

Version:
February 21, 2017



(TREC)
Wire Wound
RF Chip Inductor

Token Electronics Industry Co., Ltd.

Taiwan: No.137, Sec. 1, Zhongxing Rd., Wugu District,
New Taipei City, Taiwan, R.O.C. 24872
Tel: +886 2981 0109 **Fax:** +886 2988 7487

China: 12F, Zhong Xing Industry Bld., Chuang Ye Road,
Nan Shan District, Shen Zhen City,
Guang Dong, China 518054
Tel: +86 755 26055363; **Fax:** +86 755 26055365

[Web: www.token.com.tw](http://www.token.com.tw)

[Email: rfq@token.com.tw](mailto:rfq@token.com.tw)



▶ 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)".



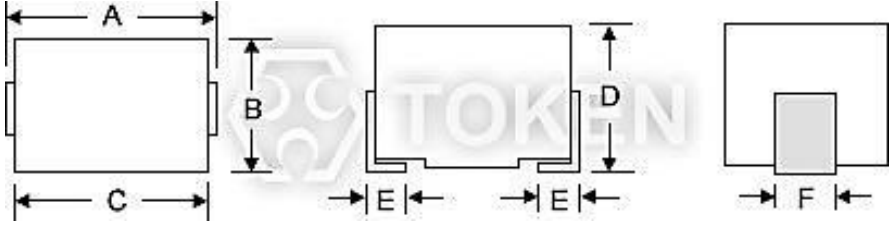
A Brief Introduction to the Product:

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

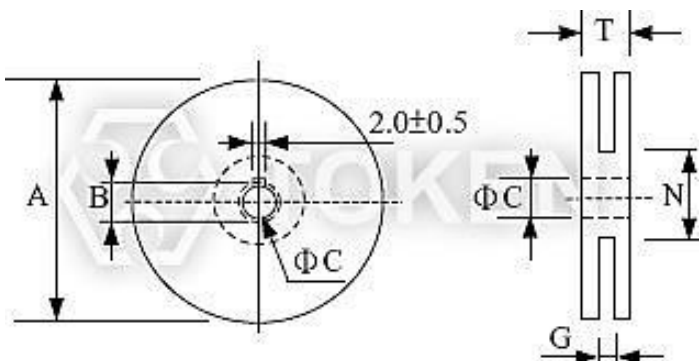


RF (TREC Series) Dimensions

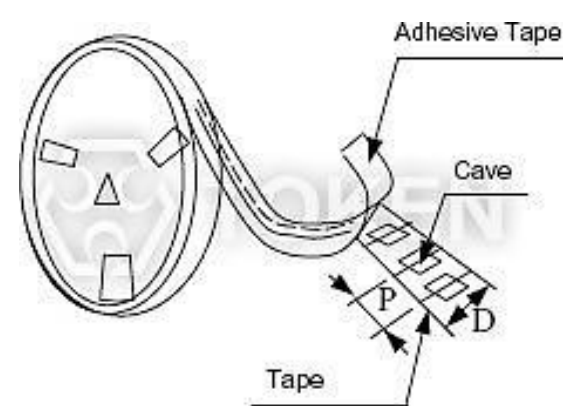
Reel & Packaging

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 (μH)	Q (min)	Test Freq. (MHZ)	SRF (MHz)(min)	DCR (Ω)(max)	IDC (mA)
TREC322522N - 1R0M	1.0 ± 20%	10	7.96	100	0.156	770
TREC322522N - 1R5M	1.5 ± 20%	10	7.96	80	0.195	580
TREC322522N - 2R2M	2.2 ± 20%	10	7.96	65	0.260	480
TREC322522N - 3R3M	3.3 ± 20%	10	7.96	55	0.325	400
TREC322522N - 4R7M	4.7 ± 20%	10	7.96	45	0.520	320
TREC322522N - 6R8M	6.8 ± 20%	10	7.96	35	0.650	280
TREC322522N - 100K	10 ± 10%	15	2.52	28	1.105	220
TREC322522N - 150K	15 ± 10%	15	2.52	25	1.690	180
TREC322522N - 220K	22 ± 10%	15	2.52	20	2.600	145
TREC322522N - 330K	33 ± 10%	15	2.52	15	3.640	115
TREC322522N - 390K	39 ± 10%	15	2.52	14	4.500	110
TREC322522N - 470K	47 ± 10%	15	2.52	13	5.460	105
TREC322522N - 680K	68 ± 10%	15	2.52	10	8.450	85
TREC322522N - 820K	82 ± 10%	15	2.52	9	8.710	80
TREC322522N - 101K	100 ± 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 $85 \pm 2^\circ\text{C}$, 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 0.10 μ H	K 10%
TREC453232N		1R0 1.00 μ H	M 20%
		100 10.00 $\times 10^0\mu$ H	
		101 10.00 $\times 10^1\mu$ H	
		102 10.00 $\times 10^2\mu$ H	
		103 10.00 $\times 10^3\mu$ H	

▶ 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.

