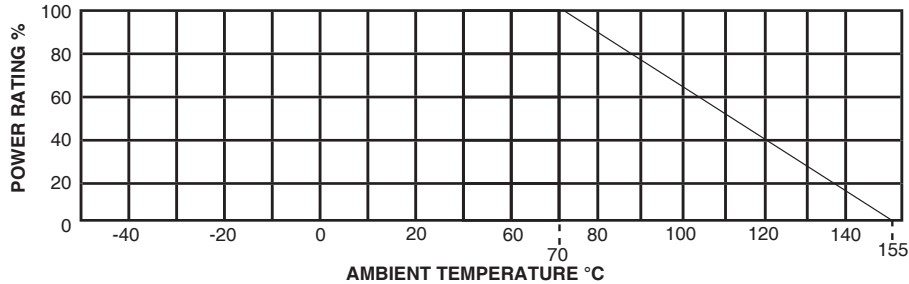
$$\sqrt{\text{Power rating (Watts)} \times \text{Resistance (Ohms)}}$$

Note * - Maximum Overload Voltage for all resistors is the lower of the two values:

“Maximum Overload Voltage” as specified above or the result of the following formula

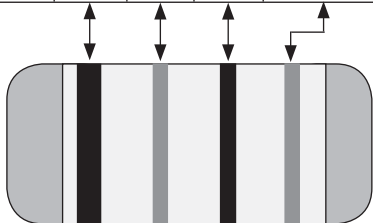
$$2.5 \times \sqrt{\text{Power rating (Watts)} \times \text{Resistance (Ohms) for 5 sec.}}$$

Power Derating Curve: For operation above 70°C, power rating must be derated according to the following chart:



COLOR CODING

| Color | Significant Figure | | | Multiplier |
|--------|--------------------|-----|------|------------|
| | 1st | 2nd | 3rd* | |
| Black | 0 | 0 | 0 | 1 |
| Brown | 1 | 1 | 1 | 10 |
| Red | 2 | 2 | 2 | 100 |
| Orange | 3 | 3 | 3 | 1,000 |
| Yellow | 4 | 4 | 4 | 10,000 |
| Green | 5 | 5 | 5 | 100,000 |
| Blue | 6 | 6 | 6 | 1,000,000 |
| Violet | 7 | 7 | 7 | 10,000,000 |
| Grey | 8 | 8 | 8 | - |
| White | 9 | 9 | 9 | - |
| Gold | - | - | - | 0.1 |
| Silver | - | - | - | 0.01 |



Note: 3 bands for 2%* & 5% tolerance parts,
4 bands for 1% tolerance parts.

*2% tolerance parts identified by reel label

E-24 & E-96 VALUES

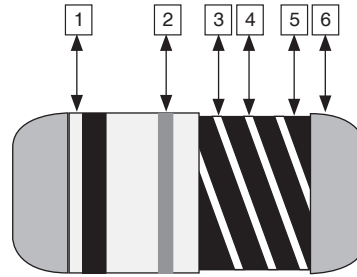
| E-24 Values | E-96 Values | | | |
|-------------|-------------|-----|-----|-----|
| | 100 | 102 | 105 | 107 |
| 110 | 110 | 113 | 115 | 118 |
| 120 | 121 | 124 | 127 | 130 |
| 130 | 133 | 137 | 140 | 143 |
| 150 | 147 | 150 | 154 | 158 |
| 160 | 162 | 165 | 169 | 174 |
| 180 | 178 | 182 | 187 | 191 |
| 200 | 196 | 200 | 205 | 210 |
| 220 | 215 | 221 | 226 | 232 |
| 240 | 237 | 243 | 249 | 255 |
| 270 | 261 | 267 | 274 | 280 |
| 300 | 287 | 294 | 301 | 309 |
| 330 | 316 | 324 | 332 | 340 |
| 360 | 348 | 357 | 365 | 374 |
| 390 | 383 | 392 | 402 | 412 |
| 430 | 422 | 432 | 442 | 453 |
| 470 | 464 | 475 | 487 | 499 |
| 510 | 511 | 523 | 536 | 549 |
| 560 | 562 | 576 | 590 | 604 |
| 620 | 619 | 634 | 649 | 665 |
| 680 | 681 | 698 | 715 | 732 |
| 750 | 750 | 768 | 787 | 806 |
| 820 | 825 | 845 | 866 | 887 |
| 910 | 909 | 931 | 953 | 976 |

ZERO OHM MARKING



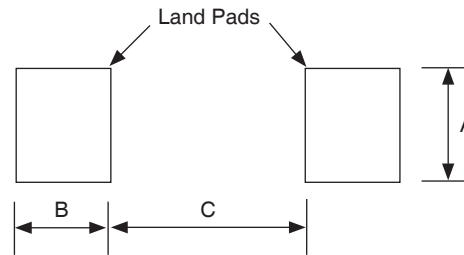
CONSTRUCTION

| Item | Material |
|------|--------------------|
| 1 | Insulation Coating |
| 2 | Marking |
| 3 | Cutting Line |
| 4 | Ceramic Core |
| 5 | Resistive Film |
| 6 | Terminal |

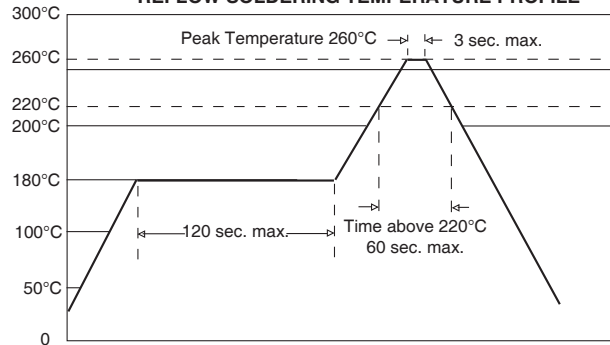


LAND PATTERN DIMENSIONS (mm)

| Type | Case Size | A | B | C |
|---------|-----------|-----|-----|-----|
| NFR0102 | 0102 | 1.5 | 0.8 | 1.0 |
| NFR0204 | 0204 | 1.6 | 1.2 | 1.6 |
| NFR0207 | 0207 | 2.4 | 1.7 | 3.0 |

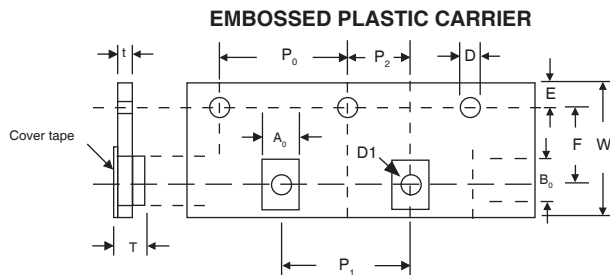


REFLOW SOLDERING TEMPERATURE PROFILE



CARRIER TAPE DIMENSIONS (mm)

| Type | Case Size | A | B | W | F | E | D | D ₁ | P ₀ | P ₁ | P ₂ | T |
|---------|-----------|----------|----------|----------|----------|----------|---------|----------------|----------------|----------------|----------------|----------|
| NFR0102 | 0102 | 1.45±0.1 | 2.25±0.1 | 8.0±0.1 | 3.5±0.05 | 1.75±0.1 | 1.5±0.1 | 0.9 min | 4.0±0.1 | 4.0±0.1 | 2.0±0.1 | 1.70±0.1 |
| NFR0204 | 0204 | 1.60±0.1 | 3.70±0.1 | 8.0±0.1 | 3.5±0.05 | 1.75±0.1 | 1.5±0.1 | 0.9 min | 4.0±0.1 | 4.0±0.1 | 2.0±0.1 | 1.87±0.1 |
| NFR0207 | 0207 | 2.4±0.1 | 6.05±0.1 | 12.0±0.1 | 5.5±0.05 | 1.75±0.1 | 1.5±0.1 | 1.4 min. | 4.0±0.1 | 4.0±0.1 | 2.0±0.1 | 2.80±0.1 |



REEL DIMENSIONS AND QUANTITY (mm)

| Type | Case Size | A | B | C | W | T | Qty |
|---------|-----------|-----------|------------|------------|------------|-------------|-------|
| NFR0102 | 0102 | 178 ± 1.5 | 60.0 ± 1.0 | 13.0 ± 0.2 | 9.0 ± 0.5 | 12.0 ± 0.15 | 3,000 |
| NFR0204 | 0204 | | | | | | |
| NFR0207 | 0207 | 178 ± 1.5 | 60.0 ± 1.0 | 13.0 ± 0.5 | 13.2 ± 0.5 | 15.5 ± 0.20 | 2,000 |

