

► Product Introduction

Chip Narrow Pad Wire wound Inductors with High Current for RF Applications.

Features :

- Accurate dimensions for automatically surface mounted.
- Lead-free materials is used for the plating on the terminals.
- High resistance to heat, humidity, mechanical shocks and presser.
- The product uses metal terminals, which realize excellent connection reliability.
- The product has good heat durability that withstands lead-free compatible reflow soldering conditions.

Applications :

- TREC series high reliable wire would chip inductors for communication, equipment, instrument, video & audio have been developed in response to the trend toward higher density mounting of parts in electric circuits.

Operating Temperature:

- Range: -25 ~ +85 °C .

Token TREC Series is primarily designed for chip narrow pad, high current, molded type, wire wound inductors and offers improved performance in the same compact case size. Product conforms to the RoHS directive and Lead-free. The TREC series chip inductor can be customized designs for tighter tolerances on request.

Contact us with your specific needs. For more information, please link to Token official website "[RF Inductors](http://www.token.com.tw)".



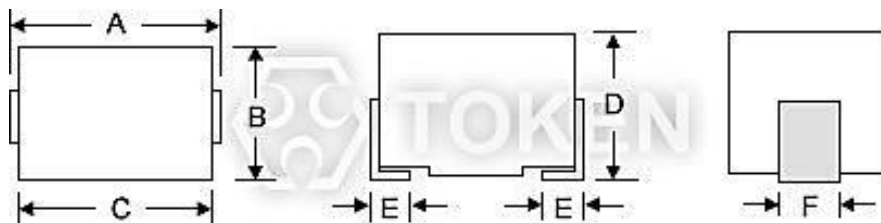
A Brief Introduction to the Product:

SMD RF Inductors EC322522N and EC453232N series are revolutionary, high reliable wire wound components for communication, equipment, instruments, video & audio have been developed in response to the trend toward higher density mounting of inductor parts in electric circuits.

Config. & Dim.

Configurations & Dimensions (Unit: mm) (TREC322522N, TREC453232N)

| Type | A | B | C | D | E | F |
|-------------------|---------------|---------------|---------------|---------------|---------------|---------------|
| TREC322522N(1210) | 3.2 ± 0.4 | 2.5 ± 0.2 | 2.9 ± 0.3 | 2.2 ± 0.2 | 0.6 ± 0.2 | 1.0 ± 0.2 |
| TREC453232N(1812) | 4.5 ± 0.4 | 3.2 ± 0.2 | 4.2 ± 0.3 | 3.2 ± 0.2 | 1.0 ± 0.2 | 1.2 ± 0.2 |

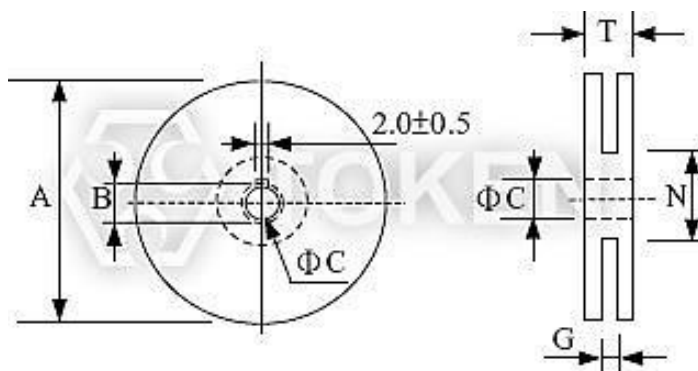


RF (TREC Series) Dimensions

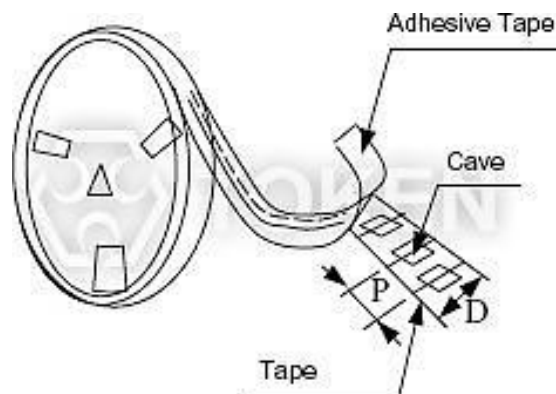
Reel & Packaging

Reel & Packaging (TREC322522N, TREC453232N)

| TYPE | A | B | C | D | G | N | T |
|------|-----|----------------|----------------|----|--------|--------|----------|
| 8mm | 178 | 21.0 ± 0.8 | 13.0 ± 0.5 | 8 | 10 max | 50 min | 14.4 max |
| 12mm | 178 | 21.0 ± 0.8 | 13.0 ± 0.5 | 10 | 14 max | 50 min | 14.4 max |



Reel Dimensions



Tape Packing Dimensions

Electrical Characteristics

Electrical Characteristics (TREC322522N) - EIA 1210

| Part No. | Inductance (μ H) | Q (min) | Test Freq. (MHZ) | SRF (MHz)(min) | DCR (Ω)(max) | IDC (mA) |
|--------------------|--------------------------|------------|---------------------|-------------------|--------------------------|-------------|
| TREC322522N - 1R0M | 1.0 \pm 20% | 10 | 7.96 | 100 | 0.156 | 770 |
| TREC322522N - 1R5M | 1.5 \pm 20% | 10 | 7.96 | 80 | 0.195 | 580 |
| TREC322522N - 2R2M | 2.2 \pm 20% | 10 | 7.96 | 65 | 0.260 | 480 |
| TREC322522N - 3R3M | 3.3 \pm 20% | 10 | 7.96 | 55 | 0.325 | 400 |
| TREC322522N - 4R7M | 4.7 \pm 20% | 10 | 7.96 | 45 | 0.520 | 320 |
| TREC322522N - 6R8M | 6.8 \pm 20% | 10 | 7.96 | 35 | 0.650 | 280 |
| TREC322522N - 100K | 10 \pm 10% | 15 | 2.52 | 28 | 1.105 | 220 |
| TREC322522N - 150K | 15 \pm 10% | 15 | 2.52 | 25 | 1.690 | 180 |
| TREC322522N - 220K | 22 \pm 10% | 15 | 2.52 | 20 | 2.600 | 145 |
| TREC322522N - 330K | 33 \pm 10% | 15 | 2.52 | 15 | 3.640 | 115 |
| TREC322522N - 390K | 39 \pm 10% | 15 | 2.52 | 14 | 4.500 | 110 |
| TREC322522N - 470K | 47 \pm 10% | 15 | 2.52 | 13 | 5.460 | 105 |
| TREC322522N - 680K | 68 \pm 10% | 15 | 2.52 | 10 | 8.450 | 85 |
| TREC322522N - 820K | 82 \pm 10% | 15 | 2.52 | 9 | 8.710 | 80 |
| TREC322522N - 101K | 100 \pm 10% | 15 | 0.796 | 8 | 10.14 | 75 |

- Note: Test equipment L, Q: HP4285A +16034E, or equivalentSRF: HP8753C NETWORK ANALYZER, or equivalent.
DC resistance: AX-111A DIGITAL MILLIOHM METER, or equivalent.

Electrical Characteristics (TREC453232N) - EIA 1812

| Part No. | Inductance (μH) | Q (min) | Test Freq. (MHZ) | SRF (MHz)(min) | DCR (Ω)(max) | IDC (mA) |
|--------------------|-----------------|---------|------------------|----------------|--------------|----------|
| TREC453232N - 1R0K | 1.0 ± 10% | 10 | 7.96 | 180 | 0.11 | 1050 |
| TREC453232N - 1R2K | 1.2 ± 10% | 10 | 7.96 | 160 | 0.12 | 1000 |
| TREC453232N - 1R5K | 1.5 ± 10% | 10 | 7.96 | 130 | 0.15 | 950 |
| TREC453232N - 1R8K | 1.8 ± 10% | 10 | 7.96 | 100 | 0.16 | 900 |
| TREC453232N - 2R2K | 2.2 ± 10% | 10 | 7.96 | 80 | 0.18 | 850 |
| TREC453232N - 2R7K | 2.7 ± 10% | 10 | 7.96 | 60 | 0.20 | 800 |
| TREC453232N - 3R3K | 3.3 ± 10% | 10 | 7.96 | 45 | 0.22 | 750 |
| TREC453232N - 3R9K | 3.9 ± 10% | 10 | 7.96 | 40 | 0.24 | 700 |
| TREC453232N - 4R7K | 4.7 ± 10% | 10 | 7.96 | 35 | 0.27 | 650 |
| TREC453232N - 5R6K | 5.6 ± 10% | 10 | 7.96 | 30 | 0.30 | 650 |
| TREC453232N - 6R8K | 6.8 ± 10% | 10 | 7.96 | 28 | 0.35 | 600 |
| TREC453232N - 8R2K | 8.2 ± 10% | 10 | 7.96 | 25 | 0.40 | 600 |
| TREC453232N - 100K | 10 ± 10% | 10 | 2.52 | 22 | 0.50 | 550 |
| TREC453232N - 120K | 12 ± 10% | 10 | 2.52 | 21 | 0.60 | 500 |
| TREC453232N - 150K | 15 ± 10% | 10 | 2.52 | 20 | 0.70 | 450 |
| TREC453232N - 180K | 18 ± 10% | 10 | 2.52 | 19 | 0.80 | 400 |
| TREC453232N - 220K | 22 ± 10% | 10 | 2.52 | 18 | 0.90 | 370 |
| TREC453232N - 270K | 27 ± 10% | 10 | 2.52 | 16 | 1.20 | 330 |
| TREC453232N - 330K | 33 ± 10% | 10 | 2.52 | 14 | 1.40 | 300 |
| TREC453232N - 390K | 39 ± 10% | 10 | 2.52 | 12 | 1.60 | 280 |
| TREC453232N - 470K | 47 ± 10% | 10 | 2.52 | 11.5 | 1.90 | 260 |
| TREC453232N - 560K | 56 ± 10% | 10 | 2.52 | 11 | 2.20 | 240 |
| TREC453232N - 680K | 68 ± 10% | 10 | 2.52 | 10 | 2.60 | 220 |
| TREC453232N - 820K | 82 ± 10% | 10 | 2.52 | 9 | 3.50 | 200 |
| TREC453232N - 101K | 100 ± 10% | 20 | 0.796 | 8 | 4.00 | 180 |
| TREC453232N - 121K | 120 ± 10% | 20 | 0.796 | 7.5 | 4.50 | 160 |
| TREC453232N - 151K | 150 ± 10% | 20 | 0.796 | 7 | 6.50 | 140 |
| TREC453232N - 181K | 180 ± 10% | 20 | 0.796 | 6.5 | 7.50 | 120 |
| TREC453232N - 221K | 220 ± 10% | 20 | 0.796 | 5.5 | 9.00 | 120 |
| TREC453232N - 271K | 270 ± 10% | 20 | 0.796 | 5 | 11.0 | 100 |
| TREC453232N - 331K | 330 ± 10% | 20 | 0.796 | 4 | 13.0 | 90 |

- Note: Test equipment L, Q: HP4285A +16034E, or equivalent.
SRF: HP8753C NETWORK ANALYZER, or equivalent.
DC resistance: AX-111A DIGITAL MILLIOHM METER, or equivalent.



► Characteristics

Mechanical Performance Test (TREC322522N, TREC453232N)

| REQUIREMENTS | CHARACTERISTICS | TEST METHOD(DIS C 5321) |
|-------------------|---|---|
| Terminal Strength | No evidence of damage | Terminals shall withstand a pull of 0.5Kgf in a horizontal direction |
| Vibration | Δ L/L shall be within $\pm 3\%$. No evidence of damage | 2 hours in each direction of X,Y,Z on p-Board at a frequency range of 10-55-10HZ with 1.5mm amplitude |
| Dropping | Δ L/L shall be within $\pm 3\%$. No evidence of damage | Dropping 1m over the ground of concrete or cement |

Electrical Performance Test (TREC322522N, TREC453232N)

| REQUIREMENTS | CHARACTERISTICS | TEST METHOD(JIS C 5321) |
|--------------------------------------|---|---|
| Resistance to Soldering Heat | No evidence of damage Δ L/L shall be within $\pm 3\%$ | Immerse in the solder (H63A) of $260 \pm 5^\circ\text{C}$ for 10 ± 1 sec, leave for 2hrs at normal TEMP |
| Solderability | More than 90% surface to be covered with new soldering | AV100V 60 SEC. |
| Dielectric with withstanding voltage | No evidence of breakdown resistor 1000 Mohm and over | DC500V 30 SEC. |
| Insulation Resistance | No evidence of breakdown, resistor 1000 Mohm and over | DC 500V 30 SEC. |

Climatic Test (TREC322522N, TREC453232N)

| REQUIREMENTS | CHARACTERISTICS | TEST METHOD(JIS C 5321) |
|-------------------------------------|--|---|
| LOW TEMP. Characteristics | No evidence of damage, Δ L/L within $\pm 5\%$, Q/Q within $\pm 30\%$ | Immerse in the solder (H63A) of $260 \pm 5^\circ\text{C}$ for 10 ± 1 sec, leave for 2hrs at normal TEMP. |
| TEMP. Cycling | No evidence of damage, Δ L/L within $\pm 5\%$ | Keep for 30 min. at TEMP. of $-25^\circ\text{C} \sim +85^\circ\text{C}$ at 5 cycle case of TEMP. change from low to high and V.V. |
| Temperature Characteristics | Δ L/L within $\pm 3\%$ | Δ L/L to be measured at the temperature of between -25°C and $+85^\circ\text{C}$ |
| Moisture load Characteristics | No evidence of damage, Δ L/L within $\pm 5\%$, Q/Q within ± 30 | TEMP. $40 \pm 2^\circ\text{C}$, Humidity 90~95% 96 ± 2 hrs, measurements shall be performed after 1~2hrs at normal TEMP.. |
| High TEMP. overload Characteristics | No evidence of damage, Δ L/L within $\pm 5\%$, Q/Q within ± 30 | Leave for 96 ± 2 hrs in a bath of TEMP. $85 \pm 2^\circ\text{C}$, measurements shall be performed after 1~2hrs at normal TEMP. |

Order Codes

Order Codes (TREC322522N, TREC453232N)

| TREC322522N | - | 1R0 | M |
|-------------|---|------------------------------|-----------|
| Part Number | | Inductance | Tolerance |
| TREC322522N | | R10 0.10μH | K 10% |
| TREC453232N | | 1R0 1.00μH | M 20% |
| | | 100 10.00×10 ⁰ μH | |
| | | 101 10.00×10 ¹ μH | |
| | | 102 10.00×10 ² μH | |
| | | 103 10.00×10 ³ μH | |

General Information

Token Cuts Inductor Size and Cost

Token utilizes the latest technology enabling the most cost-effective designs in manufacturing inductors. The 0402, 0603, 0805, 1206, 1210, to 1812 series of RF Miniature Inductors all contain wire wound or multi-layer technology with material substrate in ceramic or ferrite cores. Thus providing economic cost with the ultimate performance demanded by today's RF applications. Inductors feature high Q factor, SRFs (self-resonant or series resonant frequency), and I_{dc} (maximum current carrying capacity).

How to quickly search RF inductors for all of the characteristics?

Searching and comparing data sheets of inductor manufacturers can be time consuming. Token's Parameter Sorting Search Mode allows selection of inductors based on different parameters. To enter Searching Mode:

- By entering just the inductance value,
- By sorting parameter to narrow down searching range,
- Or by enter keyword / part number / size dimensions L*W*H to partial or exact searching.

Inductors Selection Notes:

For choke applications, the SRFs (self-resonant or series resonant frequency) is the frequency that provides the best signal blocking.

- At the SRF, impedance is at its maximum.
- At frequencies below the SRF, impedance increases with frequency.
- At frequencies above the SRF, impedance decreases with frequency.

For higher order filter or impedance matching applications, in general, the choice of inductance value typically determines the SRF and vice versa. The higher the inductance value, the lower the SRF, due to increased winding capacitance. It is more important to have a relatively flat inductance curve (constant inductance vs. frequency) near the required frequency. This suggests selecting an inductor with an SRF well above the design frequency. A rule of thumb is to select an inductor with an SRF that is a decade (10X) higher than the operating frequency.

What is Q factor? High Q leads to low insertion loss, minimizing power consumption, and narrow bandwidth. It is important if the inductor is to be used as part of an LC (oscillator) circuit or in narrow band pass applications. In general, wire wound inductors have much higher Q values than multilayer inductors of the same size and value. Token's material science and manufacturing expertise effectively bridges the gap between wire-wound performance and multi-layer inductors with its TRMF100505 (EIA 0402) and TRMI160808 (EIA 0603) series.

How does current requirement affect inductor? Higher current requires larger wire or more threads of the same wire size to keep losses and temperature rise to a minimum. Larger wire lowers the DCR and increases the Q factor. Using a ferrite core inductor with a lower turn count can achieve higher current capacity and lower DCR. Ferrite, however, may introduce new limitations such as larger variation of inductance with temperature, looser tolerances, lower Q, and reduced saturation current ratings. Token's ferrite inductors with open magnetic structures, will not saturate, even at full rated current.

