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RF Inductor Series

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Technical Application Notes

► Technical Application Notes

Technical Application Notes for Inductors and Chokes

Selecting the Optimum Inductor Choke to Best Match the Right Performance

Inductive components store energy intermittently in switch-mode power supplies and DC/DC converters, form parts of RF circuits or RFID systems, transform current/voltage, match impedances, are filter elements and last but not least interference suppression components to ensure EMC.

The requirements on inductors depend on how and where they are used. RF circuits need coils with high quality factors and resonant frequencies. EMC applications require high inductance to achieve good interference suppression characteristics, low Q factors being more desirable here due to the need to avoid resonance.

Token Electronics provides suitable inductive components for all applications. This guide contains a wide selection of standard components, from SMT types through high current inductors for power electronics applications to transformers.

Comparison of Inductor Factors for Applications					
Applications	Inductance	Current Rating	Resonance frequency	Q factor	DC Resistance
RF Circuits, Resonant Circuits	low	low	very high	very high	low
EMC	high	high	high	low	very low
RFID	depends on the specific application	low	high	high	low
DC/DC Converters	depends on the specific application	high	medium	high	low
Transformers in DC/DC	depends on the specific application	depends on the specific application	medium	depends on the specific application	low
Signal Processing	depends on the specific application	low	high	-	medium

RF Circuits

The Token RF product range of SMT and leaded RF chokes are especially suitable for RF and other high frequency circuits. Typical applications are resonant circuits and frequency-selective filters of the type increasingly used in telecommunications engineering and automotive electronics.



Filter Circuits

When inductive components are used for filters in power supplies for electronics, high inductance, the lowest possible DC resistance and a low Q factor are required. The impedance should have a wideband frequency characteristic. In addition to the current rating, the maximum permissible pulse current (switching transient currents) and adequately high core material saturation are important.

RFID Systems

RFID systems allow contactless identification without direct line-of-sight contact. They are used for wireless data transmission in a range of a few meters. Examples of their application include the automobile industry, logistics, agriculture, medical engineering and security systems. The range of Token transponder coils is especially designed for high mechanical stability and high sensitivity as required in the automobile industry for immobilizers, car access systems and tire pressure monitoring systems (TPMS).

DC/DC Converters, Switch-Mode Power Supplies

Inductive components are used for magnetic energy storage in all kinds of DC/DC converters and switch-mode power supplies. Depending on application, a broad range of different components starting from high-current RF and SMT power inductors up to toroid chokes and transformers can be used.

Signal Processing

Among other things, signal transformers are notable for being able to transform signals in a large frequency range. They are consequently used in particular in high-speed data transmission (e.g. xDSL) for matching and electrical isolation. Innovative materials and a special winding and coil former design result in low losses, good total harmonic distortion, and fulfilling the requirements on creep age and clearance distances.

EMC Application

For broadband interference suppression, current-compensated chokes with different core shapes are especially suitable, e.g. ring or D cores and powder core chokes.

Apart from use as filters in mains and other power supply lines, such chokes are important for data lines as used in telecommunications engineering, in line cards, in telephone exchanges (digital and analog), in automotive electronics, and CAN bus applications.

Almost all component families are approved in accordance with the main international standards. All chokes for low-frequency mains networks are dimensioned and tested in compliance with applicable EN and IEC standards.



Multilayer Ferrite Beads Chip Inductors (TRMA)

► Product Introduction

Token High Current Multilayer Ferrite Bead Inductors lower DC resistance and handle up to 6A.

Features :

- Low DC Resistance.
- Multiple Size Availability.
- Effective EMI Protection.
- High Soldering Heat Resistance.

Applications :

- Portable Equipment.
- Modem, Personal Computers.
- CD-ROM, Hard Disk, Printers.

Token TRMA series multilayer ferrite bead SMD inductor is one popular high current version of Token chips products. Ceramic materials and process technologies have allowed Token to lower the DC resistance of its chip ferrite beads, increasing rated current to create the TRMA series.

With a maximum current rating of up to 6A and a wide operating temperature range of between -55°C and $+125^{\circ}\text{C}$, the TRMA series is ideally suited to applications in harsh environments.

The series comes in 0402 size packaging ($1 \times 0.5 \times 0.5 \text{ mm}$), for designers seeking to reduce board space without performance degradation. Low DC resistance also helps reduce power consumption for battery-powered applications.



The TRMA devices give effective EMI and RFI suppression and the range also offers high impedance values over a wide frequency range. Quoted reference values are between 7Ω and 1500Ω at 100MHz. Available in case sizes ranging from 0402, 0603, 0805, 1206, 1210, 1806, to 1812, the ferrite chip beads feature nickel barrier terminations with a solder plate finish to help ensure a good solder joint. Parts are supplied taped and reeled, and are fully compatible with automatic pick and place equipment.

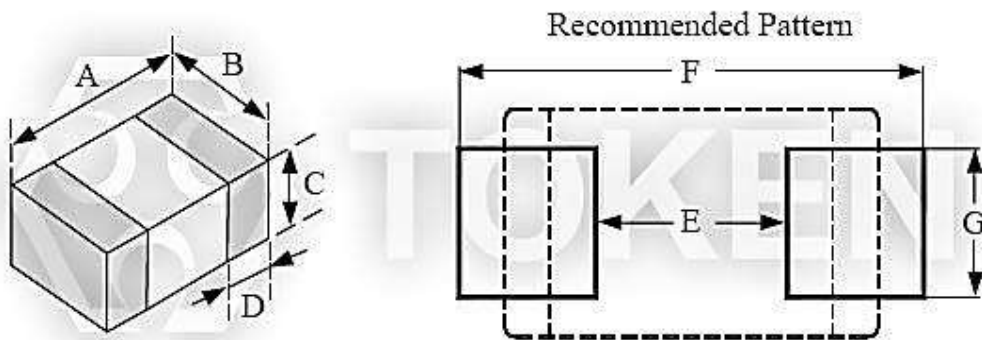
Custom parts are available on request. Token will also produce devices outside these specifications to meet specific customer requirements, please contact our sales or link to Token official website "[RF Inductors](http://www.token.com.tw)" for more information.



► Dimensions

Dimensions (Unit: mm) (TRMA)

Type	A	B	C	D	E	F	G
TRMA100505 (0402)	1.0 ± 0.10	0.50 ± 0.10	0.5 ± 0.10	0.25 ± 0.10	0.4	1.2~1.4	0.4
TRMA160808 (0603)	1.6 ± 0.20	0.80 ± 0.15	0.8 ± 0.15	0.30 ± 0.20	0.8	2.4~3.4	0.6
TRMA201209 (0805)	2.0 ± 0.20	1.25 ± 0.20	0.9 ± 0.20	0.50 ± 0.30	1.2	3.0~4.0	1.0
TRMA321611 (1206)	3.2 ± 0.20	1.60 ± 0.20	1.1 ± 0.20	0.50 ± 0.30	2.0	4.2~5.2	1.2
TRMA322513 (1210)	3.2 ± 0.20	2.50 ± 0.20	1.3 ± 0.20	0.50 ± 0.30	2.0	5.5~6.5	1.8
TRMA451616 (1806)	4.5 ± 0.25	1.60 ± 0.20	1.6 ± 0.20	0.50 ± 0.30	3.0	5.5~6.5	1.2
TRMA453215 (1812)	4.5 ± 0.25	3.20 ± 0.20	1.5 ± 0.20	0.50 ± 0.30	3.0	5.5~6.5	2.4



(TRMA) Recommended Pattern and Dimensions

► Standard Electrical Specifications

Standard Electrical Specifications (TRMA100505) - EIA 0402 Size

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMA100505 - YTRYH100	10	25	100	0.030	1000

Standard Electrical Specifications (TRMA322513) - EIA 1210 Size

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMA322513 - YTRYH190	19	25	100	0.025	4000
TRMA322513 - YTRYH320	32	25	100	0.025	4000
TRMA322513 - YTRYH600	60	25	100	0.025	4000
TRMA322513 - YTRYH900	90	25	100	0.025	3000

Standard Electrical Specifications (TRMA160808) - EIA 0603 Size

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMA160808 - YTRYH100	10	25	100	0.020	4000
TRMA160808 - YTRYH110	11	25	100	0.020	4000
TRMA160808 - YTRYH150	15	25	100	0.030	3000
TRMA160808 - YTRYH170	17	25	100	0.030	3000
TRMA160808 - YTRYH190	19	25	100	0.030	3000
TRMA160808 - YTRYH200	20	25	100	0.030	3000
TRMA160808 - YTRYH220	22	25	100	0.030	3000
TRMA160808 - YTRYH250	25	25	100	0.030	3000
TRMA160808 - YTRYH300	30	25	100	0.030	3000
TRMA160808 - YTRYH310	31	25	100	0.030	3000
TRMA160808 - YTRYH320	32	25	100	0.035	3000
TRMA160808 - YTRYH330	33	25	100	0.035	3000
TRMA160808 - YTRYH400	40	25	100	0.035	3000
TRMA160808 - YTRYH470	47	25	100	0.040	3000
TRMA160808 - YTRYH500	50	25	100	0.040	3000
TRMA160808 - YTRYH560	56	25	100	0.040	3000
TRMA160808 - YTRYH600	60	25	100	0.040	3000
TRMA160808 - YTRYH680	68	25	100	0.050	2500
TRMA160808 - YTRYH700	70	25	100	0.050	2500
TRMA160808 - YTRYH750	75	25	100	0.050	2500
TRMA160808 - YTRYH800	80	25	100	0.050	2500
TRMA160808 - YTRYH900	90	25	100	0.050	2500
TRMA160808 - YTRYH101	100	25	100	0.050	2500
TRMA160808 - YTRYH121	120	25	100	0.080	2500
TRMA160808 - YTRYH151	150	25	100	0.085	2000
TRMA160808 - YTRYH181	180	25	100	0.090	2000
TRMA160808 - YTRYH201	200	25	100	0.095	2000
TRMA160808 - YTRYH221	220	25	100	0.100	2000
TRMA160808 - YTRYH241	240	25	100	0.120	1500
TRMA160808 - YTRYH301	300	25	100	0.120	1500
TRMA160808 - YTRYH331	330	25	100	0.120	1500
TRMA160808 - YTRYH401	400	25	100	0.120	1500
TRMA160808 - YTRYH451	450	25	100	0.150	1500
TRMA160808 - YTRYH471	470	25	100	0.150	1500
TRMA160808 - YTRYH501	500	25	100	0.150	1500
TRMA160808 - YTRYH601	600	25	100	0.200	1000
TRMA160808 - YTRYH701	700	25	100	0.250	800
TRMA160808 - YTRYH751	750	25	100	0.250	800
TRMA160808 - YTRYH801	800	25	100	0.250	800
TRMA160808 - YTRYH102	1000	25	100	0.250	800
TRMA160808 - YTRYH152	1500	25	100	0.400	500



Standard Electrical Specifications (TRMA201209) - EIA 0805 Size

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMA201209 - YTRYH110	11	25	100	0.010	6000
TRMA201209 - YTRYH130	13	25	100	0.020	5000
TRMA201209 - YTRYH150	15	25	100	0.020	5000
TRMA201209 - YTRYH170	17	25	100	0.020	5000
TRMA201209 - YTRYH190	19	25	100	0.020	4000
TRMA201209 - YTRYH220	22	25	100	0.020	4000
TRMA201209 - YTRYH260	26	25	100	0.020	4000
TRMA201209 - YTRYH280	28	25	100	0.020	4000
TRMA201209 - YTRYH300	30	25	100	0.020	4000
TRMA201209 - YTRYH310	31	25	100	0.020	4000
TRMA201209 - YTRYH320	32	25	100	0.020	4000
TRMA201209 - YTRYH390	39	25	100	0.020	3000
TRMA201209 - YTRYH400	40	25	100	0.020	3000
TRMA201209 - YTRYH420	42	25	100	0.025	3000
TRMA201209 - YTRYH500	50	25	100	0.025	3000
TRMA201209 - YTRYH600	60	25	100	0.030	3000
TRMA201209 - YTRYH700	70	25	100	0.040	3000
TRMA201209 - YTRYH750	75	25	100	0.040	3000
TRMA201209 - YTRYH800	80	25	100	0.040	3000
TRMA201209 - YTRYH900	90	25	100	0.040	3000
TRMA201209 - YTRYH101	100	25	100	0.040	3000
TRMA201209 - YTRYH121	120	25	100	0.040	3000
TRMA201209 - YTRYH131	130	25	100	0.050	2500
TRMA201209 - YTRYH151	150	25	100	0.050	2500
TRMA201209 - YTRYH181	180	25	100	0.050	2500
TRMA201209 - YTRYH201	200	25	100	0.050	2500
TRMA201209 - YTRYH221	220	25	100	0.080	2000
TRMA201209 - YTRYH241	240	25	100	0.080	2000
TRMA201209 - YTRYH251	250	25	100	0.080	2000
TRMA201209 - YTRYH301	300	25	100	0.080	2000
TRMA201209 - YTRYH331	330	25	100	0.080	2000
TRMA201209 - YTRYH391	390	25	100	0.100	2000
TRMA201209 - YTRYH401	400	25	100	0.100	2000
TRMA201209 - YTRYH451	450	25	100	0.100	2000
TRMA201209 - YTRYH471	470	25	100	0.100	2000
TRMA201209 - YTRYH501	500	25	100	0.100	2000
TRMA201209 - YTRYH601	600	25	100	0.100	2000
TRMA201209 - YTRYH751	750	25	100	0.120	1500
TRMA201209 - YTRYH102	1000	25	100	0.120	1500
TRMA201209 - YTRYH152	1500	25	100	0.300	1000



Standard Electrical Specifications (TRMA321611) - EIA 1206 Size

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMA321611 - YTRYH070	7	25	100	0.015	6000
TRMA321611 - YTRYH080	8	25	100	0.015	6000
TRMA321611 - YTRYH110	11	25	100	0.015	6000
TRMA321611 - YTRYH190	19	25	100	0.015	6000
TRMA321611 - YTRYH260	26	25	100	0.015	6000
TRMA321611 - YTRYH300	30	25	100	0.015	4000
TRMA321611 - YTRYH310	31	25	100	0.015	4000
TRMA321611 - YTRYH320	32	25	100	0.015	4000
TRMA321611 - YTRYH350	35	25	100	0.015	4000
TRMA321611 - YTRYH400	40	25	100	0.015	4000
TRMA321611 - YTRYH420	42	25	100	0.015	4000
TRMA321611 - YTRYH480	48	25	100	0.020	4000
TRMA321611 - YTRYH500	50	25	100	0.020	4000
TRMA321611 - YTRYH520	52	25	100	0.020	4000
TRMA321611 - YTRYH600	60	25	100	0.020	4000
TRMA321611 - YTRYH680	68	25	100	0.020	4000
TRMA321611 - YTRYH700	70	25	100	0.020	4000
TRMA321611 - YTRYH750	75	25	100	0.025	3000
TRMA321611 - YTRYH800	80	25	100	0.025	3000
TRMA321611 - YTRYH900	90	25	100	0.030	3000
TRMA321611 - YTRYH101	100	25	100	0.030	2500
TRMA321611 - YTRYH121	120	25	100	0.030	2500
TRMA321611 - YTRYH151	150	25	100	0.040	2000
TRMA321611 - YTRYH201	200	25	100	0.050	2000
TRMA321611 - YTRYH221	220	25	100	0.050	2000
TRMA321611 - YTRYH121	120	25	100	0.030	2500
TRMA321611 - YTRYH151	150	25	100	0.040	2000
TRMA321611 - YTRYH201	200	25	100	0.050	2000
TRMA321611 - YTRYH221	220	25	100	0.050	2000
TRMA321611 - YTRYH301	300	25	100	0.060	2000
TRMA321611 - YTRYH331	330	25	100	0.060	2000
TRMA321611 - YTRYH391	390	25	100	0.060	2000
TRMA321611 - YTRYH401	400	25	100	0.100	2000
TRMA321611 - YTRYH501	500	25	100	0.100	2000
TRMA321611 - YTRYH601	600	25	100	0.100	2000
TRMA321611 - YTRYH102	1000	25	50	0.150	1200
TRMA321611 - YTRYH122	1200	25	50	0.180	1000
TRMA321611 - YTRYH152	1500	25	50	0.200	800



Standard Electrical Specifications (TRMA451616) - EIA 1806 Size

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMA451616 - YTRYH190	19	25	100	0.020	6000
TRMA451616 - YTRYH400	40	25	100	0.020	6000
TRMA451616 - YTRYH500	50	25	100	0.020	6000
TRMA451616 - YTRYH600	60	25	100	0.020	5000
TRMA451616 - YTRYH700	70	25	100	0.025	5000
TRMA451616 - YTRYH750	75	25	100	0.025	5000
TRMA451616 - YTRYH800	80	25	100	0.025	4000
TRMA451616 - YTRYH900	90	25	100	0.100	2000
TRMA451616 - YTRYH101	100	25	100	0.100	2000
TRMA451616 - YTRYH151	150	25	100	0.100	2000
TRMA451616 - YTRYH191	190	25	100	0.100	2000
TRMA451616 - YTRYH301	300	25	100	0.100	2000
TRMA451616 - YTRYH471	470	25	100	0.100	2000
TRMA451616 - YTRYH601	600	25	100	0.100	2000
TRMA451616 - YTRYH851	850	25	100	0.100	2000
TRMA451616 - YTRYH102	1000	25	100	0.100	2000
TRMA451616 - YTRYH132	1300	25	100	0.100	2000

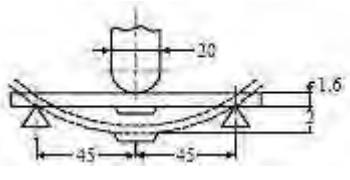

Standard Electrical Specifications (TRMA453215) - EIA 1812 Size

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMA453215 - YTRYH190	19	25	100	0.030	6000
TRMA453215 - YTRYH300	30	25	100	0.030	6000
TRMA453215 - YTRYH470	47	25	100	0.030	6000
TRMA453215 - YTRYH500	50	25	100	0.030	6000
TRMA453215 - YTRYH600	60	25	100	0.030	6000
TRMA453215 - YTRYH700	70	25	100	0.030	6000
TRMA453215 - YTRYH800	80	25	100	0.030	4000
TRMA453215 - YTRYH900	90	25	100	0.030	4000
TRMA453215 - YTRYH121	120	25	100	0.030	4000
TRMA453215 - YTRYH125	125	25	100	0.030	4000
TRMA453215 - YTRYH151	150	25	100	0.030	4000
TRMA453215 - YTRYH191	190	25	100	0.030	4000



Characteristics

Environmental Characteristics (TRMA Series)

Item	Specification	Test Methods
Flexure Strength	The forces applied on the right conditions must not damage the terminal electrode and the ferrite	Test device shall be soldered on the substrate Dimension: 100×40×1.6 mm Deflection: 2.0mm Keeping Time: 30sec For 0402, substrate dimension is 100×40×0.8mm 
Vibration		Test device shall be soldered on the substrate Oscillation Frequency : 10 to 55 to 10Hz for 1min Amplitude : 1.5mm Time : 2hrs for each axis (X,Y&Z), total 6hrs
Resistance to Soldering Heat	Appearance: No damage More than 75% of the terminal electrode should be covered with solder. Impedance: within ± 30% of initial value	Pre-heating: 150°C, 1min Solder Temperature: 260 ± 5°C Immersion Time: 10 ± 1sec
Solderability	The electrodes shall be at least 90% covered with new solder coating	Pre-heating: 150°C, 1min Solder Temperature: 245 ± 5°C Immersion Time: 4 ± 1sec
Terminal Strength Test	0402 series : ≥0.2kg 0603 series : ≥0.5kg 0805 series : ≥1.0kg other series : ≥ 2.0kg	Test device shall be soldered on the substrate 
Temperature Cycle	Appearance: No damage Impedance: within ± 30% of initial value	One cycle: One cycle/step1: -55 ± 3°C for 30min step2: 25 ± 2°C for 3.0min step3: 125 ± 3°C for 30min step4: 25 ± 2°C for 3.0min Total: 100cycles Measured after exposure in the room condition for 24hrs
Humidity Resistance		Temperature: 40 ± 2°C Relative Humidity: 90 ~ 95% time: 1000hrs Measured after exposure in the room condition for 24hrs
High Temperature Resistance		Temperature: 125 ± 3°C Relative Humidity : 0% Applied Current: Rated Current time: 1000hrs Measured after exposure in the room condition for 24hrs
Low Temperature Resistance		Temperature: -55 ± 3°C TR relative Humidity : 0% time: 1000hrs Measured after exposure in the room condition for 24hrs

Order Codes

Order Codes (TRMA)

TRMA160808		Y		TR		Y		H		100	
Part Number		Impedance Tolerance		Package		Design Code		Current		Impedance	
TRMA100505	0402	Y	± 25%	TR	Taping Reel	Y	ui:200	H	High Current	100	10 Ω
TRMA160808	0603					Q	ui:75			110	11 Ω
TRMA201209	0805					M	± 20%	N	General Current	451	450 Ω
TRMA321611	1206	152	1500 Ω								
TRMA322 13	1210										
TRMA451616	1806										
TRMA453215	1812										



► 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.



Multilayer Bead RF Inductors (TRMB)

▶ Product Introduction

Token RF inductor chip multilayer bead offer high impedance for high speed signals.

Features :

- Low DC Resistance.
- Effective EMI Protection.
- Multiple Size Availability.
- High Soldering Heat Resistance.

Applications :

- Portable Equipment.
- Personal Computers.
- CD-ROM, Hard Disk, Modem, Printers.

Token Electronics has introduced the (TRMB) Series, a family of twelve multilayer chip bead inductors offering high impedance. The (TRMB) Bead series is a multilayer technology with good overall characteristics in a cost effective package. In addition, (TRMB) parts offer a high-performance noise-filtering capability over a wide range of high frequencies.

In systems that currently use multiple narrow-band inductors to cover a wide frequency range, the (TRMB) can provide the same function in a single chip, reducing component count and board area. The (TRMB) multilayer inductor series is available in 1812, 1806, 1210, 1206, 0805, 0603, and 0402 sizes in three catalogs, standard, low profile, and High Speed Signals. This product provides a good addition of electrical performance and low cost.

Token Multilayer Bead RF Inductor (TRMB) series is primarily designed for effective EMI protection and low dc resistance. Full series conform to the RoHS directive and Lead-free. Multilayer Bead Chip Inductor with wide inductance selection and impedance can be customized designs and tighter tolerances available on request.

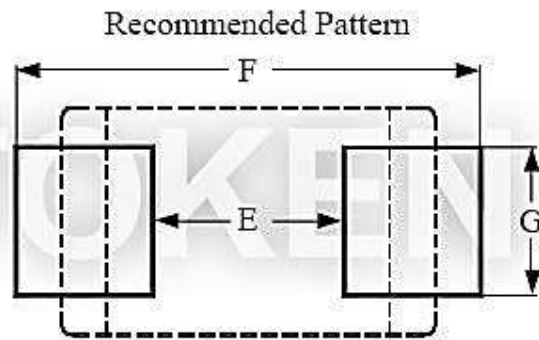
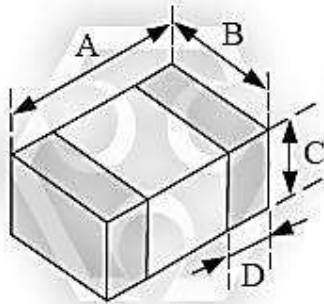
Application of specific designs also available including different factor values to frequency requirements. Custom parts are available on request. Token will also produce devices outside these specifications to meet specific customer requirements, Contact us with your specific needs. For more information, please link to Token official website "[RF Inductors](#)".



► Dimensions

Configurations & Dimensions (Unit: mm) (TRMB)

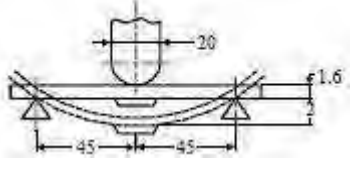

Type	A	B	C	D	E	F	G
TRMB100505 (0402)	1.0 ± 0.10	0.50 ± 0.10	0.5 ± 0.10	0.25 ± 0.10	0.4	1.2~1.4	0.4
TRMB160808 (0603)	1.6 ± 0.20	0.80 ± 0.15	0.8 ± 0.15	0.30 ± 0.20	0.8	2.4~3.4	0.6
TRMB201209 (0805)	2.0 ± 0.20	1.25 ± 0.20	0.9 ± 0.20	0.50 ± 0.30	1.2	3.0~4.0	1.0
TRMB321611 (1206)	3.2 ± 0.20	1.60 ± 0.20	1.1 ± 0.20	0.50 ± 0.30	2.0	4.2~5.2	1.2
TRMB321616 (1206)	3.2 ± 0.20	1.60 ± 0.20	1.6 ± 0.20	0.50 ± 0.30	2.0	4.2~5.2	1.2
TRMB322513 (1210)	3.2 ± 0.20	2.50 ± 0.20	1.3 ± 0.20	0.50 ± 0.30	2.0	5.5~6.5	1.8
TRMB451616 (1806)	4.5 ± 0.25	1.60 ± 0.20	1.6 ± 0.20	0.50 ± 0.30	3.0	5.5~6.5	1.2
TRMB453215 (1812)	4.5 ± 0.25	3.20 ± 0.20	1.5 ± 0.20	0.50 ± 0.30	3.0	5.5~6.5	2.4



(TRMB) Recommended Pattern and Dimensions (Unit: mm)

Characteristics

Environmental Characteristics (TRMB)

Item	Specification	Test Methods
Flexure Strength	The forces applied on the right conditions must not damage the terminal electrode and the ferrite	Test device shall be soldered on the substrate Dimension: 100×40×1.6 mm Deflection: 2.0mm Keeping Time: 30sec For 0402, substrate dimension is 100×40×0.8mm 
Vibration		Test device shall be soldered on the substrate Oscillation Frequency : 10 to 55 to 10Hz for 1min Amplitude : 1.5mm Time : 2hrs for each axis (X,Y&Z), total 6hrs
Resistance to Soldering Heat	Appearance: No damage More than 75% of the terminal electrode should be covered with solder. Impedance: within± 30% of initial value	Pre-heating: 150°C, 1min Solder Temperature: 260 ± 5°C Immersion Time: 10 ± 1sec
Solderability	The electrodes shall be at least 90% covered with new solder coating	Pre-heating: 150°C, 1min Solder Temperature: 245 ± 5°C Immersion Time: 4 ± 1sec
Terminal Strength Test	0402 series : ≥0.2kg 0603 series : ≥0.5kg 0805 series : ≥1.0kg other series : ≥ 2.0kg	Test device shall be soldered on the substrate 
Temperature Cycle	Appearance: No damage Impedance: within ± 30% of initial value	One cycle: One cycle/step1: -55 ± 3°C for 30min step2: 25 ± 2°C for 3.0min step3: 125 ± 3°C for 30min step4: 25 ± 2°C for 3.0min Total: 100cycles Measured after exposure in the room condition for 24hrs
Humidity Resistance		Temperature: 40 ± 2°C Relative Humidity: 90 ~ 95% time: 1000hrs Measured after exposure in the room condition for 24hrs
High Temperature Resistance		Temperature: 125 ± 3°C Relative Humidity : 0% Applied Current: Rated Current time: 1000hrs Measured after exposure in the room condition for 24hrs
Low Temperature Resistance		Temperature: -55 ± 3°C TR relative Humidity : 0% time: 1000hrs Measured after exposure in the room condition for 24hrs

Electrical Characteristics

Electrical Characteristics (TRMB100505) - (EIA 0402)

Part Number	Impedance (Ω)	Tolerance (\pm %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB100505 - YTRYN060	6	25	100	0.05	500
TRMB100505 - YTRYN100	10	25	100	0.05	500
TRMB100505 - YTRYN300	30	25	100	0.30	300
TRMB100505 - YTRYN330	33	25	100	0.30	300
TRMB100505 - YTRYN400	40	25	100	0.30	300
TRMB100505 - YTRYN470	47	25	100	0.40	300
TRMB100505 - YTRYN600	60	25	100	0.40	300
TRMB100505 - YTRYN700	70	25	100	0.40	300
TRMB100505 - YTRYN750	75	25	100	0.40	300
TRMB100505 - YTRYN800	80	25	100	0.40	300
TRMB100505 - YTRYN900	90	25	100	0.50	300
TRMB100505 - YTRYN101	100	25	100	0.50	300
TRMB100505 - YTRYN121	120	25	100	0.50	300
TRMB100505 - YTRYN151	150	25	100	0.50	300
TRMB100505 - YTRYN221	220	25	100	0.50	300
TRMB100505 - YTRYN241	240	25	100	0.50	300
TRMB100505 - YTRYN301	300	25	100	0.80	300
TRMB100505 - YTRYN331	330	25	100	0.80	300
TRMB100505 - YTRYN481	480	25	100	0.80	300
TRMB100505 - YTRYN601	600	25	100	1.00	300
TRMB100505 - YTRYN102	1000	25	100	1.50	100
TRMB100505 - YTRYN152	1500	25	100	2.00	60



Electrical Characteristics (TRMB160808) - (EIA 0603)

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB160808 - YTRYN060	6	25	100	0.05	500
TRMB160808 - YTRYN070	7	25	100	0.05	500
TRMB160808 - YTRYN100	10	25	100	0.05	500
TRMB160808 - YTRYN110	11	25	100	0.05	500
TRMB160808 - YTRYN150	15	25	100	0.08	500
TRMB160808 - YTRYN170	17	25	100	0.08	500
TRMB160808 - YTRYN190	19	25	100	0.08	500
TRMB160808 - YTRYN200	20	25	100	0.10	400
TRMB160808 - YTRYN220	22	25	100	0.10	400
TRMB160808 - YTRYN250	25	25	100	0.10	400
TRMB160808 - YTRYN260	26	25	100	0.10	400
TRMB160808 - YTRYN300	30	25	100	0.10	400
TRMB160808 - YTRYN310	31	25	100	0.10	400
TRMB160808 - YTRYN320	32	25	100	0.10	400
TRMB160808 - YTRYN330	33	25	100	0.10	400
TRMB160808 - YTRYN400	40	25	100	0.10	400
TRMB160808 - YTRYN470	47	25	100	0.10	400
TRMB160808 - YTRYN500	50	25	100	0.10	400
TRMB160808 - YTRYN520	52	25	100	0.10	400
TRMB160808 - YTRYN550	55	25	100	0.10	400
TRMB160808 - YTRYN560	56	25	100	0.10	400
TRMB160808 - YTRYN600	60	25	100	0.10	400
TRMB160808 - YTRYN680	68	25	100	0.15	400
TRMB160808 - YTRYN700	70	25	100	0.15	400
TRMB160808 - YTRYN750	75	25	100	0.15	400
TRMB160808 - YTRYN800	80	25	100	0.15	400
TRMB160808 - YTRYN900	90	25	100	0.20	400
TRMB160808 - YTRYN101	100	25	100	0.20	400
TRMB160808 - YTRYN121	120	25	100	0.25	400
TRMB160808 - YTRYN141	140	25	100	0.25	300
TRMB160808 - YTRYN151	150	25	100	0.30	200
TRMB160808 - YTRYN181	180	25	100	0.30	200
TRMB160808 - YTRYN201	200	25	100	0.30	200
TRMB160808 - YTRYN221	220	25	100	0.30	200
TRMB160808 - YTRYN241	240	25	100	0.40	200
TRMB160808 - YTRYN301	300	25	100	0.40	200
TRMB160808 - YTRYN331	330	25	100	0.50	200
TRMB160808 - YTRYN401	400	25	100	0.50	200
TRMB160808 - YTRYN421	420	25	100	0.50	200
TRMB160808 - YTRYN451	450	25	100	0.50	200



Part Number	Impedance (Ω)	Tolerance (\pm %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB160808 - YTRYN471	470	25	100	0.50	200
TRMB160808 - YTRYN501	500	25	100	0.50	200
TRMB160808 - YTRYN601	600	25	100	0.50	200
TRMB160808 - YTRYN751	750	25	100	0.70	200
TRMB160808 - YTRYN801	800	25	100	0.70	200
TRMB160808 - YTRYN102	1000	25	100	0.70	200
TRMB160808 - YTRYN122	1200	25	100	1.00	50
TRMB160808 - YTRYN152	1500	25	100	1.00	50
TRMB160808 - YTRYN172	1700	25	100	1.20	50
TRMB160808 - YTRYN202	2000	25	100	1.20	50
TRMB160808 - YTRYN222	2200	25	100	1.20	50
TRMB160808 - YTRYN252	2500	25	100	1.30	50
TRMB160808 - YTRYN272	2700	25	100	1.30	50



Electrical Characteristics (TRMB201209) - (EIA 0805)

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB201209 - YTRYN050	5	25	100	0.10	600
TRMB201209 - YTRYN070	7	25	100	0.10	600
TRMB201209 - YTRYN090	9	25	100	0.10	600
TRMB201209 - YTRYN100	10	25	100	0.10	600
TRMB201209 - YTRYN110	11	25	100	0.10	600
TRMB201209 - YTRYN120	12	25	100	0.10	600
TRMB201209 - YTRYN150	15	25	100	0.10	600
TRMB201209 - YTRYN170	17	25	100	0.10	600
TRMB201209 - YTRYN190	19	25	100	0.10	600
TRMB201209 - YTRYN220	22	25	100	0.10	600
TRMB201209 - YTRYN260	26	25	100	0.10	600
TRMB201209 - YTRYN280	28	25	100	0.10	600
TRMB201209 - YTRYN300	30	25	100	0.10	600
TRMB201209 - YTRYN310	31	25	100	0.10	600
TRMB201209 - YTRYN320	32	25	100	0.10	600
TRMB201209 - YTRYN330	33	25	100	0.10	500
TRMB201209 - YTRYN390	39	25	100	0.10	500
TRMB201209 - YTRYN400	40	25	100	0.10	500
TRMB201209 - YTRYN420	42	25	100	0.10	500
TRMB201209 - YTRYN470	47	25	100	0.10	500
TRMB201209 - YTRYN500	50	25	100	0.10	500
TRMB201209 - YTRYN520	52	25	100	0.15	500
TRMB201209 - YTRYN560	56	25	100	0.15	500
TRMB201209 - YTRYN600	60	25	100	0.15	500
TRMB201209 - YTRYN700	70	25	100	0.15	500
TRMB201209 - YTRYN750	75	25	100	0.15	500
TRMB201209 - YTRYN800	80	25	100	0.15	500
TRMB201209 - YTRYN900	90	25	100	0.15	500
TRMB201209 - YTRYN950	95	25	100	0.15	500
TRMB201209 - YTRYN101	100	25	100	0.25	300
TRMB201209 - YTRYN121	120	25	100	0.25	300
TRMB201209 - YTRYN151	150	25	100	0.25	300
TRMB201209 - YTRYN181	180	25	100	0.30	300
TRMB201209 - YTRYN201	200	25	100	0.30	300
TRMB201209 - YTRYN221	220	25	100	0.3	300
TRMB201209 - YTRYN241	240	25	100	0.3	300
TRMB201209 - YTRYN301	300	25	100	0.3	300
TRMB201209 - YTRYN331	330	25	100	0.3	300
TRMB201209 - YTRYN401	400	25	100	0.3	300
TRMB201209 - YTRYN421	420	25	100	0.3	300



Part Number	Impedance (Ω)	Tolerance (\pm %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB201209 - YTRYN431	430	25	100	0.4	300
TRMB201209 - YTRYN451	450	25	100	0.4	300
TRMB201209 - YTRYN471	470	25	100	0.4	300
TRMB201209 - YTRYN501	500	25	100	0.4	300
TRMB201209 - YTRYN601	600	25	100	0.4	300
TRMB201209 - YTRYN681	680	25	100	0.4	300
TRMB201209 - YTRYN751	750	25	100	0.5	200
TRMB201209 - YTRYN102	1000	25	100	0.5	200
TRMB201209 - YTRYN122	1200	25	100	0.6	200
TRMB201209 - YTRYN152	1500	25	100	0.6	200
TRMB201209 - YTRYN202	2000	25	100	0.7	200
TRMB201209 - YTRYN222	2200	25	100	0.7	200
TRMB201209 - YTRYN252	2500	25	100	0.7	200
TRMB201209 - YTRYN272	2700	25	100	0.7	200



Electrical Characteristics (TRMB321611) - (EIA 1206)

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB321611 - YTRYN080	8	25	100	0.05	600
TRMB321611 - YTRYN090	9	25	100	0.05	600
TRMB321611 - YTRYN110	11	25	100	0.05	600
TRMB321611 - YTRYN170	17	25	100	0.05	600
TRMB321611 - YTRYN190	19	25	100	0.05	600
TRMB321611 - YTRYN220	22	25	100	0.05	600
TRMB321611 - YTRYN240	24	25	100	0.05	600
TRMB321611 - YTRYN260	26	25	100	0.05	600
TRMB321611 - YTRYN300	30	25	100	0.05	600
TRMB321611 - YTRYN310	31	25	100	0.05	600
TRMB321611 - YTRYN320	32	25	100	0.05	600
TRMB321611 - YTRYN330	33	25	100	0.05	600
TRMB321611 - YTRYN350	35	25	100	0.10	500
TRMB321611 - YTRYN470	47	25	100	0.10	500
TRMB321611 - YTRYN500	50	25	100	0.10	500
TRMB321611 - YTRYN520	52	25	100	0.10	500
TRMB321611 - YTRYN600	60	25	100	0.10	500
TRMB321611 - YTRYN700	70	25	100	0.10	500
TRMB321611 - YTRYN750	75	25	100	0.15	500
TRMB321611 - YTRYN800	80	25	100	0.15	500
TRMB321611 - YTRYN900	90	25	100	0.15	500
TRMB321611 - YTRYN101	100	25	100	0.15	500
TRMB321611 - YTRYN121	120	25	100	0.15	500
TRMB321611 - YTRYN151	150	25	100	0.15	500
TRMB321611 - YTRYN181	180	25	100	0.20	400
TRMB321611 - YTRYN201	200	25	100	0.20	400
TRMB321611 - YTRYN221	220	25	100	0.20	400
TRMB321611 - YTRYN241	240	25	100	0.20	400
TRMB321611 - YTRYN301	300	25	100	0.20	400
TRMB321611 - YTRYN401	400	25	100	0.20	400
TRMB321611 - YTRYN471	470	25	100	0.20	400
TRMB321611 - YTRYN501	500	25	100	0.20	400
TRMB321611 - YTRYN601	600	25	100	0.30	400
TRMB321611 - YTRYN701	700	25	100	0.40	200
TRMB321611 - YTRYN102	1000	25	50	0.40	200
TRMB321611 - YTRYN122	1200	25	50	0.40	200
TRMB321611 - YTRYN152	1500	25	50	0.45	200
TRMB321611 - YTRYN202	2000	25	30	0.60	200
TRMB321611 - YTRYN272	2700	25	30	0.60	200



Electrical Characteristics (TRMB321616) - (EIA 1206)

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB321616 - YTRYN250	25	25	100	0.10	500
TRMB321616 - YTRYN600	60	25	100	0.20	500
TRMB321616 - YTRYN700	70	25	100	0.20	500

Electrical Characteristics (TRMB322513) - (EIA 1210)

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB322513 - YTRYN320	32	25	100	0.20	500
TRMB322513 - YTRYN600	60	25	100	0.20	500
TRMB322513 - YTRYN900	90	25	100	0.20	500
TRMB322513 - YTRYN121	120	25	100	0.20	500

Electrical Characteristics (TRMB451616) - (EIA 1806)

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB451616 - YTRYN330	33	25	100	0.20	600
TRMB451616 - YTRYN500	50	25	100	0.20	600
TRMB451616 - YTRYN600	60	25	100	0.20	600
TRMB451616 - YTRYN800	80	25	100	0.20	600
TRMB451616 - YTRYN900	90	25	100	0.30	500
TRMB451616 - YTRYN101	100	25	100	0.30	500
TRMB451616 - YTRYN151	150	25	100	0.30	500
TRMB451616 - YTRYN171	170	25	100	0.30	500

Electrical Characteristics (TRMB453215) - (EIA 1812)

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB453215 - YTRYN700	70	25	100	0.30	500
TRMB453215 - YTRYN121	120	25	100	0.30	500

Order Codes

Order Codes (TRMB)

TRMB160808		Y		TR		Y		H		100	
Part Number		Impedance Tolerance		Package		Design Code		Current		Impedance	
TRMB100505	0402	Y	± 25%	TR	Taping Reel	Y	ui:200	H	High Current	060	6 Ω
TRMB160808	0603					Q	ui:75			100	10 Ω
TRMB201209	0805					M	± 20%	N	General Current	330	33 Ω
TRMB321611	1206	152	1500 Ω								
TRMB321616	1206										
TRMB322513	1210										
TRMB451616	1806										
TRMB453215	1812										



► Introduction (TRMB)

About using multilayer chips:

- Chip Beads, perform the function of removing RF energy that exists within a transmission line structure (Printed circuit board tracking). This RF energy is an AC sine wave component that co-exists with the DC voltage level of the transmitted signal. The DC component is the intended signal of interest whereas RF energy will propagate down the trace and radiate as EMI.
- Beads perform the function of being a high frequency resistor (attenuator) allowing DC energy to pass through whilst removing AC energy.
- Chip Beads consist of a soft ferrite material which responds to RF energy. This material contains high resistivity in monolithic form. Eddy current losses are inversely proportional to resistivity. These losses increase with the square of the frequency. The eddy currents are the RF energy that travels through the device.
- Hard ferrite is associated with a permanent magnetic field, its polarities become fixed as North and South. Soft ferrite material will change its impedance value based on the frequency that the bead presents to the circuit and does not permanently retain the magnetic field.

Advantages of using Multilayer Chips:

- Suitable to high density printed circuit boards.
- Perfect shape for automatic mounting, with no directionality.
- Monolithic inorganic material construction for high reliability.
- Outstanding soldering heat resistance. Both flow and reflow soldering methods can be used.
- Small size chips generate high impedance. Minimum floating capacity and excellent high frequency characteristics.

A selection guide to miniature ferrite chip beads:

- The TRMB100505, TRMB160808, TRMB201209, and TRMB321611 Series covers a wide range of impedance characteristics. It is designed to prevent electromagnetic interference.
- The TRMB100505-YTRQN060, TRMB160808-YTRQN060, TRMB201209-YTRQN050, and TRMB321611-YTRQN150 Series can minimize attenuation of the signal wave form due to its sharp impedance characteristics. Those are designed for high speed applications. Those series generates an impedance down to relatively low frequency.
- The TRMB100505-YTRYN060, TRMB100505-YTRQN060, TRMB160808-YTRYN060, TRMB160808-YTRQN060, TRMB321611-YTRYN080, and TRMB201209-YTRQN050 Series can be used in high current circuits due to its low DC resistance.



▶ Electrical Characteristics for High Speed Signals Use

Electrical Characteristics for High Speed Signals Use (TRMB100505) - EIA 0402

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB100505 - YTRQN060	6	25	100	0.08	300
TRMB100505 - YTRQN100	10	25	100	0.10	300
TRMB100505 - YTRQN220	22	25	100	0.25	300
TRMB100505 - YTRQN260	26	25	100	0.25	300
TRMB100505 - YTRQN300	30	25	100	0.25	300
TRMB100505 - YTRQN400	40	25	100	0.25	350
TRMB100505 - YTRQN750	75	25	100	0.30	300
TRMB100505 - YTRQN800	80	25	100	0.30	300
TRMB100505 - YTRQN101	100	25	100	0.40	300
TRMB100505 - YTRQN121	120	25	100	0.40	300
TRMB100505 - YTRQN221	220	25	100	0.60	200



Electrical Characteristics for High Speed Signals Use (TRMB160808) - EIA 0603

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB160808 - YTRQN060	6	25	100	0.05	500
TRMB160808 - YTRQN070	7	25	100	0.05	400
TRMB160808 - YTRQN100	10	25	100	0.07	400
TRMB160808 - YTRQN190	19	25	100	0.20	300
TRMB160808 - YTRQN200	20	25	100	0.20	300
TRMB160808 - YTRQN220	22	25	100	0.20	300
TRMB160808 - YTRQN300	30	25	100	0.20	300
TRMB160808 - YTRQN400	40	25	100	0.20	300
TRMB160808 - YTRQN470	47	25	100	0.20	300
TRMB160808 - YTRQN500	50	25	100	0.25	300
TRMB160808 - YTRQN600	60	25	100	0.25	300
TRMB160808 - YTRQN680	68	25	100	0.25	300
TRMB160808 - YTRQN700	70	25	100	0.25	300
TRMB160808 - YTRQN750	75	25	100	0.25	300
TRMB160808 - YTRQN800	80	25	100	0.25	300
TRMB160808 - YTRQN101	100	25	100	0.30	300
TRMB160808 - YTRQN121	120	25	100	0.30	300
TRMB160808 - YTRQN131	130	25	100	0.30	300
TRMB160808 - YTRQN141	140	25	100	0.30	300
TRMB160808 - YTRQN151	150	25	100	0.30	200
TRMB160808 - YTRQN161	160	25	100	0.30	200
TRMB160808 - YTRQN181	180	25	100	0.35	200
TRMB160808 - YTRQN201	200	25	100	0.35	200
TRMB160808 - YTRQN221	220	25	100	0.35	200
TRMB160808 - YTRQN241	240	25	100	0.35	200
TRMB160808 - YTRQN301	300	25	100	0.40	200
TRMB160808 - YTRQN401	400	25	100	0.50	200
TRMB160808 - YTRQN421	420	25	100	0.50	200
TRMB160808 - YTRQN471	470	25	100	0.50	200
TRMB160808 - YTRQN481	480	25	100	0.50	200
TRMB160808 - YTRQN601	600	25	100	0.50	200
TRMB160808 - YTRQN102	1000	25	100	0.60	100
TRMB160808 - YTRQN122	1200	25	100	0.60	100
TRMB160808 - YTRQN152	1500	25	100	0.70	100
TRMB160808 - YTRQN182	1800	25	100	0.80	100
TRMB160808 - YTRQN222	2200	25	100	1.00	50
TRMB160808 - YTRQN252	2500	25	100	1.50	50



Electrical Characteristics for High Speed Signals Use (TRMB201209) - EIA 0805

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB201209 - YTRQN050	5	25	100	0.07	800
TRMB201209 - YTRQN060	6	25	100	0.07	800
TRMB201209 - YTRQN070	7	25	100	0.10	700
TRMB201209 - YTRQN110	11	25	100	0.10	700
TRMB201209 - YTRQN260	26	25	100	0.15	600
TRMB201209 - YTRQN300	30	25	100	0.15	600
TRMB201209 - YTRQN320	32	25	100	0.15	600
TRMB201209 - YTRQN400	40	25	100	0.15	500
TRMB201209 - YTRQN600	60	25	100	0.15	500
TRMB201209 - YTRQN700	70	25	100	0.15	500
TRMB201209 - YTRQN750	75	25	100	0.15	500
TRMB201209 - YTRQN900	90	25	100	0.15	500
TRMB201209 - YTRQN101	100	25	100	0.20	400
TRMB201209 - YTRQN121	120	25	100	0.20	400
TRMB201209 - YTRQN151	150	25	100	0.20	400
TRMB201209 - YTRQN171	170	25	100	0.30	400
TRMB201209 - YTRQN201	200	25	100	0.30	300
TRMB201209 - YTRQN221	220	25	100	0.30	300
TRMB201209 - YTRQN241	240	25	100	0.30	300
TRMB201209 - YTRQN301	300	25	100	0.30	300
TRMB201209 - YTRQN401	400	25	100	0.30	300
TRMB201209 - YTRQN421	420	25	100	0.30	300
TRMB201209 - YTRQN471	470	25	100	0.35	200
TRMB201209 - YTRQN501	500	25	100	0.35	200
TRMB201209 - YTRQN601	600	25	100	0.35	200
TRMB201209 - YTRQN751	750	25	100	0.40	200
TRMB201209 - YTRQN102	1000	25	100	0.40	200
TRMB201209 - YTRQN122	1200	25	100	0.45	200
TRMB201209 - YTRQN152	1500	25	100	0.45	200
TRMB201209 - YTRQN202	2000	25	100	0.50	200
TRMB201209 - YTRQN222	2200	25	100	0.50	200
TRMB201209 - YTRQN252	2500	25	100	0.60	200
TRMB201209 - YTRQN272	2700	25	100	0.60	200



Electrical Characteristics for High Speed Signals Use (TRMB321611) - EIA 1206

Part Number	Impedance (Ω)	Tolerance (± %)	Freq. (MHz)	DCR (Ω)(max)	IDC (mA)(max)
TRMB321611 - YTRQN150	15	25	100	0.15	600
TRMB321611 - YTRQN170	17	25	100	0.15	600
TRMB321611 - YTRQN190	19	25	100	0.15	600
TRMB321611 - YTRQN300	30	25	100	0.15	600
TRMB321611 - YTRQN320	32	25	100	0.15	600
TRMB321611 - YTRQN500	50	25	100	0.15	500
TRMB321611 - YTRQN600	60	25	100	0.15	500
TRMB321611 - YTRQN800	80	25	100	0.15	500
TRMB321611 - YTRQN900	90	25	100	0.15	500
TRMB321611 - YTRQN121	120	25	100	0.20	400
TRMB321611 - YTRQN151	150	25	100	0.20	400
TRMB321611 - YTRQN201	200	25	100	0.25	300
TRMB321611 - YTRQN221	220	25	100	0.30	300
TRMB321611 - YTRQN301	300	25	100	0.30	300
TRMB321611 - YTRQN351	350	25	100	0.30	300
TRMB321611 - YTRQN401	400	25	100	0.30	300
TRMB321611 - YTRQN601	600	25	100	0.35	300
TRMB321611 - YTRQN102	1000	25	100	0.40	200
TRMB321611 - YTRQN122	1200	25	100	0.40	200
TRMB321611 - YTRQN152	1500	25	100	0.45	200

Order Codes

Order Codes (TRMB)

TRMB160808		Y		TR		Y		H		100	
Part Number		Impedance Tolerance		Package		Design Code		Current		Impedance	
TRMB100505	0402	Y	± 25%	TR	Taping Reel	Y	ui:200	H	High Current	060	6 Ω
TRMB160808	0603					Q	ui:75			100	10 Ω
TRMB201209	0805					M	± 20%	N	General Current	330	33 Ω
TRMB321611	1206	152	1500 Ω								



▶ 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.



Thin-Film RF Inductors (TRAL)

▶ Product Introduction

Chip Thin-Film RF Inductors

Provide Small-Format Protection.

Features :

- A Photo Lithographic Single Layer Ceramic Chip.
- High SRF, Excellent Q, Superior Temperature Stability.
- Self Resonant Frequency Controlled within 10%.
- Stable Inductance in High Frequency Circuit.
- Highly Stable Design for Critical Needs.
- Tight Tolerance of $\pm 1\%$ or $\pm 0.1\text{nH}$.

Applications :

- Cellular Telephone, Pagers and GPS Products.
- VCO, TCXO Circuit and RF Transceiver Module.
- Wireless LAN, Bluetooth Module.
- Communication Appliances.

Token (TRAL) chip inductors provide reliable protection against challenging EMI problems in high frequency filtering applications. This miniature wire wound inductor features a low seated height that stands only 0.23mm above the circuit board. It protects sensitive electronic circuitry and ensures high performance operation in a wide range of compact devices that are shrinking ever smaller in physical size.

Token (TRAL) series uses a thin-film technology for high reliability and precision tolerances to 1% or $\pm 0.1\text{nH}$. The (TRAL) thin-film inductor series is available in 0603, 0402, and 0201 sizes, in inductance values from 0.1 to 100nH, in tolerances down to 0.1nH or 1%, and with SRF (self-resonant frequency) tightly controlled.

The technology characteristics make it ideal for the latest cellphone and PDA applications in addition to wireless network and Bluetooth enabled devices.

Application of specific designs also available including different inductance values and Q specifications adjusted to frequency requirements. Customized designs and tighter tolerances are available on request. Thin Film Inductor is mounted in a surface mount package which assures mechanical stability, excellent lead planarity, and suitable for automatic pick and place equipment.

The (TRAL) series is lead-free and RoHS compliant. Detailed specifications, both mechanical and electrical, please contact Token sales representative or link to Token official website "[RF Inductors](#)" for more information.



Config. & Dim.

Configurations & Dimensions (Unit: mm) (TRAL)

Codes	A	B	C	D
TRAL01 (0201)	0.6 ± 0.05	0.3 ± 0.05	0.23 ± 0.05	0.15 ± 0.05
TRAL02 (0402)	1.0 ± 0.05	0.5 ± 0.05	0.32 ± 0.05	0.2 ± 0.10
TRAL03 (0603)	1.6 ± 0.10	0.8 ± 0.10	0.45 ± 0.10	0.3 ± 0.20

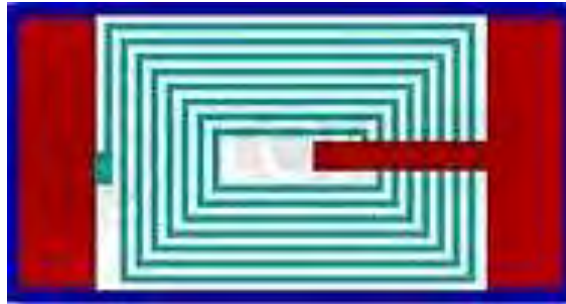
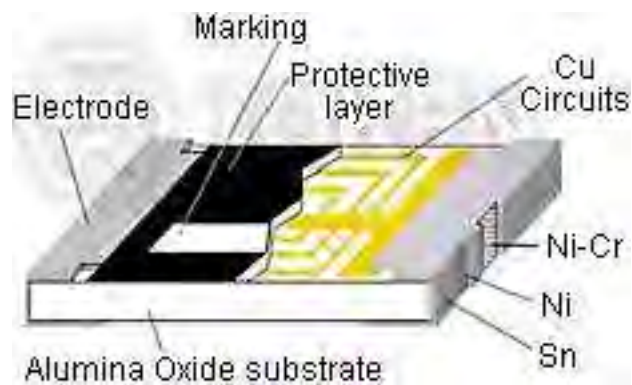
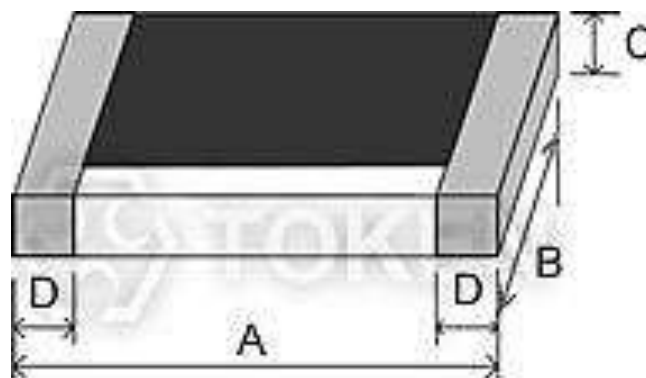


Photo Lithographic Pattern



Material Construction



(TRAL) Dimensions (Unit: mm)

Standard Electrical Specifications

Standard Electrical Specifications (TRAL) - EIA 0201

Part No.	Inductance (nH)	Tolerance (% or nH)	Q (min)	DCR (Ω)(max)	IDC (mA)(max)	SRF (GHz)(min)
TRAL01*TR0N1	0.1	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.20	400	9
TRAL01*TR0N2	0.2	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.20	400	9
TRAL01*TR0N3	0.3	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.20	400	9
TRAL01*TR0N4	0.4	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.25	350	9
TRAL01*TR0N5	0.5	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.25	350	9
TRAL01*TR0N6	0.6	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.25	350	9
TRAL01*TR0N7	0.7	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.30	300	9
TRAL01*TR0N8	0.8	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.30	300	9
TRAL01*TR0N9	0.9	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.30	300	9
TRAL01*TR1N0	1.0	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.30	300	9
TRAL01*TR1N1	1.1	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.35	300	9
TRAL01*TR1N2	1.2	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.35	300	9
TRAL01*TR1N3	1.3	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.45	250	9
TRAL01*TR1N4	1.4	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.45	250	9
TRAL01*TR1N5	1.5	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.45	250	9
TRAL01*TR1N6	1.6	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.55	200	9
TRAL01*TR1N7	1.7	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.55	200	9
TRAL01*TR1N8	1.8	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.55	200	9
TRAL01*TR1N9	1.9	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.55	200	9
TRAL01*TR2N0	2.0	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.70	200	8
TRAL01*TR2N1	2.1	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.70	200	8
TRAL01*TR2N2	2.2	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.70	200	8
TRAL01*TR2N3	2.3	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.80	150	8
TRAL01*TR2N4	2.4	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.80	150	8
TRAL01*TR2N5	2.5	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.80	150	8
TRAL01*TR2N6	2.6	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.80	150	8
TRAL01*TR2N7	2.7	± 0.1, 0.2, 0.3nH	8 / 500MHz	0.80	150	8
TRAL01*TR2N8	2.8	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.00	150	6
TRAL01*TR2N9	2.9	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.00	150	6
TRAL01*TR3N0	3.0	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.00	150	6
TRAL01*TR3N1	3.1	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.00	150	6
TRAL01*TR3N2	3.2	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.00	150	6
TRAL01*TR3N3	3.3	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.00	150	6
TRAL01*TR3N4	3.4	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.20	150	6
TRAL01*TR3N5	3.5	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.20	150	6
TRAL01*TR3N6	3.6	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.20	150	6
TRAL01*TR3N7	3.7	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.20	150	6
TRAL01*TR3N8	3.8	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.20	150	6
TRAL01*TR3N9	3.9	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.20	150	6
TRAL01*TR4N0	4.0	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.20	150	6
TRAL01*TR4N4	4.4	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.30	140	6
TRAL01*TR4N7	4.7	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.40	130	6
TRAL01*TR4N9	4.9	± 0.1, 0.2, 0.3nH	8 / 500MHz	1.60	130	6
TRAL01*TR5N6	5.6	± 2, ± 5%	8 / 500MHz	1.80	130	4
TRAL01*TR6N1	6.1	± 2, ± 5%	8 / 500MHz	2.00	120	4
TRAL01*TR6N8	6.8	± 2, ± 5%	8 / 500MHz	2.30	110	4
TRAL01*TR7N4	7.4	± 2, ± 5%	8 / 500MHz	2.80	110	4
TRAL01*TR8N2	8.2	± 2, ± 5%	8 / 500MHz	3.00	110	3
TRAL01*TR9N1	9.1	± 2, ± 5%	8 / 500MHz	3.25	100	3
TRAL01*TR9N2	9.2	± 2, ± 5%	8 / 500MHz	3.25	100	3
TRAL01*TR10N	10	± 2, ± 5%	8 / 500MHz	3.50	80	2

● Token is capable of manufacturing the optional spec based on customer's requirement.



Standard Electrical Specifications (TRAL) - EIA 0402

Part No.	Inductance (nH)	Tolerance (% or nH)	Q (min)	DCR (Ω)(max)	IDC (mA)(max)	SRF (GHz)(min)
TRAL02*TR0N2	0.2	0.1/0.2/0.3(nH)	13 / 500MHz	0.10	800	14
TRAL02*TR0N4	0.4	0.1/0.2/0.3(nH)	13 / 500MHz	0.10	800	14
TRAL02*TR0N8	0.8	0.1/0.2/0.3(nH)	13 / 500MHz	0.15	700	14
TRAL02*TR1N0	1.0	0.1/0.2/0.3(nH)	13 / 500MHz	0.15	700	12
TRAL02*TR1N2	1.2	0.1/0.2/0.3(nH)	13 / 500MHz	0.15	700	12
TRAL02*TR1N5	1.5	0.1/0.2/0.3(nH)	13 / 500MHz	0.25	700	10
TRAL02*TR1N6	1.6	0.1/0.2/0.3(nH)	13 / 500MHz	0.25	560	10
TRAL02*TR1N8	1.8	0.1/0.2/0.3(nH)	13 / 500MHz	0.25	560	10
TRAL02*TR2N0	2.0	0.1/0.2/0.3(nH)	13 / 500MHz	0.35	560	8
TRAL02*TR2N2	2.2	0.1/0.2/0.3(nH)	13 / 500MHz	0.35	440	8
TRAL02*TR2N7	2.7	0.1/0.2/0.3(nH)	13 / 500MHz	0.35	440	8
TRAL02*TR3N1	3.1	0.1/0.2/0.3(nH)	13 / 500MHz	0.45	380	6
TRAL02*TR3N3	3.3	0.1/0.2/0.3(nH)	13 / 500MHz	0.45	380	6
TRAL02*TR3N6	3.6	0.1/0.2/0.3(nH)	13 / 500MHz	0.55	380	6
TRAL02*TR3N9	3.9	0.1/0.2/0.3(nH)	13 / 500MHz	0.55	340	6
TRAL02*TR4N7	4.7	0.1/0.2/0.3(nH)	13 / 500MHz	0.65	320	6
TRAL02*TR5N6	5.6	0.1/0.2/0.3(nH)	13 / 500MHz	0.85	280	6
TRAL02*TR5N9	5.9	0.1/0.2/0.3(nH)	13 / 500MHz	0.85	280	6
TRAL02*TR6N8	6.8	0.1/0.2/0.3(nH)	13 / 500MHz	1.05	260	6
TRAL02*TR7N2	7.2	0.1/0.2/0.3(nH)	13 / 500MHz	1.05	260	6
TRAL02*TR8N0	8.0	0.1/0.2/0.3(nH)	13 / 500MHz	1.25	220	5.5
TRAL02*TR8N2	8.2	0.1/0.2/0.3(nH)	13 / 500MHz	1.25	220	5.5
TRAL02*TR9N1	9.1	0.1/0.2/0.3(nH)	13 / 500MHz	1.25	220	5.5
TRAL02*TR10N	10	1/2/3/5(%)	13 / 500MHz	1.35	200	4.5
TRAL02*TR12N	12	1/2/3/5(%)	13 / 500MHz	1.55	180	3.7
TRAL02*TR13N8	13.8	1/2/3/5(%)	13 / 500MHz	1.75	180	3.7
TRAL02*TR15N	15	1/2/3/5(%)	13 / 500MHz	1.75	130	3.3
TRAL02*TR17N	17	1/2/3/5(%)	13 / 500MHz	1.95	100	3.1
TRAL02*TR18N	18	1/2/3/5(%)	13 / 500MHz	2.15	100	3.1
TRAL02*TR20N8	20.8	1/2/3/5(%)	13 / 500MHz	2.55	90	2.8
TRAL02*TR22N	22	1/2/3/5(%)	13 / 500MHz	2.65	90	2.8
TRAL02*TR27N	27	1/2/3/5(%)	13 / 500MHz	3.25	75	2.5
TRAL02*TR33N	33	1/2/3/5(%)	13 / 500MHz	3.75	75	2.5

● Token is capable of manufacturing the optional spec based on customer's requirement.



Standard Electrical Specifications (TRAL) - EIA 0603

Part No.	Inductance (nH)	Tolerance (% or nH)	Q (min)	DCR (Ω)(max)	IDC (mA)(max)	SRF (GHz)(min)
TRAL03*TR1N0	1.0	0.1/0.2/0.3(nH)	15 / 300MHz	0.35	800	13
TRAL03*TR1N2	1.2	0.1/0.2/0.3(nH)	15 / 300MHz	0.35	800	13
TRAL03*TR1N5	1.5	0.1/0.2/0.3(nH)	15 / 300MHz	0.35	800	10
TRAL03*TR1N8	1.8	0.1/0.2/0.3(nH)	15 / 300MHz	0.35	300	10
TRAL03*TR2N2	2.2	0.1/0.2/0.3(nH)	15 / 300MHz	0.35	300	8
TRAL03*TR2N7	2.7	0.1/0.2/0.3(nH)	15 / 300MHz	0.45	300	6
TRAL03*TR3N3	3.3	0.1/0.2/0.3(nH)	15 / 300MHz	0.45	300	6
TRAL03*TR3N9	3.9	0.1/0.2/0.3(nH)	15 / 300MHz	0.45	300	6
TRAL03*TR4N7	4.7	0.1/0.2/0.3(nH)	15 / 300MHz	0.55	300	5
TRAL03*TR5N6	5.6	0.1/0.2/0.3(nH)	15 / 300MHz	0.65	300	5
TRAL03*TR6N8	6.8	0.1/0.2/0.3(nH)	15 / 300MHz	0.75	300	5
TRAL03*TR8N2	8.2	0.1/0.2/0.3(nH)	15 / 300MHz	0.95	300	4
TRAL03*TR10N	10	1/2/3/5(%)	15 / 300MHz	0.95	300	4
TRAL03*TR12N	12	1/2/3/5(%)	15 / 300MHz	1.05	300	3
TRAL03*TR15N	15	1/2/3/5(%)	15 / 300MHz	1.35	300	3
TRAL03*TR18N	18	1/2/3/5(%)	15 / 300MHz	1.65	300	2
TRAL03*TR22N	22	1/2/3/5(%)	15 / 300MHz	1.95	250	2
TRAL03*TR27N	27	1/2/3/5(%)	15 / 300MHz	2.35	250	2
TRAL03*TR33N	33	1/2/3/5(%)	15 / 300MHz	2.75	250	1.5
TRAL03*TR39N	39	1/2/3/5(%)	15 / 300MHz	3.00	200	1.5
TRAL03*TR47N	47	1/2/3/5(%)	15 / 300MHz	3.00	200	1.5
TRAL03*TR56N	56	1/2/3/5(%)	15 / 300MHz	5.00	150	1
TRAL03*TR68N	68	1/2/3/5(%)	15 / 300MHz	5.00	150	1
TRAL03*TRR10	100	1/2/3/5(%)	15 / 300MHz	7.50	100	1

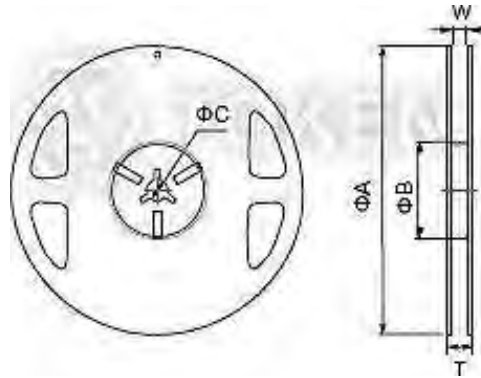
- Token is capable of manufacturing the optional spec based on customer's requirement.



▶ Reel & Packaging

Reel & Packaging Quantity (Unit: mm) (TRAL)

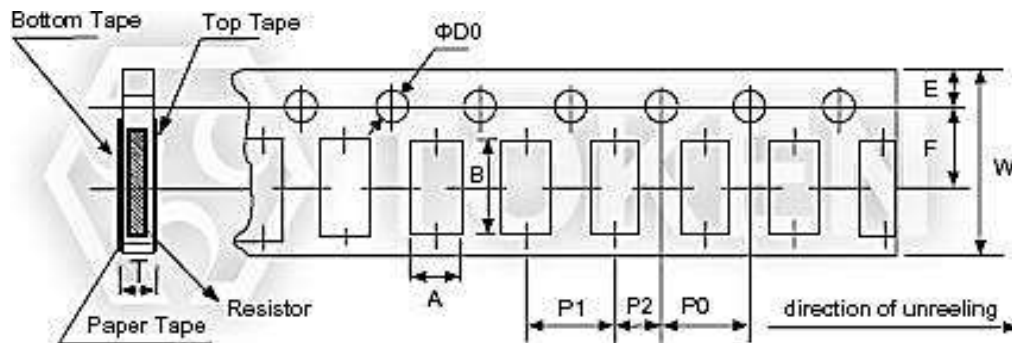
Codes	ΦA	ΦB	ΦC	W	T	Paper Tape (PCS)
TRAL01	178.0 ± 1.0	60 ± 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	10,000
TRAL02	178.0 ± 1.0	60 ± 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	10,000
TRAL03	178.0 ± 1.0	60 ± 1.0	13.5 ± 0.7	9.5 ± 1.0	11.5 ± 1.0	5,000



Reel Dimensions (Unit: mm)

Paper Tape (Unit: mm) (TRAL)

Codes	$A \pm 0.05$	$B \pm 0.05$	$W \pm 0.10$	$E \pm 0.05$	$F \pm 0.05$	$P0 \pm 0.10$	P1	$P2 \pm 0.05$	$\Phi D0$	T
TRAL01	0.40	0.70	8.00	1.75	3.5	4.00	2.00 ± 0.05	2.00	1.55 ± 0.03	0.42 ± 0.02
TRAL02	0.70	1.16	8.00	1.75	3.5	4.00	2.00 ± 0.05	2.00	1.55 ± 0.05	0.40 ± 0.03
TRAL03	1.10	1.90	8.00	1.75	3.5	4.00	4.00 ± 0.10	2.00	1.55 ± 0.05	0.60 ± 0.03



Paper Tape Specifications (Unit: mm)

▶ Environ. Characteristics

Environmental Characteristics (TRAL)

Item	Specification	Test Method
Bending Test	As SPEC.	JIS-C-5202-6.1.4 Bending Amplitude 3mm for 10 seconds
Dielectric Withstand Voltage	>100V	MIL-STD-202F Method 301 Apply 100VA (rms) for 1minute.
Insulation Resistance	>1000MΩ	MIL-STD-202F Method 302 Apply 100VDC for 1minute.
Resistance to Soldering Heat	$\Delta L \leq 10\%$	MIL-STD-202F Method 210E 260±5°C, 10 seconds
High Temperature Exposure	$\Delta L \leq 10\%$	JIS-C-5202-7.2 85±2°C, 1000 +48/-0 hours
Moisture Resistance	$\Delta L \leq 10\%$	MIL-STD-202F Method 103B 40±°C, 90~95%RH, 1000 +48/-0 hours
Low Temperature Storage	$\Delta L \leq 10\%$	JIS-C-5202-7.1 -40±3°C, 1000 +48/-0 hours
Temperature Cycle	$\Delta L \leq 10\%$	JIS-C-5202-7.4 -40/RT/85/RT, 10 cycles
Solderability	95% min coverage	MIL-STD-202F Method 208H 245±5°C, for 3 seconds

● Note: Storage Temperature: 25±3°C; Humidity: <80%RH.

▶ Order Codes

Order Codes (TRAL)

TRAL	02			G	TR		10N		
Part Number	Dimensions (L×W) (mm)			Inductance Tolerance (%) or (nH)		Package		Inductance	
TRAL01	01	0.60×0.30mm	EIA0201	J	5%	TR	Taping Reel	1N0	1.0nH
TRAL02	02	1.00×0.50mm	EIA0402	H	±3%			10N	10nH
TRAL03	03	1.60×0.80mm	EIA0603	G	±2%			20N8	20.8nH
				F	±1%			R10	100nH
				S	±0.3nH				
				C	±0.2nH				
				B	±0.1nH				

► 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.



Multilayer Ceramic RF Inductors (TRMF)

▶ Product Introduction

Chip Multilayer RF Ceramic Inductors Add New Options for High-Frequency Applications.

Features :

- High Q and high reliability and ceramic material.
- To prevent EMI interference noises between electronic circuits.

Applications :

- Display Monitor, Gaming Machine,
- Notebook Computer, Disc Drive Unit(CD/DVD),
- Inkjet Printer, Hard Disk Drive, Copying Machine,
- Video Tape Recorder, DVD Player, Video Camera,
- Color TV, Digital Still Camera, Car Electronics, Lowest EMI.

Ceramic materials and process technologies have allowed Token to add magnetics portfolio with a new series of multilayer high-frequency ceramic inductors. The Token (TRMF) series inductors are aimed at signal shaping and RF filtering applications in a wide range of electronic systems. Target end products include remote controls, high-end video processing equipment, set-top boxes, cell phones, pagers, keyless entry systems, wireless and wire line networks, and cable modems.

Standard inductance options for the (TRMF) series range from 1 nH to 100 nH. Available tolerances are $\pm 0.3\text{nH}$, $\pm 5\%$, and $\pm 10\%$. Maximum DC resistance (DCR) ranges from 0.1Ω to 2.5Ω depending on inductance. In a space-saving surface-mount 0402 package measures (1 × 0.5 mm) and with 2-mil (0.5 mm) height profile. 0402, 0603, and 0805 package size is available.

(TRMF) inductors feature a high Q rating and minimum self-resonant frequency ranges from 0.6 GHz to 10 GHz. Designed for reliable operation in high-frequency applications, (TRMF) inductors are rated for currents from 100 mA to 500 mA. Their surface-mount packaging is solder able by reflow or wave methods and specified for a wide operating temperature range of -55°C to $+125^{\circ}\text{C}$.

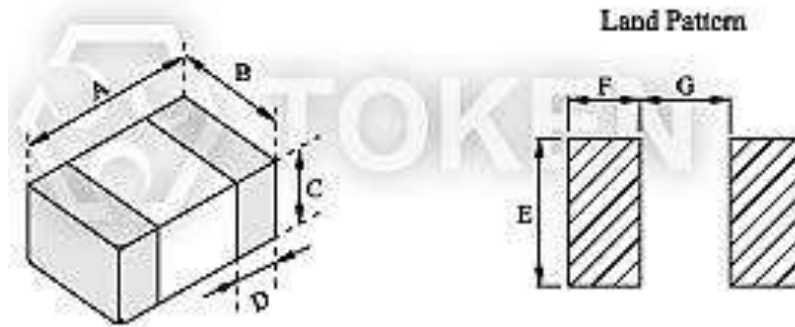
The (TRMF) series is fully RoHS compliant and is supplied in tape and reel packaging ready for use with automated assembly processes. Contact us with your specific needs. For more information, please link to Token official website "[RF Inductors](http://www.token.com.tw)".



► Configurations & Dimensions

Configurations & Dimensions (unit: mm) (TRMF)

Type	A	B	C	D	E	F	G
TRMF100505 (0402)	1.0 ± 0.1	0.5 ± 0.1	0.5 ± 0.1	0.1(min)	0.5	0.45	0.5
TRMF160808 (0603)	1.6 ± 0.2	0.8 ± 0.2	0.8 ± 0.2	0.3 ± 0.2	0.7	0.70	0.7
TRMF201209 (0805)	2.0 ± 0.2	1.2 ± 0.2	0.9 ± 0.2	0.5 ± 0.3	1.0	0.80	1.0



RF Surface Mount (TRMF) Dimensions

Electrical Characteristics

Electrical Characteristics (TRMF100505) - EIA 0402

Part Number	Inductance (nH)	Tolerance	Quality Factor /Min	L/Q Freq. (MHz)	Q (typical) Frequency (MHz)			Resistance DC/Max (Ohm)	Self-Resonant Frequency /Min.(GHz)	Current DC/Max (mA)
					100	500	800			
TRMF100505 - 1N0*	1.0	± 0.3nH	8	100	11	33	37	0.12	10.0	300
TRMF100505 - 1N2*	1.2	± 0.3nH	8	100	11	29	26	0.12	10.0	300
TRMF100505 - 1N5*	1.5	± 0.3nH	8	100	12	29	40	0.13	6.00	300
TRMF100505 - 1N8*	1.8	± 0.3nH	8	100	11	26	34	0.14	6.00	300
TRMF100505 - 2N2*	2.2	± 0.3nH	8	100	11	26	36	0.16	6.00	300
TRMF100505 - 2N7*	2.7	± 0.3nH	8	100	12	29	38	0.17	6.00	300
TRMF100505 - 3N3*	3.3	±0.3nH,±10%	8	100	11	28	37	0.19	6.00	300
TRMF100505 - 3N9*	3.9	±0.3nH,±10%	8	100	11	26	32	0.22	4.00	300
TRMF100505 - 4N7*	4.7	±0.3nH,±10%	8	100	12	28	37	0.24	4.00	300
TRMF100505 - 5N6*	5.6	±0.3nH,±10%	8	100	11	26	35	0.27	4.00	300
TRMF100505 - 6N8*	6.8	±5%,±10%	8	100	11	26	34	0.32	3.90	300
TRMF100505 - 8N2*	8.2	±5%,±10%	8	100	12	26	34	0.37	3.50	300
TRMF100505 - 10N*	10	±5%,±10%	8	100	11	25	31	0.42	3.20	300
TRMF100505 - 12N*	12	±5%,±10%	8	100	11	25	31	0.50	2.60	300
TRMF100505 - 15N*	15	±5%,±10%	8	100	11	24	30	0.55	2.30	300
TRMF100505 - 18N*	18	±5%,±10%	8	100	11	24	30	0.65	2.00	300
TRMF100505 - 22N*	22	±5%,±10%	8	100	12	24	30	0.80	1.60	300
TRMF100505 - 27N*	27	±5%,±10%	8	100	11	24	28	0.90	1.40	300
TRMF100505 - 33N*	33	±5%,±10%	8	100	12	23	26	1.00	1.20	200
TRMF100505 - 39N*	39	±5%,±10%	8	100	11	21	24	1.20	1.10	150
TRMF100505 - 47N*	47	±5%,±10%	8	100	11	21	23	1.30	0.90	150
TRMF100505 - 56N*	56	±5%,±10%	8	100	12	21	21	2.00	0.75	150
TRMF100505 - 68N*	68	±5%,±10%	8	100	11	19	19	2.20	0.75	100
TRMF100505 - 82N*	82	±5%,±10%	8	100	10	19	16	2.50	0.60	100
TRMF100505 - R10*	100	±5%,±10%	8	100	10	18	-	2.50	0.60	100

- Note: Measuring Equipment: HP-4291B + 16192A
Storage Temperature: 25±3°C; Humidity<80% RH



Electrical Characteristics (TRMF160808) - EIA 0603

Part Number	Inductance (nH)	Tolerance	Quality Factor /Min	L/Q Freq. (MHz)	Q (typical) Frequency (MHz)			Resistance DC/Max (Ohm)	Self-Resonant Frequency /Min.(GHz)	Current DC/Max (mA)
					100	500	800			
TRMF160808 - 1N0*	1.0	±0.3nH	8	100	15	36	49	0.10	6.0	500
TRMF160808 - 1N2*	1.2	±0.3nH	8	100	15	36	49	0.10	6.0	500
TRMF160808 - 1N5*	1.5	±0.3nH	8	100	14	34	47	0.10	6.0	500
TRMF160808 - 1N8*	1.8	±0.3nH	8	100	17	40	55	0.10	6.0	500
TRMF160808 - 2N2*	2.2	±0.3nH	8	100	15	38	49	0.10	6.0	500
TRMF160808 - 2N7*	2.7	±0.3nH	8	100	14	37	48	0.10	6.0	500
TRMF160808 - 3N3*	3.3	±0.3nH,±10%	10	100	16	40	51	0.13	6.0	500
TRMF160808 - 3N9*	3.9	±0.3nH,±10%	10	100	14	36	48	0.15	6.0	500
TRMF160808 - 4N7*	4.7	±0.3nH,±10%	10	100	14	37	48	0.20	4.0	500
TRMF160808 - 5N6*	5.6	±0.3nH,±10%	10	100	14	36	46	0.23	4.0	500
TRMF160808 - 6N8*	6.8	±5%,±10%	10	100	15	37	48	0.25	3.75	500
TRMF160808 - 8N2*	8.2	±5%,±10%	10	100	16	39	50	0.28	3.30	500
TRMF160808 - 10N*	10	±5%,±10%	12	100	16	37	47	0.30	3.0	300
TRMF160808 - 12N*	12	±5%,±10%	12	100	15	36	45	0.35	2.6	300
TRMF160808 - 15N*	15	±5%,±10%	12	100	16	38	48	0.40	2.3	300
TRMF160808 - 18N*	18	±5%,±10%	12	100	17	38	47	0.45	2.0	300
TRMF160808 - 22N*	22	±5%,±10%	12	100	18	40	49	0.50	1.6	300
TRMF160808 - 27N*	27	±5%,±10%	12	100	18	40	47	0.55	1.4	300
TRMF160808 - 33N*	33	±5%,±10%	12	100	17	40	46	0.60	1.2	300
TRMF160808 - 39N*	39	±5%,±10%	12	100	19	40	46	0.65	1.1	300
TRMF160808 - 47N*	47	±5%,±10%	12	100	17	36	39	0.70	0.9	300
TRMF160808 - 56N*	56	±5%,±10%	12	100	18	36	37	0.75	0.9	300
TRMF160808 - 68N*	68	±5%,±10%	12	100	18	35	36	0.85	0.7	300
TRMF160808 - 82N*	82	±5%,±10%	12	100	18	33	29	1.00	0.6	300
TRMF160808 - R10*	100	±5%,±10%	12	100	18	28	16	1.20	0.6	300

- Note: Measuring Equipment : HP-4291B + 16192A
Storage Temperature : 25±3°C ; Humidity<80% RH



Electrical Characteristics (TRMF201209) - EIA 0805

Part Number	Inductance (nH)	Tolerance	Quality Factor /Min.	L/Q Freq (MHz)	Self-Resonant Frequency /Min.(GHz)	Resistance DC/Max (Ohm)	Current DC/Max (mA)
TRMF201209 - 1N0*	1.0	±0.3nH	10	100	>6.00	0.10	300
TRMF201209 - 1N2*	1.2	±0.3nH	10	100	>6.00	0.10	300
TRMF201209 - 1N5*	1.5	±0.3nH	10	100	>6.00	0.10	300
TRMF201209 - 1N8*	1.8	±0.3nH	10	100	>6.00	0.10	300
TRMF201209 - 2N2*	2.2	±0.3nH	10	100	>6.00	0.10	300
TRMF201209 - 2N7*	2.7	±0.3nH	12	100	>6.00	0.10	300
TRMF201209 - 3N3*	3.3	±0.3nH,±10%	12	100	>6.00	0.13	300
TRMF201209 - 3N9*	3.9	±0.3nH,±10%	12	100	5.40	0.15	300
TRMF201209 - 4N7*	4.7	±0.3nH,±10%	12	100	4.50	0.20	300
TRMF201209 - 5N6*	5.6	±0.3nH,±10%	12	100	4.00	0.23	300
TRMF201209 - 6N8*	6.80	±5%,±10%	15	100	3.65	0.25	300
TRMF201209 - 8N2*	8.2	±5%,±10%	15	100	3.00	0.28	300
TRMF201209 - 10N*	10	±5%,±10%	15	100	2.50	0.30	300
TRMF201209 - 12N*	12	±5%,±10%	15	100	2.45	0.35	300
TRMF201209 - 15N*	15	±5%,±10%	15	100	2.00	0.40	300
TRMF201209 - 18N*	18	±5%,±10%	15	100	1.75	0.45	300
TRMF201209 - 22N*	22	±5%,±10%	15	100	1.70	0.50	300
TRMF201209 - 27N*	27	±5%,±10%	15	100	1.55	0.55	300
TRMF201209 - 33N*	33	±5%,±10%	15	100	1.35	0.60	300
TRMF201209 - 39N*	39	±5%,±10%	18	100	1.30	0.65	300
TRMF201209 - 47N*	47	±5%,±10%	18	100	1.20	0.70	300
TRMF201209 - 56N*	56	±5%,±10%	18	100	1.15	0.75	300
TRMF201209 - 68N*	68	±5%,±10%	18	100	1.00	0.80	300
TRMF201209 - 82N*	82	±5%,±10%	18	100	0.85	0.90	300
TRMF201209 - R10*	100	±5%,±10%	18	100	0.73	1.00	300

- Note: Measuring Equipment : HP-4291B + 16197A
Storage Temperature : 25±3°C ; Humidity<80% RH



Order Codes

Order Codes (TRMF)

TRMF100505	-	1N2		S	
Part Number		Inductance		Tolerance	
TRMF100505		1N2	1.2nH	S	0.3nH
TRMF160808		10N	10.0nH	J	5%
TRMF201209		R10	100.00nH	K	10%
				M	20%



► 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,
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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.
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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.

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Multilayer Ferrite Chip Inductors (TRMI)

► Product Introduction

||| New options in chip multilayer ferrite inductor.

Features :

- Sizes EIA 0603 / EIA 0805 / EIA 1206.
- Closed magnetic circuit avoids crosstalk.
- Suitable for high density installation, re-flow soldering.

Applications :

- Portable Equipment.
- Personal Computers.
- CD-ROM, Hard Disk, Modem, Printers.

Token (TRMI) series is a multilayer ferrite technology with good overall characteristics in a cost effective package. The (TRMI) multilayer inductor series is available in 0603, 0805, and 1206 sizes. Inductance values range from 10 to 33000nH, and tolerances are as tight as $\pm 10\%$. This product provides a good blend of electrical performance and low cost.

The (TRMI) devices utilize closed magnetic circuit construction to avoid crosstalk. These are suitable for EMI reduction on DC power lines and low speed signal lines where the smaller packaging reduces board space. Conform to the RoHS directive and Lead-free. Package of multilayer Ferrite TRMI chip is suitable for automatic pick and place equipment and is mounted in a surface mount package which assures mechanical stability and excellent lead planarity.

Multilayer Ferrite RF Chip Inductor can be customized designs and tighter tolerances available on request. Application of specific designs also available including different inductance values and Q specifications adjusted to frequency requirements.

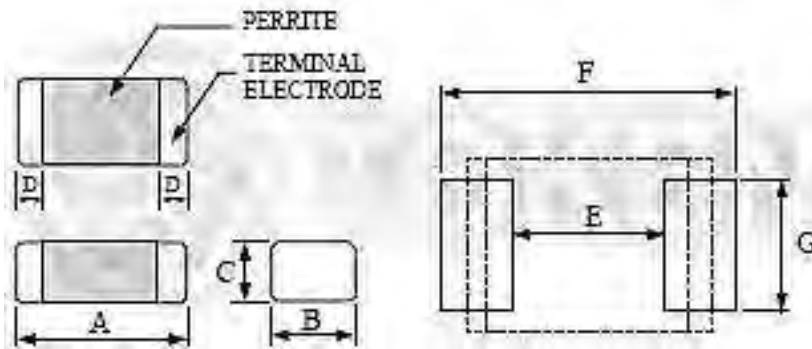
Custom parts are available on request. Token will also produce devices outside these specifications to meet specific customer requirements, Contact us with your specific needs. For more information, please link to Token official website "[RF Inductors](http://www.token.com.tw)".



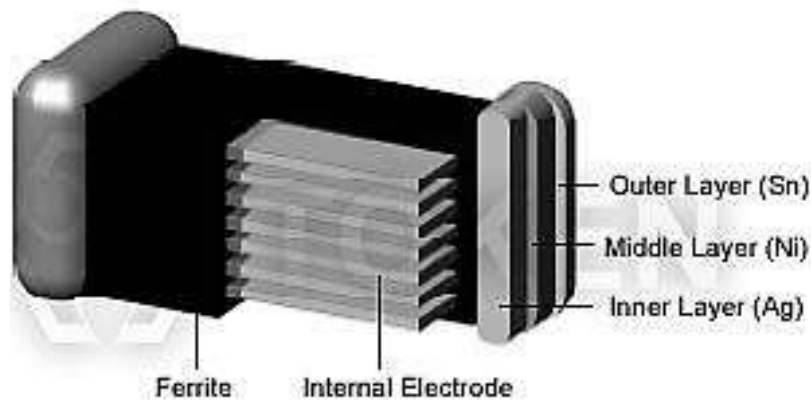
► Config. & Dim.

Configurations & Dimensions (Unit: mm) (TRMI)

Type	A	B	C	D	E	F	G
TRMI160808 (0603)	1.6 ± 0.2	0.8 ± 0.2	0.8 ± 0.2	0.3 ± 0.2	0.8	2.4~3.4	0.6
TRMI201209 (0805)	2.0 ± 0.2	1.25 ± 0.2	0.9 ± 0.2	0.5 ± 0.3	1.2	3.0~4.0	1.0
TRMI201212 (0805)	2.0 ± 0.2	1.25 ± 0.2	1.25 ± 0.2	0.5 ± 0.3	1.2	3.0~4.0	1.0
TRMI321611 (1206)	3.2 ± 0.2	1.6 ± 0.2	1.1 ± 0.2	0.5 ± 0.3	2.0	4.2~5.2	1.2



Surface Mount (TRMI) Dimensions



Surface Mount (TRMI) Material Construction

Electrical Characteristics

Electrical Characteristics (TRMI160808) - EIA 0603

Part Number	Inductance (nH)	Tolerance	L/Q Freq. (MHz)	Q (min)	SRF (MHz)(min)	DCR (Ω)(max)	IDC (mA)(max)
TRMI160808 - 10N	10	± 20%	50MHz, 200mV	10	300	0.20	50
TRMI160808 - 33N	33	± 20%	50MHz, 200mV	10	270	0.20	50
TRMI160808 - 47N	47	± 20%	50MHz, 200mV	10	260	0.30	50
TRMI160808 - 56N	56	± 20%	50MHz, 200mV	10	255	0.30	50
TRMI160808 - 68N	68	± 20%	50MHz, 200mV	10	250	0.30	50
TRMI160808 - 82N	82	± 20%	50MHz, 200mV	10	245	0.30	50
TRMI160808 - R10	100	± 10,± 20%	25MHz, 200mV	15	240	0.50	50
TRMI160808 - R12	120	± 10,± 20%	25MHz, 200mV	15	205	0.50	50
TRMI160808 - R15	150	± 10,± 20%	25MHz, 200mV	15	180	0.60	50
TRMI160808 - R18	180	± 10,± 20%	25MHz, 200mV	15	165	0.60	50
TRMI160808 - R22	220	± 10,± 20%	25MHz, 200mV	15	150	0.80	50
TRMI160808 - R27	270	± 10,± 20%	25MHz, 200mV	15	136	0.80	50
TRMI160808 - R33	330	± 10,± 20%	25MHz, 200mV	15	125	0.85	35
TRMI160808 - R39	390	± 10,± 20%	25MHz, 200mV	15	110	1.00	35
TRMI160808 - R47	470	± 10,± 20%	25MHz, 200mV	15	105	1.35	35
TRMI160808 - R56	560	± 10,± 20%	25MHz, 200mV	15	95	1.55	35
TRMI160808 - R68	680	± 10,± 20%	25MHz, 200mV	15	85	1.70	35
TRMI160808 - R82	820	± 10,± 20%	25MHz, 200mV	15	75	2.10	35
TRMI160808 - 1R0	1000	± 10,± 20%	10MHz, 200mV	35	65	0.60	25
TRMI160808 - 1R2	1200	± 10,± 20%	10MHz, 200mV	35	60	0.80	25
TRMI160808 - 1R5	1500	± 10,± 20%	10MHz, 200mV	35	55	0.80	25
TRMI160808 - 1R8	1800	± 10,± 20%	10MHz, 200mV	35	50	0.95	25
TRMI160808 - 2R2	2200	± 10,± 20%	10MHz, 200mV	35	45	1.55	15
TRMI160808 - 2R7	2700	± 10,± 20%	10MHz, 200mV	35	40	1.35	15
TRMI160808 - 3R3	3300	± 10,± 20%	10MHz, 200mV	35	38	1.55	15
TRMI160808 - 3R9	3900	± 10,± 20%	10MHz, 200mV	35	35	1.70	15
TRMI160808 - 4R7	4700	± 10,± 20%	10MHz, 200mV	35	33	2.10	15
TRMI160808 - 5R6	5600	± 10,± 20%	4MHz, 200mV	35	22	1.55	5
TRMI160808 - 6R8	6800	± 10,± 20%	4MHz, 200mV	35	20	1.70	5
TRMI160808 - 8R2	8200	± 10,± 20%	4MHz, 60 mV	30	18	2.10	5
TRMI160808 - 100	10000	± 10,± 20%	2MHz, 60mV	30	17	2.55	5



Electrical Characteristics (TRMI201209) - EIA 0805

Part Number	Inductance (nH)	Tolerance	L/Q Freq. (MHz)	Q (min)	SRF (MHz)(min)	DCR (Ω)(max)	IDC (mA)(max)
TRMI201209 - 47N	47	± 20%	50MHz, 200mV	20	320	0.20	300
TRMI201209 - 56N	56	± 20%	50MHz, 200mV	20	320	0.20	300
TRMI201209 - 68N	68	± 20%	50MHz, 200mV	20	280	0.20	300
TRMI201209 - 82N	82	± 20%	50MHz, 200mV	20	255	0.20	300
TRMI201209 - R10	100	± 10,± 20%	25MHz, 200mV	20	235	0.30	250
TRMI201209 - R12	120	± 10,± 20%	25MHz, 200mV	20	220	0.30	250
TRMI201209 - R15	150	± 10,± 20%	25MHz, 200mV	20	200	0.40	250
TRMI201209 - R18	180	± 10,± 20%	25MHz, 200mV	20	185	0.40	250
TRMI201209 - R22	220	± 10,± 20%	25MHz, 200mV	20	170	0.50	250
TRMI201209 - R27	270	± 10,± 20%	25MHz, 200mV	20	150	0.50	250
TRMI201209 - R33	330	± 10,± 20%	25MHz, 200mV	20	145	0.55	250
TRMI201209 - R39	390	± 10,± 20%	25MHz, 200mV	25	135	0.65	200
TRMI201209 - R47	470	± 10,± 20%	25MHz, 200mV	25	125	0.65	200
TRMI201209 - R56	560	± 10,± 20%	25MHz, 200mV	25	115	0.75	150
TRMI201209 - R68	680	± 10,± 20%	25MHz, 200mV	25	105	0.80	150
TRMI201209 - R82	820	± 10,± 20%	25MHz, 200mV	25	100	1.00	150
TRMI201209 - 1R0	1000	± 10,± 20%	10MHz, 200mV	45	75	0.40	50
TRMI201209 - 1R2	1200	± 10,± 20%	10MHz, 200mV	45	65	0.50	50
TRMI201209 - 1R5	1500	± 10,± 20%	10MHz, 200mV	45	60	0.50	50
TRMI201209 - 1R8	1800	± 10,± 20%	10MHz, 200mV	45	55	0.60	50
TRMI201209 - 2R2	2200	± 10,± 20%	10MHz, 200mV	45	50	0.65	30

Electrical Characteristics (TRMI201212) - EIA 0805

Part Number	Inductance (nH)	Tolerance	L/Q Freq. (MHz)	Q (min)	SRF (MHz)(min)	DCR (Ω)(max)	IDC (mA)(max)
TRMI201212 - 2R7	2700	± 10,± 20%	10MHz, 200mV	45	45	0.75	30
TRMI201212 - 3R3	3300	± 10,± 20%	10MHz, 200mV	45	41	0.80	30
TRMI201212 - 3R9	3900	± 10,± 20%	10MHz, 200mV	45	38	0.90	30
TRMI201212 - 4R7	4700	± 10,± 20%	10MHz, 200mV	45	35	1.00	30
TRMI201212 - 5R6	5600	± 10,± 20%	4MHz, 200mV	45	32	0.90	15
TRMI201212 - 6R8	6800	± 10,± 20%	4MHz, 200mV	45	29	1.00	15
TRMI201212 - 8R2	8200	± 10,± 20%	4MHz, 200mV	45	26	1.10	15
TRMI201212 - 100	10000	± 10,± 20%	2MHz, 60mV	45	24	1.15	15
TRMI201212 - 120	12000	± 10,± 20%	2MHz, 60mV	45	22	1.25	15
TRMI201212 - 150	15000	± 10,± 20%	1MHz, 60mV	30	19	0.80	5
TRMI201212 - 180	18000	± 10,± 20%	1MHz, 60mV	30	18	0.90	5
TRMI201212 - 220	22000	± 10,± 20%	1MHz, 60mV	30	16	1.10	5



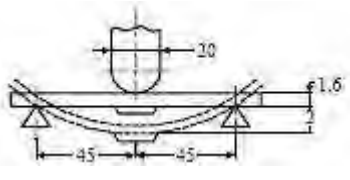
Electrical Characteristics (TRMI) - EIA 1206

Part Number	Inductance (nH)	Tolerance	L/Q Freq. (MHz)	Q (min)	SRF (MHz)(min)	DCR (Ω)(max)	IDC (mA)(max)
TRMI321611 - 47N	47	± 20%	50MHz, 200mV	20	320	0.15	300
TRMI321611 - 56N	56	± 20%	50MHz, 200mV	20	280	0.25	300
TRMI321611 - 68N	68	± 20%	50MHz, 200mV	20	280	0.25	300
TRMI321611 - 82N	82	± 20%	50MHz, 200mV	20	250	0.25	300
TRMI321611 - R10	100	± 10,± 20%	25MHz, 200mV	20	235	0.25	250
TRMI321611 - R12	120	± 10,± 20%	25MHz, 200mV	20	220	0.30	250
TRMI321611 - R15	150	± 10,± 20%	25MHz, 200mV	20	200	0.30	250
TRMI321611 - R18	180	± 10,± 20%	25MHz, 200mV	20	185	0.40	250
TRMI321611 - R22	220	± 10,± 20%	25MHz, 200mV	20	170	0.40	250
TRMI321611 - R27	270	± 10,± 20%	25MHz, 200mV	20	150	0.50	250
TRMI321611 - R33	330	± 10,± 20%	25MHz, 200mV	20	145	0.60	250
TRMI321611 - R39	390	± 10,± 20%	25MHz, 200mV	25	135	0.50	200
TRMI321611 - R47	470	± 10,± 20%	25MHz, 200mV	25	125	0.60	200
TRMI321611 - R56	560	± 10,± 20%	25MHz, 200mV	25	115	0.70	150
TRMI321611 - R68	680	± 10,± 20%	25MHz, 200mV	25	105	0.80	150
TRMI321611 - R82	820	± 10,± 20%	25MHz, 200mV	25	100	0.90	150
TRMI321611 - 1R0	1000	± 10,± 20%	10MHz, 200mV	45	75	0.40	100
TRMI321611 - 1R2	1200	± 10,± 20%	10MHz, 200mV	45	65	0.50	100
TRMI321611 - 1R5	1500	± 10,± 20%	10MHz, 200mV	45	60	0.50	80
TRMI321611 - 1R8	1800	± 10,± 20%	10MHz, 200mV	45	55	0.50	70
TRMI321611 - 2R2	2200	± 10,± 20%	10MHz, 200mV	45	50	0.60	60
TRMI321611 - 2R7	2700	± 10,± 20%	10MHz, 200mV	45	45	0.60	60
TRMI321611 - 3R3	3300	± 10,± 20%	10MHz, 200mV	45	41	0.70	60
TRMI321611 - 3R9	3900	± 10,± 20%	10MHz, 200mV	45	38	0.80	50
TRMI321611 - 4R7	4700	± 10,± 20%	10MHz, 200mV	45	35	0.90	50
TRMI321611 - 5R6	5600	± 10,± 20%	4MHz, 200mV	45	32	0.70	25
TRMI321611 - 6R8	6800	± 10,± 20%	4MHz, 200mV	45	29	0.80	25
TRMI321611 - 8R2	8200	± 10,± 20%	4MHz, 200mV	45	26	0.90	25
TRMI321611 - 100	10000	± 10,± 20%	2MHz, 60mV	45	24	1.00	25
TRMI321611 - 120	12000	± 10,± 20%	2MHz, 60mV	45	22	1.05	15
TRMI321611 - 150	15000	± 10,± 20%	1MHz, 60mV	35	19	0.70	5
TRMI321611 - 180	18000	± 10,± 20%	1MHz, 60mV	35	18	0.75	5
TRMI321611 - 220	22000	± 10,± 20%	1MHz, 60mV	35	16	0.90	5
TRMI321611 - 270	27000	± 10,± 20%	1MHz, 60mV	35	14	0.90	5
TRMI321611 - 330	33000	± 10,± 20%	1MHz, 60mV	35	13	1.05	5



Characteristics

Environmental Characteristics (TRMI)

Item	Specification	Test Methods
Flexure Strength	The forces applied on the right conditions must not damage the terminal electrode and the ferrite.	Test device shall be soldered on the substrate Dimension: 100×40×1.6 mm Deflection: 2.0mm Keeping Time: 30sec For 0402, substrate dimension is 100×40×0.8mm 
Vibration		Test device shall be soldered on the substrate Oscillation Frequency : 10 to 55 to 10Hz for 1min Amplitude : 1.5mm Time : 2hrs for each axis (X,Y&Z), total 6hrs
Resistance to Soldering Heat	Appearance: No damage More than 75% of the terminal. Electrode should be covered with solder. Inductance: within ± 15% of initial value Q: within ± 30% of initial value Inductance: within± 20% of initial value (0603 over 12uH)	Pre-heating: 150°C, 1min Solder Composition: Sn/Ag3.0/Cu0.5 (Pb-Free) Solder Temperature: 260 ± 5°C (Pb-Free) Immersion Time: 10 ± 1sec
Solderability	The electrodes shall be at least 90% covered with new solder coating	Pre-heating: 150°C, 1min Solder Composition: Sn/Ag3.0/Cu0.5 (Pb-Free) Solder Temperature: 245 ± 5°C (Pb-Free) Immersion Time: 4 ± 1sec
Temperature Cycle	Appearance: No damage L change: within± 10% of initial value Q change: within± 30% of initial value	One cycle: step1: -25 ± 3°C for 30min step2: 25 ± 2°C for 3.0min step3: 85 ± 3°C for 30min step4: 25 ± 2°C for 3.0min Total: 100cycles Measured after exposure in the room condition for 24hrs
Humidity Resistance		Temperature: 40 ± 2°C Relative Humidity: 90 ~ 95% Time: 1000hrs Measured after exposure in the room condition for 24hrs
High Temperature Resistance		Temperature: 125 ± 3°C Relative Humidity : 20% Applied Current: Rated Current Time: 1000hrs Measured after exposure in the room condition for 24hrs
Low Temperature Resistance		Temperature: -25 ± 3°C Relative Humidity : 0% Time: 1000hrs Measured after exposure in the room condition for 24hrs

Measurement Equipments (TRMI)

Item	Specification	Test Methods
Inductance	Refer to standard electrical characteristic spec.	HP4291B
Q		HP4291B
SRF		HP4291B
DC Resistance RDC		AX-1152B
Rated Current IDC		Applied the current to coils, The inductance change should be less than 10% to initial value

Order Codes

Order Codes (TRMI)

TRMI160808	-	10N		M	
Part Number		Inductance		Tolerance	
TRMI160808		10N	10nH	S	0.3nH
TRMI201209		56N	56nH	J	5%
TRMI201212		R68	680nH	K	10%
TRMI321611		180	18000nH	M	20%



► 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.



Wire Wound RF Chip Inductor (TREC)

► 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:

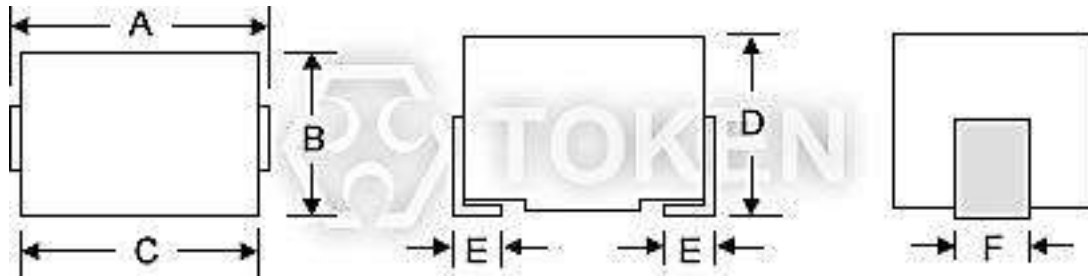
SMD RF Inductors EC322522N and EC453232N series are revolutionary, high reliable wire wound components for communication, equipment, instruments, video & audio have been developed in response to the trend toward higher density mounting of inductor parts in electric circuits.



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

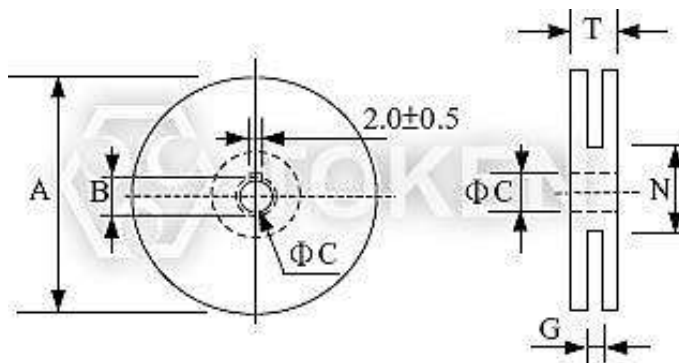


RF (TREC Series) Dimensions

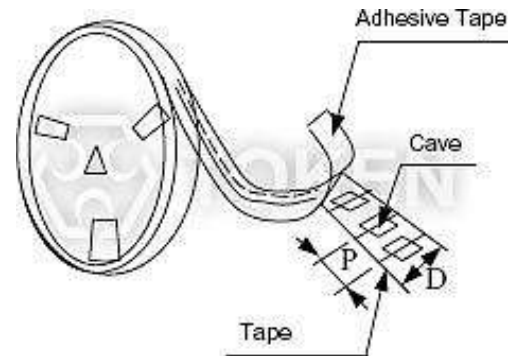
Reel & Packaging

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 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 0.10 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.



High SRFs RF Inductor (TREM)

► Product Introduction

Narrow Pad Chip Wire Wound Inductors with High SRFs for RF Applications.

Features :

- Metal terminals with excellent connection reliability.
- 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.
- Good heat durability that withstands lead-free compatible reflow soldering conditions.

Applications :

- (TREM) series is suited for communication, video & audio, equipment, instrument which have been developed in response to the trend toward higher density mounting of parts in electric circuits.

Operating Temperature:

- Range: -25 ~ +85°C.

Token (TREM) Series is primarily designed for chip narrow pad, high SRFs, 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 (TREM) series chip RF 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:

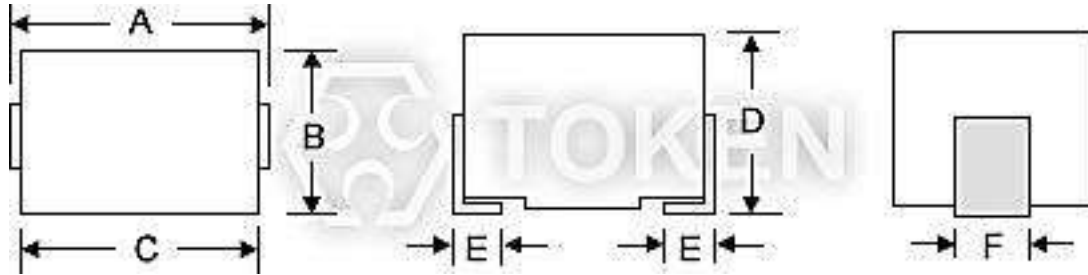
SMT Inductors EM322522N and EM453232N series are revolutionary, high reliable wire wound components for communication, equipment, instruments, video & audio have been developed in response to the trend toward higher density mounting of inductor parts in electric circuits.



Config. & Dim.

Configurations & Dimensions (Unit: mm) (REM322522N, TREM453232N)

Type	A	B	C	D	E	F
TREM322522N(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
TREM453232N(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

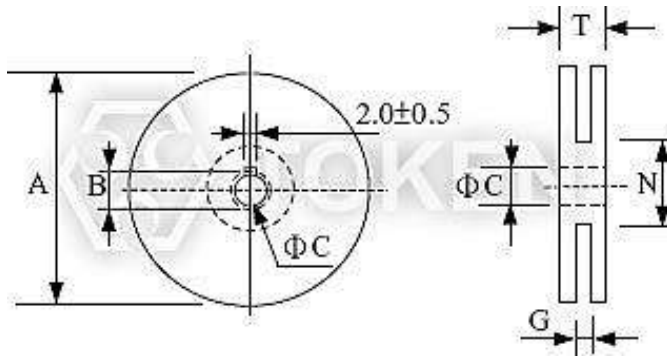


RF Narrow Pad Surface Mount (TREM) Dimensions

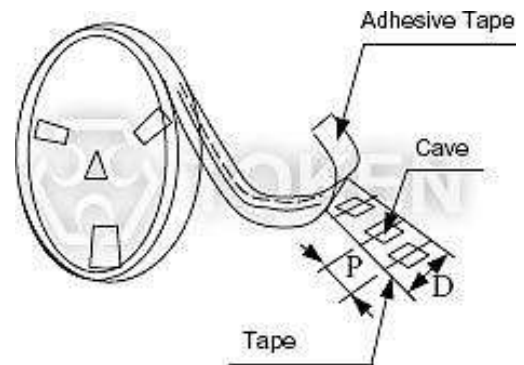
Reel & Packaging

Reel & Packaging (TREM322522N, TREM453232N)

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 (TREM322522N) - EIA 1210

Part No.	Inductance (μH)	Tolerance (%)	Q (min)	Test Freq. (MHZ)	SRF (MHz)(min)	DCR (Ω)(max)	IDC (mA)
TREM322522N - R10*	0.10	±20,±10	28	100	700	0.44	450
TREM322522N - R12*	0.12	±20,±10	30	25.2	500	0.22	450
TREM322522N - R15*	0.15	±20,±10	30	25.2	450	0.25	450
TREM322522N - R18*	0.18	±20,±10	30	25.2	400	0.28	450
TREM322522N - R22*	0.22	±20,±10	30	25.2	350	0.32	450
TREM322522N - R27*	0.27	±20,±10	30	25.2	320	0.36	450
TREM322522N - R33*	0.33	±20,±10	30	25.2	300	0.40	450
TREM322522N - R39*	0.39	±20,±10	30	25.2	250	0.45	450
TREM322522N - R47*	0.47	±20,±10	30	25.2	220	0.50	450
TREM322522N - R56*	0.56	±20,±10	30	25.2	180	0.55	450
TREM322522N - R68*	0.68	±20,±10	30	25.2	160	0.60	450
TREM322522N - R82*	0.82	±20,±10	30	25.2	140	0.65	450
TREM322522N - 1R0*	1.00	±10,±5	30	7.96	120	0.70	400
TREM322522N - 1R2*	1.20	±10,±5	30	7.96	100	0.75	390
TREM322522N - 1R5*	1.50	±10,±5	30	7.96	85	0.85	370
TREM322522N - 1R8*	1.80	±10,±5	30	7.96	80	0.90	350
TREM322522N - 2R2*	2.20	±10,±5	30	7.96	75	1.00	320
TREM322522N - 2R7*	2.70	±10,±5	30	7.96	70	1.10	290
TREM322522N - 3R3*	3.30	±10,±5	30	7.96	60	1.20	260
TREM322522N - 3R9*	3.90	±10,±5	30	7.96	55	1.30	250
TREM322522N - 4R7*	4.70	±10,±5	30	7.96	50	1.50	220
TREM322522N - 5R6*	5.60	±10,±5	30	7.96	45	1.60	200
TREM322522N - 6R8*	6.80	±10,±5	30	7.96	40	1.80	180
TREM322522N - 8R2*	8.20	±10,±5	30	7.96	35	2.00	170
TREM322522N - 100*	10.0	±10,±5	30	2.52	30	2.10	150
TREM322522N - 120*	12.0	±10,±5	30	2.52	20	2.50	140
TREM322522N - 150*	15.0	±10,±5	30	2.52	20	2.80	130
TREM322522N - 180*	18.0	±10,±5	30	2.52	20	3.30	120
TREM322522N - 220*	22.0	±10,±5	30	2.52	20	3.70	110
TREM322522N - 270*	27.0	±10,±5	30	2.52	20	5.00	80
TREM322522N - 330*	33.0	±10,±5	30	2.52	17	5.60	70
TREM322522N - 390*	39.0	±10,±5	30	2.52	16	6.40	65
TREM322522N - 470*	47.0	±10,±5	30	2.52	15	7.00	60
TREM322522N - 560*	56.0	±10,±5	30	2.52	13	8.00	55
TREM322522N - 680*	68.0	±10,±5	30	2.52	12	9.00	50
TREM322522N - 820*	82.0	±10,±5	30	2.52	11	10.0	45
TREM322522N - 101*	100	±10,±5	20	0.796	10	10.0	40
TREM322522N - 121*	120	±10,±5	20	0.796	10	11.0	70
TREM322522N - 151*	150	±10,±5	20	0.796	8	15.0	65
TREM322522N - 181*	180	±10,±5	20	0.796	7	17.0	60
TREM322522N - 221*	220	±10,±5	20	0.796	7	21.0	50

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



Electrical Characteristics (TREM453232N) - EIA 1812 -

Part No.	Inductance (μH)	Tolerance (%)	Q (min)	Test Freq. (MHZ)	SRF (MHz)(min)	DCR (Ω)(max)	IDC (mA)
TREM453232N - R10*	0.10	±10,±20	25	25.2	300	0.18	800
TREM453232N - R12*	0.12	±10,±20	30	25.2	280	0.20	770
TREM453232N - R15*	0.15	±10,±20	30	25.2	250	0.22	730
TREM453232N - R18*	0.18	±10,±20	30	25.2	220	0.24	700
TREM453232N - R22*	0.22	±10,±20	30	25.2	200	0.25	665
TREM453232N - R27*	0.27	±10,±20	30	25.2	180	0.26	635
TREM453232N - R33*	0.33	±10,±20	30	25.2	165	0.28	605
TREM453232N - R39*	0.39	±10,±20	30	25.2	150	0.30	575
TREM453232N - R47*	0.47	±10,±20	30	25.2	145	0.32	545
TREM453232N - R56*	0.56	±10,±20	30	25.2	140	0.36	520
TREM453232N - R68*	0.68	±10,±20	30	25.2	135	0.40	500
TREM453232N - R82*	0.82	±10,±20	30	25.2	130	0.45	475
TREM453232N - 1R0*	1.00	±10,±20	40	7.96	100	0.50	450
TREM453232N - 1R2*	1.20	±10,±20	40	7.96	80	0.55	430
TREM453232N - 1R5*	1.50	±10,±20	40	7.96	70	0.60	410
TREM453232N - 1R8*	1.80	±10,±20	40	7.96	60	0.65	390
TREM453232N - 2R2*	2.20	±10,±20	40	7.96	55	0.70	380
TREM453232N - 2R7*	2.70	±10,±20	40	7.96	50	0.75	370
TREM453232N - 3R3*	3.30	±10,±20	40	7.96	45	0.80	355
TREM453232N - 3R9*	3.90	±10,±20	40	7.96	40	0.90	330
TREM453232N - 4R7*	4.70	±10,±20	40	7.96	35	1.00	315
TREM453232N - 5R6*	5.60	±10,±20	40	7.96	33	1.10	300
TREM453232N - 6R8*	6.80	±10,±20	40	7.96	27	1.20	285
TREM453232N - 8R2*	8.20	±5,±10	40	7.96	25	1.40	270
TREM453232N - 100*	10.0	±5,±10	40	2.52	20	1.60	250
TREM453232N - 120*	12.0	±5,±10	40	2.52	18	2.00	225
TREM453232N - 150*	15.0	±5,±10	40	2.52	17	2.50	200
TREM453232N - 180*	18.0	±5,±10	40	2.52	15	2.80	190
TREM453232N - 220*	22.0	±5,±10	40	2.52	13	3.20	180
TREM453232N - 270*	27.0	±5,±10	40	2.52	12	3.60	170
TREM453232N - 330*	33.0	±5,±10	40	2.52	11	4.00	160
TREM453232N - 390*	39.0	±5,±10	40	2.52	10	4.50	150
TREM453232N - 470*	47.0	±5,±10	40	2.52	10	5.00	140
TREM453232N - 560*	56.0	±5,±10	40	2.52	9	5.50	135
TREM453232N - 680*	68.0	±5,±10	40	2.52	9	6.00	130
TREM453232N - 820*	82.0	±5,±10	40	2.52	8	7.00	120
TREM453232N - 101*	100	±5,±10	30	0.796	8	8.00	110
TREM453232N - 121*	120	±5,±10	30	0.796	6	8.00	110
TREM453232N - 151*	150	±5,±10	30	0.796	5	9.00	105
TREM453232N - 181*	180	±5,±10	30	0.796	5	9.50	102
TREM453232N - 221*	220	±5,±10	30	0.796	4	10.0	100
TREM453232N - 271*	270	±5,±10	30	0.796	4	12.0	92
TREM453232N - 331*	330	±5,±10	30	0.796	3.5	14.0	85
TREM453232N - 391*	390	±5,±10	30	0.796	3	18.0	80
TREM453232N - 471*	470	±5,±10	30	0.796	3	26.0	62
TREM453232N - 561*	560	±5,±10	20	0.796	3	30.0	50
TREM453232N - 681*	680	±5,±10	20	0.796	3	30.0	50
TREM453232N - 821*	820	±5,±10	20	0.796	2.5	35.0	30
TREM453232N - 102*	1000	±5,±10	10	0.252	2.5	40.0	30

- Note: Test equipment L, Q: HP4285A +16034E, or equivalent
SRF: HP8753C NETWORK ANALYZER, or equivalent.
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► Characteristics

Mechanical Performance Test (TREM322522N, TREM453232N)

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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

TREM322522N, TREM453232N Series RF Chip Wire wound Inductors - Electrical Performance Test

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 (TREM322522N, TREM453232N)

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 (TREM322522N, TREM453232N)

TCEC322522N	-	1R0		M	
Part Number		Inductance		Tolerance	
TREM322522N		R10	0.10 μ H	J	5%
TREM453232N		1R0	1.00 μ H	K	10%
		100	10.00 $\times 10^0 \mu$ H	M	20%
		101	10.00 $\times 10^1 \mu$ H		
		102	10.00 $\times 10^2 \mu$ H		
		103	10.00 $\times 10^3 \mu$ H		



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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.



RFID Transponder Inductor (TR4308I)

▶ Product Introduction

Transponder Coils (TR4308I) is The Key of
Radio Frequency Identification (RFID) System.

Features :

- High Q value.
- Low profile with an extended length.

Applications :

- Car remote control key.

Token (TR4308I) RFID coil series is specified for RFID applications for the best performing designed at 125 kHz. The (TR4308I) covers a wide range of electrical performances and offers better sensitivity, greater read distance and higher SRF than other coils its size.

The TR4308I's length and cross section area are optimized for best sensitivity in the coil axis. The coil is wound on a plastic base, providing great durability and allowing this part to withstand harsh mechanical shock. With operating temperature range to 125°C, these coils are ideal for a wide range of applications.

Radio Frequency Identification (RFID) is the system of using radio signals to send information identifying a particular situation or item. Token (TR4308I) is suited for wireless data transmission in low frequency RFID products, such as immobilizers, TPMS, keyless entry. Other industrial applications include access control and tracking devices.

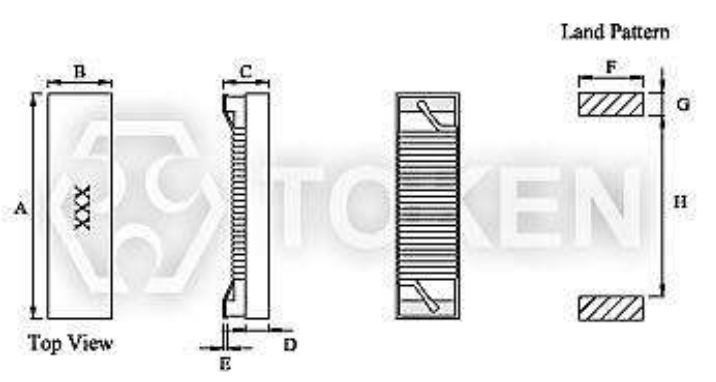
In addition to our standard models, Token can design RFID coils to operate at other frequencies. Customized inductance values are available on request. Contact us with your specific needs. For more information, please link to Token official website "[RF Inductors](http://www.token.com.tw)".



Configurations & Dimensions

Configurations & Dimensions (Unit: mm) (TR4308I)

Type	A	B	C	D	E	F	G	H
TR4308I	11.43	3.15	2.74	1.01	0.51	2.79	1.78	8.46



RFID (TR4308I) Dimensions

● Note: Design as Customer's Requested Specifications.

TR4308I Characteristics

Electrical Characteristics (TR4308I)

Part Number	Inductance (mH)	Q (min)	Test Freq. (KHz)	SRF (KHz)(min)	DCR (Ω)(max)
TR4308I - 401J	0.40	15	125	4500	7.4
TR4308I - 901J	0.90	15	125	4000	22
TR4308I - 112J	1.08	15	125	4000	25
TR4308I - 202J	1.97	17	125	2400	34
TR4308I - 242J	2.38	17	125	2200	39
TR4308I - 332J	3.30	17	125	1800	51
TR4308I - 412J	4.15	17	125	1700	74
TR4308I - 492J	4.90	17	125	1300	96
TR4308I - 682J	6.80	17	125	1000	112
TR4308I - 712J	7.10	17	125	1000	115
TR4308I - 812J	8.10	17	125	960	123

● Note: Test Freq.: 125 KHz / 0.25V. Operating Temp.: -40°C+85°C.

RFID Transponder Applications

RFID, Radio Frequency Identification System and Applications

RFID, Radio Frequency Identification, is the system of using radio signals to send information identifying a particular item. The most common application of RFID is to track and locate any subject including material, or moving item.

The RFID coil is part of the coupling device and acts as the transmitting antenna. The main specifications of the RFID coils are sensitivity and read distance; however, the inductance of the RFID coil directly influences the sensitivity and the read distance. Generally, a higher inductance provides greater sensitivity resulting in a longer read distance.

There are two major components in an RFID system:

- **Tag:**
The transponder programmed with unique information. The tag consists of an integrated circuit and a coupling device. The integrated circuit stores specific data unique to that tag.
- **Reader:**
The interrogator includes a decoder to interpret data. The coupling device interfaces with the reader.

The manufacturer of the tag usually specifies the inductance of the coil to be used. The read distance is defined as the maximum distance from the reader that the transponder responds to the reader's magnetic field. The reader produces a magnetic field that triggers the tag. When the reader receives the transmitted data, it interprets the data and takes appropriate action as shown in figure 1.

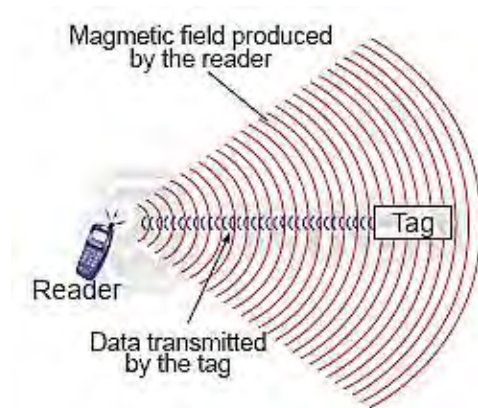


Figure 1. RFID System

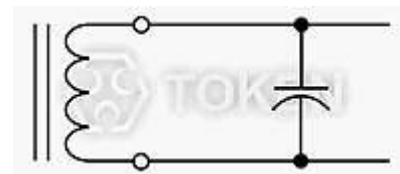


Figure 2. LC Circuit

When the transponder enters the field produced by the reader, the coil produces a voltage inside the tag. In an active transponder, the voltage is used to wake the tag and use its internal battery. In a passive transponder, this voltage can be used to power the tag. Active transponders generally have longer read distances, shorter operational life and are larger and more costly to manufacture. Passive transponders are generally smaller, have a longer life and are less expensive to manufacture.

For optimum performance, the RFID coil is used in a parallel LC circuit as shown in figure 2. Adding a capacitor to the circuit maximizes the read distance. The LC circuit is designed to resonate at the operating frequency of the reader. To calculate the value of the capacitor, use the following equation: **Capacitance (C) = 1 / (Inductance L × (2π × Frequency f))²**

Order Codes

Order Codes (TR4308I)

TR4308I	-	401		J	
Part Number		Inductance		Tolerance	
TR4308I		401	0.40(mH)	J	5%
		901	0.90(mH)		
		112	1.08(mH)		

● Note: Design as Customer's Requested Specifications.



► General Information

Token Cuts Inductor Size and Cost

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

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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.



Surface Mount Spring RF Inductor (TRAM)

► Product Introduction

The (TRAM) series features high Q value in the high frequency range.

Features :

- High frequency
- Excellent SRFs and high Q
- Good constitutive property and easy to operate

Applications :

- Pager, Cordless phone.
- High Freq. Communication Products.
- Intercom, CATV.

Token offers The Smallest **Flat Top Air Core Coils (Spring Inductors)** for only (1.8 × 2.0 × 2.0 mm). The latest range of air core surface mount coils from Token is fully compliant with RoHS legislation and available immediately in full production volumes. The (TRAM) series provides a cost effective and miniaturized alternative to the earlier version.

The wire-wound construction with a miniature core is ideal for high frequency applications. These new SMD coils measure 1.8 × 2.0 mm with a low 2.0 mm profile, which combined with a mould-sealed surface, makes them particularly suitable for high-density mounting.

Indeed, the (TRAM) series features high Q value in the high frequency range, offers stable inductance at high frequency and has high self-resonant frequency. Meanwhile, the low DC resistance design is ideal for low loss, high output and low power consumption. A wide range of devices in the series, with inductance values ranging from 3.9 to 538nH, allows designers to select the most appropriate part of their application.

These chip air core coils are aimed at high frequency circuits in telecommunications equipment, including power amplifiers, antenna modules, VCOs and SAWs, and in mobile phones, such as GSM, CDMA, and PDC. Other applications include digital TV tuners, wireless LAN and Bluetooth devices.

This new SMD inductor provides a narrow inductance deviation with a complete range of inductance values, making chip inductors an excellent choice for high frequency circuit matching. SMD coils can be customized designs and tighter tolerances available on request. Application of RF air core coil specific designs also available including different inductance values and Q specifications.

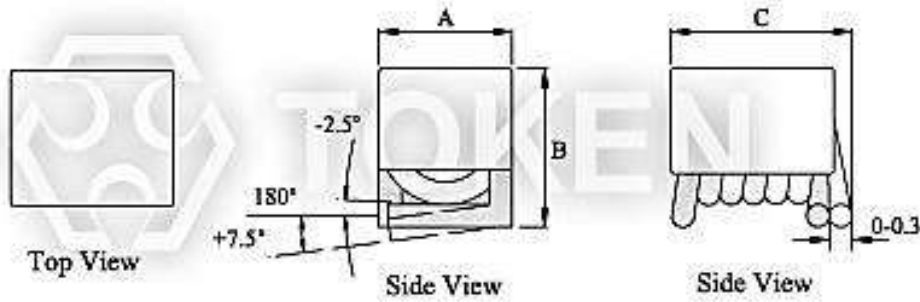
Custom parts are available on request. Token will also produce devices outside these specifications to meet specific customer requirements, please contact our sales or link to Token official website "[RF Inductors](http://www.token.com.tw)" for more information.



► Dimensions

Dimensions (Unit: mm) (TRAM0603 TRAM0805 TRAM1008)

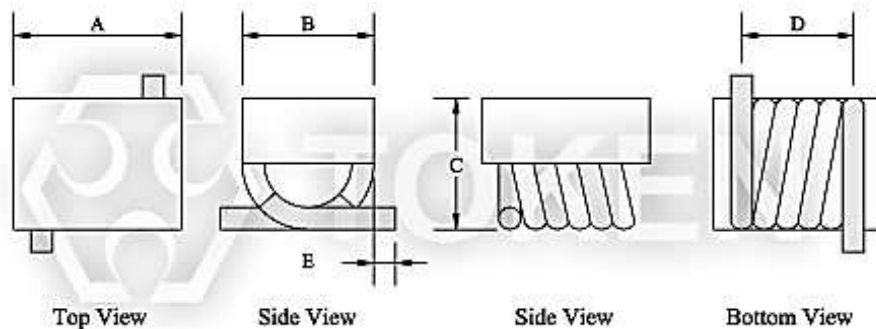
Type	A (max)	B (max)	C ± 0.2
TRAM0603	1.80	2.00	2.00
TRAM0805	1.80	2.10	2.85
TRAM1008	1.90	2.20	3.20



Ultra-Miniature (TRAM0603 TRAM0805 TRAM1008) Dimensions

Dimensions (Unit: mm) (TRAM2215 TRAM4015 TRAM132)

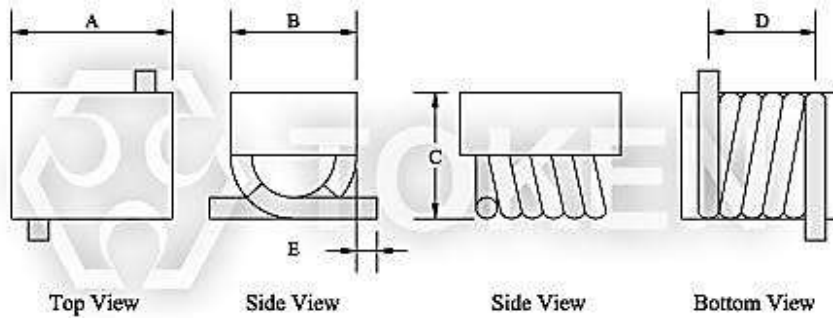
Type	A	B	C	D	E
TRAM2215	2.2 ± 0.3	1.4 ± 0.2	1.4 ± 0.2	1.8 ± 0.3	0.9 ± 0.3
TRAM4015	4.0 ± 0.3	1.4 ± 0.2	1.4 ± 0.2	3.5 ± 0.3	0.9 ± 0.3
TRAM132	9.0(max)	4.4 ± 0.3	4.6 ± 0.4	8.0 ± 0.5	1.3 ± 0.4



Ultra-Miniature (TRAM2215 TRAM4015 TRAM132) Dimensions

Dimensions (Unit: mm) (TRAM3730 TRAM7030)

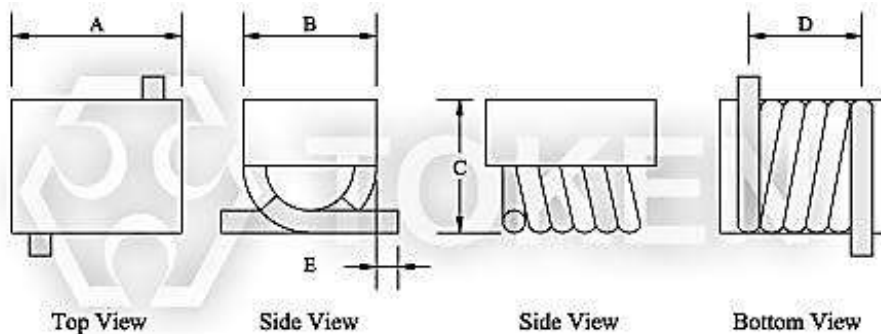
Type	A ± 0.3	B ± 0.2	C ± 0.2	D ± 0.3	E ± 0.2
TRAM3730	3.30	2.60	2.70	2.90	0.70
TRAM7030	6.30	3.60	3.70	5.80	0.70



Ultra-Miniature (TRAM3730 TRAM7030) Dimensions

Dimensions (Unit: mm) (TRAM1812)

Type	A ± 0.3	B ± 0.2	C ± 0.2	D ± 0.4	E ± 0.3
TRAM1812	4.90	3.50	3.50	4.30	1.00



Ultra-Miniature (TRAM1812) Dimensions

► Electrical Characteristics

Electrical Characteristics (TRAM 0603)

Part Number	Inductance (L)(nH)	Q (min)	Test Freq. (MHz)	SRF (MHz)(min)	DCR (mΩ)(max)	IDC (mA)(max)
TRAM0603 - 3N9K	3.9	80	300	>3000	3.0	950
TRAM0603 - 4N7K	4.7	80	300	>3000	3.6	900
TRAM0603 - 5N6K	5.6	80	300	>3000	3.8	950
TRAM0603 - 6N8K	6.8	80	300	>3000	4.5	900
TRAM0603 - 8N2K	8.2	80	300	>3000	5.3	840
TRAM0603 - 10NK	10.0	70	300	>3000	6.9	600
TRAM0603 - 12NK	12.0	70	300	>3000	8.3	600
TRAM0603 - 15NK	15.0	70	300	2500	11.5	500
TRAM0603 - 18NK	18.0	70	300	2500	12.8	500
TRAM0603 - 22NK	22.0	70	300	2400	11.3	550
TRAM0603 - 27NK	27.0	70	300	1600	17.0	500
TRAM0603 - 33NK	33.0	70	300	1600	26.9	320
TRAM0603 - 39NK	39.0	70	300	1500	30.7	320
TRAM0603 - 47NK	47.0	70	300	1500	34.5	320
TRAM0603 - 56NK	56.0	70	300	1300	38.4	320



Electrical Characteristics (TRAM 0805)

Part Number	Inductance (L)(nH)	Q (min)	Test Freq. (MHz)	SRF (MHz)(min)	DCR (mΩ)(max)	IDC (mA)(max)
TRAM0805 - 3N9K	3.9	80	300	>3000	2.6	1200
TRAM0805 - 4N7K	4.7	80	300	>3000	3.6	900
TRAM0805 - 5N6K	5.6	80	300	>3000	3.7	950
TRAM0805 - 6N8K	6.8	80	300	>3000	4.5	900
TRAM0805 - 8N2K	8.2	80	300	>3000	5.3	840
TRAM0805 - 10NK	10.0	70	300	>3000	5.4	900
TRAM0805 - 12NK	12.0	70	300	>3000	6.3	900
TRAM0805 - 15NK	15.0	70	300	2500	7.2	900
TRAM0805 - 18NK	18.0	70	300	2500	12.5	500
TRAM0805 - 22NK	22.0	70	300	2400	12.9	550
TRAM0805 - 27NK	27.0	70	300	1600	14.5	550
TRAM0805 - 33NK	33.0	70	300	1600	18.7	500
TRAM0805 - 39NK	39.0	70	300	1500	25.7	380
TRAM0805 - 47NK	47.0	70	300	1500	34.5	320
TRAM0805 - 56NK	56.0	70	300	1300	38.4	320
TRAM0805 - 68NK	68.0	70	300	1300	42.2	320



Electrical Characteristics (TRAM 1008)

Part Number	Inductance (L)(nH)	Q (min)	Test Freq. (MHz)	SRF (MHz)(min)	DCR (mΩ)(max)	IDC (mA)(max)
TRAM1008 - 6N8K	6.8	80	300	>3000	4.0	1200
TRAM1008 - 8N2K	8.2	80	300	>3000	5.0	950
TRAM1008 - 10NK	10.0	70	300	>3000	6.0	950
TRAM1008 - 12NK	12.0	70	300	>3000	6.5	900
TRAM1008 - 15NK	15.0	70	300	2500	7.3	900
TRAM1008 - 18NK	18.0	70	300	2500	9.6	840
TRAM1008 - 22NK	22.0	70	300	2400	10.8	840
TRAM1008 - 27NK	27.0	70	300	1600	13.9	600
TRAM1008 - 33NK	33.0	70	300	1600	19.5	500
TRAM1008 - 39NK	39.0	70	300	1500	21.6	500
TRAM1008 - 47NK	47.0	70	300	1500	25.2	470
TRAM1008 - 56NK	56.0	70	300	1300	27.5	470
TRAM1008 - 68NK	68.0	70	300	1300	37.1	380
TRAM1008 - 82NK	82.0	70	300	1000	51.5	320
TRAM1008 - R10K	100.0	70	300	1000	55.5	320
TRAM1008 - R12K	120.0	70	300	950	63.4	320

Electrical Characteristics (TRAM 2215)

Part Number	Turns	Inductance (L)(nH)	Q (min)	Test Freq. (MHz)	SRF (GHz)(min)
TRAM2215 - 02	2	1.65 ± 10%	100	800	>3.0
TRAM2215 - 03	3	2.55 ± 10%	100	800	>3.0
TRAM2215 - 04	4	3.85 ± 10%	100	800	>3.0
TRAM2215 - 05	5	5.45 ± 5%	100	800	>3.0

Electrical Characteristics (TRAM 4015)

Part Number	Turns	Inductance (L)(nH)	Q (min)	Test Freq. (MHz)	SRF (GHz)(min)
TRAM4015 - 06	6	5.60 ± 5%	100	800	>3.0
TRAM4015 - 07	7	7.15 ± 5%	100	800	>3.0
TRAM4015 - 08	8	8.80 ± 5%	100	800	>3.0
TRAM4015 - 09	9	9.85 ± 5%	100	800	>3.0
TRAM4015 - 10	10	12.55 ± 5%	100	800	>3.0



Electrical Characteristics (TRAM 132)

Part Number	Turns	Inductance (L)(nH)	Q (min)	Test Freq. (MHz)	SRF (GHz)(min)
TRAM132 - 09	9	90 ± 5%	100	50	>1.0
TRAM132 - 10	10	111 ± 5%	100	50	>1.0
TRAM132 - 11	11	130 ± 5%	100	50	>0.9
TRAM132 - 12	12	169 ± 5%	100	50	>0.8
TRAM132 - 13	13	206 ± 5%	100	50	>0.7
TRAM132 - 14	14	222 ± 5%	100	50	>0.6
TRAM132 - 15	15	246 ± 5%	100	50	>0.6
TRAM132 - 16	16	307 ± 5%	100	50	>0.5
TRAM132 - 17	17	380 ± 5%	100	50	>0.5
TRAM132 - 18	18	422 ± 5%	100	50	>0.4
TRAM132 - 19	19	491 ± 5%	100	50	>0.4
TRAM132 - 20	20	538 ± 5%	100	50	>0.4

Electrical Characteristics (TRAM 3730)

Part Number	Turns	Inductance (L)(nH)	Q (min)	Test Freq. (MHz)	SRF (GHz)(min)
TRAM3730 - A01T	1	2.5 ± 10%	145	150	>3.0
TRAM3730 - A02T	2	5.0 ± 10%	140	150	>3.0
TRAM3730 - A03T	3	8.0 ± 10%	140	150	>3.0
TRAM3730 - A04T	4	12.5 ± 5%	137	150	>3.0
TRAM3730 - A05T	5	18.5 ± 5%	132	150	>2.5

Electrical Characteristics (TRAM 7030)

Part Number	Turns	Inductance (L)(nH)	Q (min)	Test Freq. (MHz)	SRF (GHz)(min)
TRAM7030 - B06T	6	17.5 ± 5%	100	150	>2.2
TRAM7030 - B07T	7	22.0 ± 5%	100	150	>2.0
TRAM7030 - B08T	8	28.0 ± 5%	100	150	>1.8
TRAM7030 - B09T	9	35.5 ± 5%	100	150	>1.2
TRAM7030 - B10T	10	43.5 ± 5%	100	150	>1.0



Electrical Characteristics (TRAM 1812)

Part Number	Inductance (L)(nH)	Q (min)	Test Freq. (MHz)	SRF (GHz)(min)
TRAM1812 - 22NK	22	100	150	3.20
TRAM1812 - 27NK	27	100	150	2.70
TRAM1812 - 33NK	33	100	150	2.50
TRAM1812 - 39NJ	39	100	150	2.10
TRAM1812 - 47NJ	47	100	150	2.10
TRAM1812 - 56NJ	56	100	150	1.50
TRAM1812 - 68NJ	68	100	150	1.50
TRAM1812 - 82NJ	82	100	150	1.30
TRAM1812 - R10J	100	100	150	1.20
TRAM1812 - R12J	120	100	150	1.10



Order Codes

Order Codes (TRAM0603 TRAM0805 TRAM1008)

TRAM	1008	-	6N8	K		
Part Number	Size (L×W) (mm)		Inductance		Tolerance	
TRAM	0603	1.80×2.00mm	6N8	6.8nH	K	10%
	0805	1.80×2.10mm	10N	10.0nH	M	20%
	1008	1.90×2.20mm	R10	100.00nH		

Order Codes (TRAM2215 TRAM4015 TRAM132)

TRAM	2215	-	K
Part Number	Size (L×W) (mm)		Turns
TRAM	2215	2.20×1.40mm	
	4015	4.00×1.40mm	
	132	9.00×4.40mm	

Order Codes (TRAM3730 TRAM7030)

TRAM	3730	-	A01T
Part Number	Size (L×W) (mm)		Turns
TRAM	3730	3.30×2.60mm	
	7030	6.30×3.60mm	

Order Codes (TRAM1812)

TRAM	1812	-	22N	K		
Part Number	Size (L×W) (mm)		Inductance		Tolerance	
TRAM	1812	4.90×3.50mm	22N	22nH	J	5%
			R10	100nH	K	10%

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Surface Mount Air Core Inductors (TRAD)

▶ Product Introduction

||| **Token will wind any Air Core Inductors for you.**

Features :

- High frequency.
- Solder coated leads ensure reliable soldering.
- Non-Flat top and bottom for mechanical stability.
- Highest possible SRFs as well as excellent Q values.

Applications :

- Pager, Cordless phone.
- High Freq. Communication Products.

Token's ultra-miniature single layer coil has two advantages. Firstly, like all air core coils, it is free from iron losses and the non-linearity. Secondly, single layer coils have the additional advantage of low self-capacitance and thus high self-resonant frequency. Air Coils is known as "Spring Coils". Token manufactures all types of air coils inductors.

Single layer air coil windings formula and the Q factor can be referred at Equations of Single Layer Air Coil Winding Formula and Methods.

TRAD's inductance is unaffected by the current it carries. This contrasts with the situation with coils using ferromagnetic cores whose inductance tends to reach a peak at moderate field strengths before dropping towards zero as saturation approaches. (TRAD) series features better Q-factor, greater efficiency, greater power handling, highest possible SRFs, and less distortion.

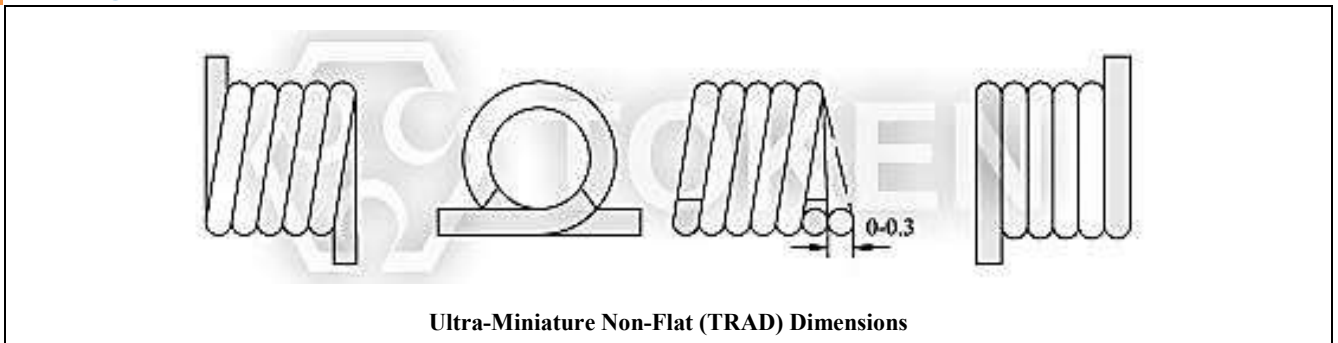
Token RF chip inductor non-flat top air core inductor conforms to the RoHS directive and Lead-free. Application of specific designs also available including different inductance values and Q specifications adjusted to frequency requirements.

Custom parts are available on request. Token will also produce devices outside these specifications to meet specific customer requirements, please contact our sales for more information. For more information, please link to Token official website "[RF Inductors](http://www.token.com.tw)".



Configurations & Dimensions

Configurations & Dimensions (Unit: mm) (TRAD)



● Note: Design as Customer's Requested Specifications.

Order Codes

Order Codes (TRAD)

TRAD	R		-	1.0	×	3.5	×	10
Part Number	Type of Winding			Wire Diameter (mm)		Inner Diameter (mm)		Numbers of Turns
TRAD	R	Clockwise winding						
	L	Counter clockwise winding						

● Note: Manufacturing according to customer's specification.

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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.



Wire Wound RF SMD Inductor (TRCM)

▶ Product Introduction

RF Chip Wire wound inductors

Go To Extremes Superior Performance.

Features :

- High resistance to heat and humidity.
- Resistant to mechanical shocks and pressures.
- Accurate dimensions for automatically surface mounted.
- Good heat durability that withstands lead-free compatible reflow soldering conditions.

Materials:

- Ferrite DR core, enamelled copper wire, tinned copper flat, epoxy novolac moldind compound

Applications :

- Other electronic equipment including HDDs and ODDs.
- Audio-visual equipment including TVs, VCRs and digital cameras.
- Electronic equipment used in onboard automobile equipment including car audio and ECU systems.
- Electronic equipment used in communication infrastructures including xDSL and mobile base stations.

Miniaturization of today's electrical and electronic devices requires component manufacturers to increase the performance of components without increasing footprint. Token (TRCM) series utilities wire wound technology that offers wide Pad inductor with the highest SRF carrying capability, highest usable frequency range, and the best Q factor of the narrow pad (TREM) and (TREC) series.

The latest wire wound chip inductor (TRCM) series offers improved performance in the same compact molded case size. These series conform to the RoHS directive and Lead-free.

Custom parts are available on request. Token will also produce devices outside these specifications to meet specific customer requirements, please contact our sales or link to Token official website "[RF Inductors](http://www.token.com.tw)" for more information.

A Brief Introduction to the Product:

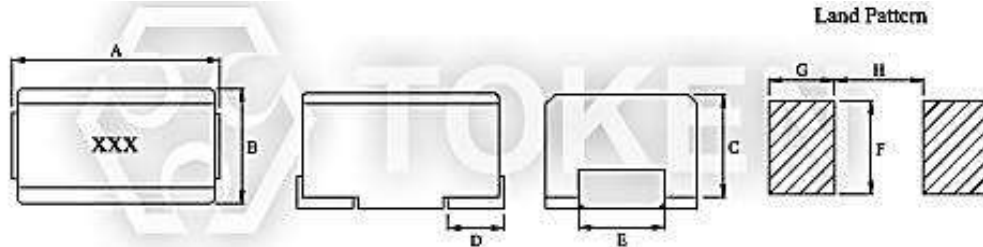
SMD Inductors CM322522 and CM453232 series are revolutionary, high reliable wire wound components for communication, equipment, instruments, video & audio have been developed in response to the trend toward higher density mounting of inductor parts in electric circuits.



Config. & Dim.

Configurations & Dimensions (Unit: mm) (TRCM)

Type	A	B	C	D	E	F	G	H
TRCM322522(1210)	3.2 ± 0.3	2.5 ± 0.2	2.2 ± 0.2	$0.4^{+0.1}_{-0}$	1.9 ± 0.1	3.0	1.0	2.0
TRCM453232(1812)	4.5 ± 0.3	3.2 ± 0.2	3.2 ± 0.2	$0.4^{+0.1}_{-0}$	2.6 ± 0.1	4.0	1.5	3.0

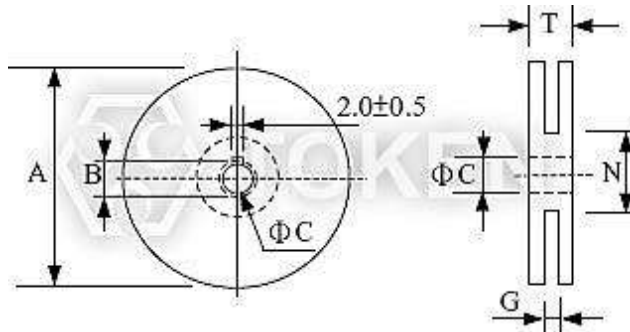


RF Surface Mount (TRCM Series) Land Pattern and Dimensions

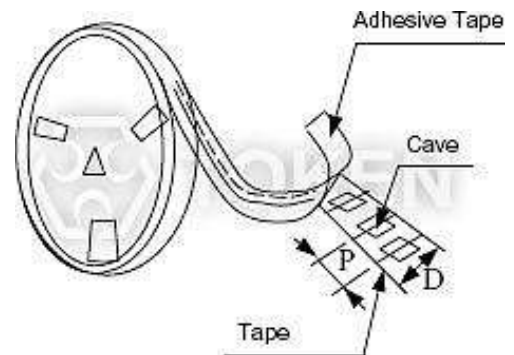
Reel & Packaging

Reel & Packaging (Unit: mm) (TRCM)

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

Standard Electrical Characteristics (TRCM322522) - EIA 1210

Part No.	Inductance (μH)	Q (min)	Test Freq. (MHZ)	SRF (MHz)(min)	DCR (Ω)(max)	IDC (mA)
TRCM322522 - 010J	0.01 ± 5%	15	100	2500	0.13	450
TRCM322522 - 012J	0.012 ± 5%	17	100	2300	0.14	450
TRCM322522 - 015J	0.015 ± 5%	19	100	2100	0.16	450
TRCM322522 - 018J	0.018 ± 5%	21	100	1900	0.18	450
TRCM322522 - 022J	0.022 ± 5%	23	100	1700	0.2	450
TRCM322522 - 027J	0.027 ± 5%	23	100	1500	0.22	450
TRCM322522 - 033J	0.033 ± 5%	25	100	1400	0.24	450
TRCM322522 - 039J	0.039 ± 5%	25	100	1300	0.27	450
TRCM322522 - 047J	0.047 ± 5%	26	100	1200	0.3	450
TRCM322522 - 056J	0.056 ± 5%	26	100	1100	0.33	450
TRCM322522 - 068J	0.068 ± 5%	27	100	1000	0.36	450
TRCM322522 - 082J	0.082 ± 5%	27	100	900	0.4	450
TRCM322522 - R10J	0.1 ± 5%	28	100	700	0.44	450
TRCM322522 - R12J	0.12 ± 5%	30	25.2	500	0.22	450
TRCM322522 - R15J	0.15 ± 5%	30	25.2	400	0.28	450
TRCM322522 - R18J	0.18 ± 5%	30	25.2	400	0.28	450
TRCM322522 - R22J	0.22 ± 5%	30	25.2	350	0.32	450
TRCM322522 - R27J	0.27 ± 5%	30	25.2	320	0.36	450
TRCM322522 - R33J	0.33 ± 5%	30	25.2	300	0.4	250
TRCM322522 - R39J	0.39 ± 5%	30	25.2	250	0.45	450
TRCM322522 - R47J	0.47 ± 5%	30	25.2	220	0.5	450
TRCM322522 - R56J	0.56 ± 5%	30	25.2	180	0.55	450
TRCM322522 - R68J	0.68 ± 5%	30	25.2	160	0.6	450
TRCM322522 - R82J	0.82 ± 5%	30	25.2	140	0.65	450
TRCM322522 - 1R0J	1 ± 5%	30	7.96	120	0.7	400
TRCM322522 - 1R2J	1.2 ± 5%	30	7.96	100	0.75	390
TRCM322522 - 1R5J	1.5 ± 5%	30	7.96	85	0.85	370
TRCM322522 - 1R8J	1.8 ± 5%	30	7.96	80	0.9	350
TRCM322522 - 2R2J	2.2 ± 5%	30	7.96	75	1	320
TRCM322522 - 2R7J	2.7 ± 5%	30	7.96	70	1.1	290
TRCM322522 - 3R3J	3.3 ± 5%	30	7.96	60	1.2	260
TRCM322522 - 3R9J	3.9 ± 5%	30	7.96	55	1.3	250
TRCM322522 - 4R7J	4.7 ± 5%	30	7.96	50	1.5	220
TRCM322522 - 5R6J	5.6 ± 5%	30	7.96	45	1.6	200
TRCM322522 - 6R8J	6.8 ± 5%	30	7.96	40	1.8	180
TRCM322522 - 8R2J	8.2 ± 5%	30	7.96	35	2	170
TRCM322522 - 100J	10 ± 5%	30	2.52	30	2.1	150
TRCM322522 - 120J	12 ± 5%	30	2.52	20	2.5	140
TRCM322522 - 150J	15 ± 5%	30	2.52	20	2.8	130
TRCM322522 - 180J	18 ± 5%	30	2.52	20	3.3	120
TRCM322522 - 220J	22 ± 5%	30	2.52	20	3.7	110



Part No.	Inductance (μH)	Q (min)	Test Freq. (MHZ)	SRF (MHz)(min)	DCR (Ω)(max)	IDC (mA)
TRCM322522 - 270J	27 ± 5%	30	2.52	20	5	80
TRCM322522 - 330J	33 ± 5%	30	2.52	17	5.6	70
TRCM322522 - 390J	39 ± 5%	30	2.52	16	6.4	65
TRCM322522 - 470J	47 ± 5%	30	2.52	15	7	60
TRCM322522 - 560J	56 ± 5%	30	2.52	13	8	55
TRCM322522 - 680J	68 ± 5%	30	2.52	12	9	50
TRCM322522 - 820J	82 ± 5%	30	2.52	11	10	45
TRCM322522 - 101J	100 ± 5%	20	0.796	10	10	40
TRCM322522 - 121J	120 ± 5%	20	0.796	10	11	70
TRCM322522 - 151J	150 ± 5%	20	0.796	8	15	65
TRCM322522 - 181J	180 ± 5%	20	0.796	7	17	60
TRCM322522 - 221J	220 ± 5%	20	0.796	7	21	50
TRCM322522 - 271J	270 ± 5%	20	0.796	6	28	45
TRCM322522 - 331J	330 ± 5%	20	0.796	5	34	40
TRCM322522 - 391J	390 ± 5%	20	0.796	5	36	35
TRCM322522 - 471J	470 ± 5%	20	0.796	4	40	25



Standard Electrical Characteristics (TRCM453232) - EIA 1812

Part No.	Inductance (μH)	Q (min)	Test Freq. (MHZ)	SRF (MHz)(min)	DCR (Ω)(max)	IDC (mA)
TRCM453232 - 1R0J	1 ± 5%	50	7.96	100	0.5	450
TRCM453232 - 1R2J	1.2 ± 5%	50	7.96	80	0.55	430
TRCM453232 - 1R5J	1.5 ± 5%	50	7.96	70	0.6	410
TRCM453232 - 1R8J	1.8 ± 5%	50	7.96	60	0.65	390
TRCM453232 - 2R2J	2.2 ± 5%	50	7.96	55	0.7	380
TRCM453232 - 2R7J	2.7 ± 5%	50	7.96	50	0.75	370
TRCM453232 - 3R3J	3.3 ± 5%	50	7.96	45	0.8	355
TRCM453232 - 3R9J	3.9 ± 5%	50	7.96	40	0.9	330
TRCM453232 - 4R7J	4.7 ± 5%	50	7.96	35	1	315
TRCM453232 - 5R6J	5.6 ± 5%	50	7.96	33	1.1	300
TRCM453232 - 6R8J	6.8 ± 5%	50	7.96	27	1.2	285
TRCM453232 - 8R2J	8.2 ± 5%	50	7.96	25	1.4	270
TRCM453232 - 100J	10 ± 5%	50	2.52	20	1.6	250
TRCM453232 - 120J	12 ± 5%	50	2.52	18	2	225
TRCM453232 - 150J	15 ± 5%	50	2.52	17	2.5	200
TRCM453232 - 180J	18 ± 5%	50	2.52	15	2.8	190
TRCM453232 - 220J	22 ± 5%	50	2.52	13	3.2	180
TRCM453232 - 270J	27 ± 5%	50	2.52	12	3.6	170
TRCM453232 - 330J	33 ± 5%	50	2.52	11	4	160
TRCM453232 - 390J	39 ± 5%	50	2.52	10	4.5	150
TRCM453232 - 470J	47 ± 5%	50	2.52	10	5	140
TRCM453232 - 560J	56 ± 5%	50	2.52	9	5.5	135
TRCM453232 - 680J	68 ± 5%	50	2.52	9	6	130
TRCM453232 - 820J	82 ± 5%	50	2.52	8	7	120
TRCM453232 - 101J	100 ± 5%	40	0.796	8	8	110
TRCM453232 - 121J	120 ± 5%	40	0.796	6	8	110
TRCM453232 - 151J	150 ± 5%	40	0.796	5	9	105
TRCM453232 - 181J	180 ± 5%	40	0.796	5	9.5	102
TRCM453232 - 221J	220 ± 5%	40	0.796	4	10	100
TRCM453232 - 271J	270 ± 5%	40	0.796	4	12	92
TRCM453232 - 331J	330 ± 5%	40	0.796	3.5	14	85
TRCM453232 - 391J	390 ± 5%	40	0.796	3	16	80
TRCM453232 - 471J	470 ± 5%	40	0.796	3	26	62
TRCM453232 - 561J	560 ± 5%	30	0.796	3	30	50
TRCM453232 - 681J	680 ± 5%	30	0.796	3	30	50
TRCM453232 - 821J	820 ± 5%	30	0.796	2.5	35	30
TRCM453232 - 102J	1000 ± 5%	30	0.252	2.5	40	30



► Performance Characteristics

Mechanical Performance Test (TRCM322522, TRCM453232)

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 (TRCM322522, TRCM453232)

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 (TRCM322522, TRCM453232)

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 (TRCM322522, TRCM453232)

TRCM322522	-	R10		J	
Part Number		Inductance		Tolerance	
TRCM322522		R10	0.10 μ H	J	5%
TRCM453232		1R0	1.00 μ H		
		100	10.00 $\times 10^0\mu$ H		
		101	10.00 $\times 10^1\mu$ H		
		102	10.00 $\times 10^2\mu$ 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.



Wire Wound Chip Ceramic Inductor (TRWL)

► Product Introduction

Token Wire wound Ceramic Inductor Simplifies Power Management Issues.

Features :

- Tighter Tolerance of $\pm 2\%$.
- Fully Automated Assembly.
- Smaller Size of 0402 (1005).
- Miniature ultra-compact size.
- High SRFs, exceptional Q values.
- Low profile, High Current are Available.

Applications :

- Remote Control, Security System, Wireless PDA.
- TCWLL, Wireless LAN / Mouse / Keyboard / Earphone.
- Cellular Phone (CDMA/GSM/PHS), Cordless Phone (DECT/CT1CT2).
- CATV Filter, VCO, RF Module & Other Wireless Products.
- Tuner, Set Top Box, Base Station, Repeater GPS Receiver.
- USB 2.0, IEEE 1394, Cable Modem / XDSL Tuner.

Token (TRWL) series is a wire wound and ceramic technology that offers the highest usable frequency range, highest current carrying capability, and the best Q factor of the three technologies. The combination of these three advantages ensures that design engineers will have the right product for many more high frequency applications than most competitors.

High frequency inductors are specifically used for their frequency dependent properties. Depending on the technology, size and inductance value, the inductor will pass a certain desired range of frequencies, but will block or attenuate frequencies above the desired range. This eliminates high frequency noise or interference from communications signals.

The Construction of Token (TRWL) open-type series chip wire wound ceramic inductors are designed to provide high SRFs. The full (TRWL) series conform to the RoHS directive and Lead-free. Customized designs and tighter tolerances are available on request.

Primarily, Token (TRWL) series as power inductors required by power supply circuits of multifunctional and small mobile phones must be small in size and low in height. These products must exhibit performance that is commensurate with the high power conversion efficiency of power supply circuits. Power supply circuits must also exhibit resistance to noise in the power supply state. All performance requirements of this component are expected based on the wire-wound inductors manufactured by Token.

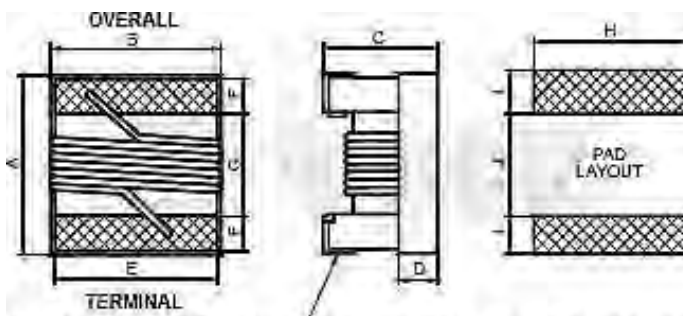
Application of specific designs also available including different inductance values and Q specifications adjusted to frequency requirements. The (TRWL) series is supplied in tape and reel packaging ready for use with automated assembly processes. Contact us with your specific needs. For more information, please link to Token official website "[RF Inductors](http://www.token.com.tw)".



► Configurations & Dimensions

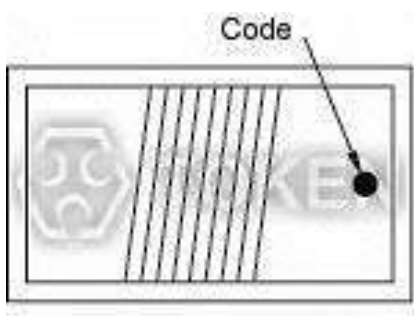
Configurations & Dimensions (Unit: mm) (TRWL)

Series	A Max.	B Max.	C Max.	D Ref.	E	F	G	H	I	J
Standard										
TRWL02 (EIA 0402)	1.27	0.76	0.61	0.15	0.51	0.23	0.56	0.66	0.50	0.46
TRWL03 (EIA 0603)	1.80	1.12	1.02	0.38	0.76	0.33	0.86	1.02	0.64	0.64
TRWL05 (EIA 0805)	2.29	1.73	1.52	0.51	1.27	0.44	1.02	1.78	1.02	0.76
TRWL06 (EIA 1206)	3.56	2.16	1.52	0.50	1.20	0.50	2.20	1.93	1.02	1.78
TRWL08 (EIA 1008)	2.92	2.79	2.03	0.65	2.03	0.51	1.52	2.54	1.02	1.27
Low Profile										
TRWL05 (EIA 0805)	2.29	1.73	1.03	0.51	1.27	0.44	1.02	1.78	1.02	0.76
TRWL08 (EIA 1008)	2.92	2.79	1.40	0.65	2.03	0.51	1.52	2.54	1.02	1.27
High Current / High Q										
TRWL03 (EIA 0603)	1.80	1.12	1.02	0.38	0.76	0.33	0.86	1.02	0.64	0.64
TRWL05 (EIA 0805)	2.29	1.73	1.52	0.51	1.27	0.44	1.02	1.78	1.02	0.76
TRWL08 (EIA 1008)	2.92	2.79	2.03	0.65	2.03	0.51	1.52	2.54	1.02	1.27



Reel Dimensions

TERMINAL WARP AROUND: Approx. 0.007" / 0.18mm Both Ends



Tape Packing Dimensions

● **Note: Color Coding:**

0603 / 0805 / 1206 / 1008 Series (0402 Series is No Color Coding)

Because of small sizes, these parts are marked with a single color dot. The inductance value represented by the dot is shown on the data page for each series.

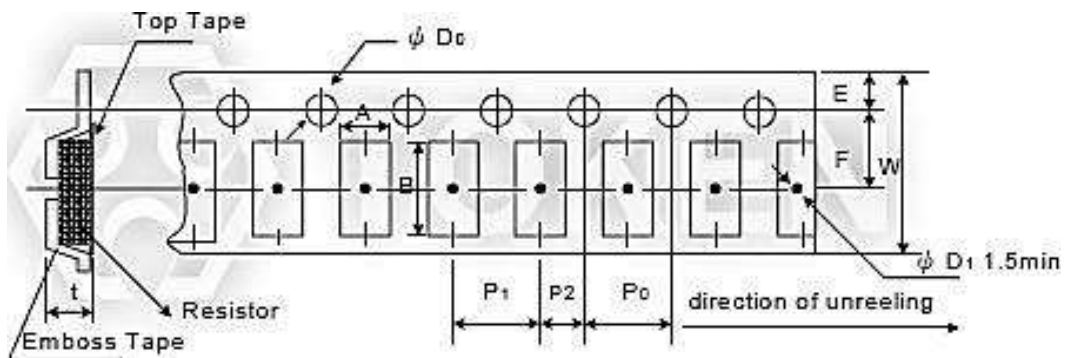
Reel & Packaging

Packaging Quantity & Reel Specifications (Unit: mm) (TRWL)

<p>Reel Specifications</p> <p>D: 21.8 ± 0.8 D: 13.0 ± 0.3 2.0 ± 0.5 180⁺⁰₋₃ 60⁺¹₋₀ 1.2 ± 0.2 9.5 ± 0.50 11.4 ± 1.0</p> <p>Packaging Quantity & Reel Specifications (TRWL)</p>	Type	Emboss Plastic Tape (PCS)
	TRWL08	2000
	TRWL06	2000
	TRWL05	2000
	TRWL03	4000
	TRWL02	4000

Emboss Plastic Tape Specifications (Unit: mm) (TRWL)

Codes	A ±0.10	B ±0.10	W ±0.2	E ±0.10	F ±0.1	P0 ±0.10	P1 ±0.10	P2 ±0.05	ΦD0 +0.10	t ±0.05
TRWL08	2.70	2.80	8.0	1.75	3.5	4.00	4.00	2.00	1.50	2.00
TRWL06	1.95	3.50	8.0	1.75	3.5	4.00	4.00	2.00	1.50	1.50
TRWL05	1.85	2.30	8.0	1.75	3.5	4.00	4.00	2.00	1.50	1.45
TRWL03	1.12	1.85	8.0	1.75	3.5	4.00	4.00	2.00	1.50	0.96
TRWL02	0.71	1.16	8.0	1.75	3.5	4.00	2.00	2.00	1.50	0.65



Emboss Plastic Tape Specifications (TRWL)

▶ Mechanical Test

Mechanical Performance Test (TRWL)

Item	Specification	Test Method
Vibration Test	Appearance: No damage L change: within $\pm 5\%$ Q change: within $\pm 10\%$	Test device shall be soldered on the substrate Oscillation Frequency: 10 to 55 to 10Hz for 1min Amplitude: 1.5mm Time: 2hrs for each axis (X, Y & Z), total 6hrs
Resistance to Soldering-Heat		Solder Temperature: $260\pm 5^{\circ}\text{C}$ Immersion Time: $10\pm 2\text{sec}$
Component Adhesion (Push Test)	1 lbs. For 0402 2 lbs. For 0603 3 lbs. For the rest	The device should be soldered ($260\pm 5^{\circ}\text{C}$ for 10 seconds) to a tinned copper substrate. A dynamometer force gauge should be applied to the side of the component. The device must withstand a minimum force of 2 or 4 pounds without a failure of adhesion on termination
Drop Test	No damage	Dropping chip by each side and each corner. Drop 10 times in total Drop height: 100cm Drop weight: 125g
Solderability Test	90% covered with solder.	Inductor shall be dipped in a melted solder bath at $235\pm 5^{\circ}\text{C}$ for 5 seconds.
Resistance to Solvent Test	No damage on appearance and marking.	MIL-STD202F, Method 215D

▶ Electrical Test

Electrical Performance Test (TRWL)

Item	Specification	Test Method
Inductance	Refer to standard electrical characteristic spec.	HP4291B
Q		HP4291B
SRF		HP8753D
DC Resistance RDC		Micro-Ohm meter (Gom-801G)
Rated Current IDC		Applied the current to coils, The inductance change should be less than 10% to initial value
Over Load Test	Inductors shall have no evidence of electrical and mechanical damage	Applied 2 times of rated allowed DC current to inductor for a period of 5 minute
Withstanding Voltage Test	Inductors shall be no evidence of electrical and mechanical damage.	AC voltage of 500 VAC applied between inductors terminal and case for 1 minute.
Insulation Resistance Test	1000M ohm min	100 VDC applied between inductor terminal and case

► Climatic Test

Climatic Test (TRWL)

Item	Specification	Test Method															
Temperature Characteristic	Appearance: No damage L change: within $\pm 10\%$ Q change: within $\pm 20\%$	-40°C ~ +125°C															
Humidity Resistance		Temperature: 40 \pm 2°C Relative Humidity: 90~95% Time: 96hrs \pm 2hrs Measured after exposure in the room condition for 2hrs															
Low Temperature Storage Test		Temperature: -40 \pm 2°C Time: 48 \pm 2hrs Inductors are tested after 1 hour at room temperature															
Thermal Shock Test		One cycle: <table border="1" data-bbox="1023 723 1417 920"> <thead> <tr> <th>Step</th> <th>Temperature (°C)</th> <th>time (min)</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-25\pm3</td> <td>30</td> </tr> <tr> <td>2</td> <td>25\pm2</td> <td>15</td> </tr> <tr> <td>3</td> <td>85\pm3</td> <td>30</td> </tr> <tr> <td>4</td> <td>25\pm2</td> <td>15</td> </tr> </tbody> </table> Total: 5 cycles	Step	Temperature (°C)	time (min)	1	-25 \pm 3	30	2	25 \pm 2	15	3	85 \pm 3	30	4	25 \pm 2	15
Step		Temperature (°C)	time (min)														
1		-25 \pm 3	30														
2	25 \pm 2	15															
3	85 \pm 3	30															
4	25 \pm 2	15															
High Temperature Storage Test	Temperature: 125 \pm 2°C Time: 48 \pm 2hrs Measured after exposure in the room condition for 1hr																
High Temperature Load Life Test	Temperature: 85 \pm 2°C Time: 1000 \pm 12hrs Load: Allowed DC current																
Humidity Load Life	There should be no evidence of short or open circuit. Temperature: 40 \pm 2°C Relative Humidity: 90~95% Time: 1000 \pm 12hrs Load: Allowed DC current																

● Note: Storage Temperature: 25 \pm 3°C; Humidity: <80%RH



Standard Electrical Specifications

Standard Electrical Specifications Standard (TRWL02) - EIA 0402

Part Number	Inductance (nH) @ 250MHz	Tolerance (%)	Q (min)	SRF (GHz)(min)	DCR (Ω)(max)	IDC (mA)	900MHz		1.7GHz	
							L	Q	L	Q
TRWL02*T1N0	1.0	10	16	12.70	0.04	1360	1.02	77	1.02	69
TRWL02*T1N9	1.9	10,5	16	11.30	0.07	1040	1.72	68	1.74	82
TRWL02*T2N0	2.0	10,5	16	11.10	0.07	1040	1.93	54	1.93	75
TRWL02*T2N2	2.2	10,5	19	10.80	0.07	960	2.19	59	2.23	100
TRWL02*T2N4	2.4	10,5	15	10.50	0.07	790	2.24	51	2.27	68
TRWL02*T2N7	2.7	10,5	16	10.40	0.12	640	2.23	42	2.25	61
TRWL02*T3N3	3.3	10,5,2	19	7.00	0.06	840	3.10	65	3.12	87
TRWL02*T3N6	3.6	10,5,2	19	6.80	0.06	840	3.56	45	3.62	71
TRWL02*T3N9	3.9	10,5,2	19	5.80	0.06	840	3.89	50	4.00	75
TRWL02*T4N3	4.3	10,5,2	18	6.00	0.09	700	4.19	47	4.30	71
TRWL02*T4N7	4.7	10,5,2	15	4.70	0.13	640	4.55	48	4.68	68
TRWL02*T5N1	5.1	10,5,2	20	4.80	0.08	800	5.15	56	5.25	82
TRWL02*T5N6	5.6	10,5,2	20	4.80	0.08	760	5.16	54	5.28	81
TRWL02*T6N2	6.2	10,5,2	20	4.80	0.08	760	6.16	52	6.37	76
TRWL02*T6N8	6.8	10,5,2	20	4.80	0.08	680	6.56	63	6.93	78
TRWL02*T7N5	7.5	10,5,2	22	4.80	0.10	680	7.91	60	8.22	88
TRWL02*T8N2	8.2	10,5,2	22	4.40	0.10	680	8.50	57	8.85	84
TRWL02*T8N7	8.7	10,5,2	18	4.10	0.20	480	8.78	54	9.21	73
TRWL02*T9N0	9.0	10,5,2	22	4.16	0.10	680	9.07	62	9.53	78
TRWL02*T9N5	9.5	10,5,2	18	4.00	0.20	480	9.42	54	9.98	69
TRWL02*T10N	10	10,5,2	21	3.90	0.19	480	9.80	50	10.10	67
TRWL02*T11N	11	10,5,2	24	3.68	0.12	640	10.70	52	11.20	78
TRWL02*T12N	12	10,5,2	24	3.60	0.12	640	11.90	53	12.70	71
TRWL02*T13N	13	10,5,2	24	3.45	0.21	440	13.40	51	14.60	57
TRWL02*T15N	15	10,5,2	24	3.28	0.17	560	14.60	55	15.50	77
TRWL02*T16N	16	10,5,2	24	3.10	0.22	560	16.60	46	18.80	47
TRWL02*T18N	18	10,5,2	24	3.10	0.23	420	18.30	57	20.28	62
TRWL02*T19N	19	10,5,2	24	3.04	0.20	480	19.10	50	21.10	67
TRWL02*T20N	20	10,5,2	25	3.00	0.25	420	20.70	52	23.66	53
TRWL02*T22N	22	10,5,2	25	2.80	0.30	400	23.20	53	26.75	53
TRWL02*T23N	23	10,5,2	22	2.72	0.30	400	23.80	49	26.90	64
TRWL02*T24N	24	10,5,2	25	2.70	0.30	400	25.10	51	29.50	50
TRWL02*T27N	27	10,5,2	24	2.48	0.30	400	28.70	49	33.50	63
TRWL02*T30N	30	10,5,2	25	2.35	0.35	400	31.10	46	38.50	39
TRWL02*T33N	33	10,5,2	24	2.35	0.35	400	34.90	31	41.74	32
TRWL02*T36N	36	10,5,2	24	2.32	0.44	320	39.50	44	48.40	53
TRWL02*T39N	39	10,5,2	25	2.10	0.55	200	41.70	47	50.23	45
TRWL02*T40N	40	10,5,2	24	2.24	0.44	320	39.00	44	47.40	33
TRWL02*T43N	43	10,5,2	25	2.03	0.81	100	45.80	46	61.55	34
TRWL02*T47N	47	10,5,2	20	2.10	0.83	150	50.00	38	-	-
TRWL02*T51N	51	10,5,2	25	1.75	0.82	100	-	-	-	-
TRWL02*T56N	56	10,5,2	22	1.76	0.97	100	-	-	-	-
TRWL02*T68N	68	10,5,2	22	1.62	1.12	100	-	-	-	-

● Note: Working Temperature Range: -40°C ~ 125°C



Standard Electrical Specifications Standard (TRWL03) - EIA 0603

Part Number	Inductance (nH)	Tolerance (%)	Q (min)	SRF (GHz)(min)	DCR (Ω)(max)	IDC (mA)	900MHz		1.7GHz		Color Code
							L	Q	L	Q	
Test Freq. @ 250MHz											
TRWL03*T1N6	1.6	10,5	24	12.5	0.030	700	1.53	35	1.58	55	Blue
TRWL03*T1N8	1.8	10,5	16	12.5	0.045	700	1.63	35	1.66	50	Black
TRWL03*T2N2	2.2	10,5	20	6.00	0.100	700	2.18	41	2.20	64	White
TRWL03*T2N7	2.7	10,5	16	>4.00	0.140	700	2.39	25	2.44	55	Yellow
TRWL03*T3N3	3.3	10,5,2	22	>6.00	0.080	700	3.35	47	3.40	65	Red
TRWL03*T3N6	3.6	10,5,2	22	5.80	0.063	700	3.53	49	3.58	65	Violet
TRWL03*T3N9	3.9	10,5,2	22	>6.00	0.080	700	3.95	49	3.96	67	Brown
TRWL03*T4N3	4.3	10,5,2	22	5.80	0.063	700	4.32	49	4.43	67	Orange
TRWL03*T4N5	4.5	10,5,2	20	5.80	0.120	700	4.74	55	4.87	92	Gray
TRWL03*T4N7	4.7	10,5,2	20	5.80	0.120	700	4.65	53	4.80	67	Violet
TRWL03*T5N1	5.1	10,5,2	20	5.80	0.160	700	5.13	47	5.36	56	Green
TRWL03*T5N6	5.6	10,5,2	20	5.80	0.170	700	5.53	56	5.86	77	Yellow
TRWL03*T6N2	6.2	10,5,2	25	5.80	0.110	700	6.28	60	6.40	85	Black
TRWL03*T6N3	6.3	10,5,2	25	5.80	0.110	700	6.67	41	6.86	61	Black
TRWL03*T6N8	6.8	10,5,2	27	5.80	0.110	700	6.75	60	7.10	81	Red
TRWL03*T7N5	7.5	10,5,2	28	4.80	0.106	700	7.70	60	7.82	65	Brown
TRWL03*T8N2	8.2	10,5,2	27	4.80	0.110	700	8.25	64	8.40	81	Green
TRWL03*T8N7	8.7	10,5,2	28	4.60	0.109	700	8.86	62	9.32	58	Yellow
TRWL03*T9N1	9.1	10,5,2	35	4.80	0.130	700	9.20	70	9.70	80	Black
TRWL03*T9N5	9.5	10,5,2	28	5.40	0.135	700	9.70	59	9.92	61	Blue
TRWL03*T10N	10.0	10,5,2	31	4.80	0.130	700	10.0	66	10.6	83	Orange
TRWL03*T11N	11.0	10,5,2	31	4.00	0.086	700	11.3	53	12.1	56	Gray
TRWL03*T12N	12.0	10,5,2	35	4.00	0.130	700	12.3	72	13.5	83	Yellow
TRWL03*T15N	15.0	10,5,2	35	4.00	0.170	700	15.4	64	16.8	89	Green
TRWL03*T16N	16.0	10,5,2	35	3.30	0.110	700	16.5	55	18.0	52	White
TRWL03*T17N	17.0	10,5,2	35	3.20	0.170	700	17.6	56	19.4	44	Red
TRWL03*T18N	18.0	10,5,2	35	3.10	0.170	700	18.7	70	21.4	69	Blue
TRWL03*T20N	20.0	10,5,2	40	3.00	0.190	700	20.7	80	23.5	30	Green
TRWL03*T22N	22.0	10,5,2	38	3.00	0.190	700	22.8	73	26.1	71	Violet
TRWL03*T23N	23.0	10,5,2	38	2.85	0.190	700	24.1	71	28.0	71	Orange
TRWL03*T24N	24.0	10,5,2	36	2.80	0.130	700	25.7	45	30.9	40	Black
TRWL03*T27N	27.0	10,5,2	40	2.80	0.220	600	29.2	74	34.6	65	Gray
TRWL03*T30N	30.0	10,5,2	37	2.80	0.150	600	31.4	47	39.8	28	Brown
TRWL03*T33N	33.0	10,5,2	40	2.30	0.220	600	36.0	67	49.5	42	White
TRWL03*T36N	36.0	10,5,2	37	2.30	0.250	600	39.1	47	48.9	24	Red
TRWL03*T39N	39.0	10,5,2	40	2.20	0.250	600	42.7	60	60.2	40	Black
Test Freq. @ 200MHz											
TRWL03*T43N	43.0	10,5,2	38	2.00	0.280	600	46.9	44	60.3	21	Orange
TRWL03*T47N	47.0	10,5,2	38	2.00	0.280	600	52.2	62	77.2	35	Brown
TRWL03*T51N	51.0	10,5,2	35	1.90	0.280	600	55.5	69	82.2	34	Blue
TRWL03*T56N	56.0	10,5,2	38	1.90	0.310	600	62.5	56	97.0	26	Red
TRWL03*T62N	62.0	10,5,2	37	1.80	0.340	600	68.0	40	110	10	Gray



Part Number	Inductance (nH)	Tolerance (%)	Q (min)	SRF (GHz)(min)	DCR (Ω)(max)	IDC (mA)	900MHz		1.7GHz		Color Code
							L	Q	L	Q	
TRWL03*T68N	68.0	10,5,2	37	1.70	0.340	600	80.5	54	168	21	Orange
Test Freq. @ 150MHz											
TRWL03*T72N	72.0	10,5,2	34	1.70	0.490	400	82.0	53	135	20	Yellow
TRWL03*T82N	82.0	10,5,2	34	1.70	0.540	400	96.2	54	177	21	Green
TRWL03*T91N	91.0	10,5,2	30	1.70	0.500	400	110	50	-	-	Brown
TRWL03*TR10	100	10,5,2	34	1.40	0.580	400	124	49	-	-	Blue
TRWL03*TR11	110	10,5,2	32	1.35	0.610	300	138	43	-	-	Violet
TRWL03*TR12	120	10,5,2	32	1.30	0.650	300	166	39	-	-	Gray
TRWL03*TR13	130	10,5,2	30	1.40	0.720	300	185	60	-	-	White
Test Freq. @ 100MHz											
TRWL03*TR14	140	10,5,2	28	1.30	0.870	280	190	80	-	-	Blue
TRWL03*TR15	150	10,5,2	32	1.30	0.950	280	230	25	-	-	White
TRWL03*TR16	160	10,5,2	25	1.30	1.400	280	215	-	-	-	Yellow
TRWL03*TR18	180	10,5,2	25	1.25	1.400	250	305	22	-	-	Black
TRWL03*TR22	220	10,5,2	25	1.20	1.600	250	377	-	-	-	Brown
TRWL03*TR26	260	10,5,2	25	1.00	2.000	200	469	-	-	-	Violet
TRWL03*TR27	270	10,5,2	25	0.90	2.100	200	-	-	-	-	Red
TRWL03*TR28	280	10,5,2	25	1.00	2.400	100	-	-	-	-	Green
TRWL03*TR30	300	10,5,2	25	0.75	2.500	150	-	-	-	-	Orange
TRWL03*TR33	330	10,5,2	25	0.90	3.800	100	-	-	-	-	Blue
TRWL03*TR39	390	10,5,2	25	0.90	4.350	100	-	-	-	-	Yellow

● Note: Working Temperature Range: -40°C ~ 125°C



Standard Electrical Specifications Standard (TRWL05) - EIA 0805

Part Number	Inductance (nH)	Tolerance (%)	Q (min)	SRF (GHz)(min)	DCR (Ω)(max)	IDC (mA)	Color Code
TRWL05*T2N7	2.7 @ 250MHz	10,5	80 @ 1500MHz	7.900	0.06	800	Brown
TRWL05*T2N8	2.8 @ 250MHz	10,5	80 @ 1500MHz	7.900	0.06	800	Gray
TRWL05*T3N0	3.0 @ 250MHz	10,5	65 @ 1500MHz	7.900	0.06	800	White
TRWL05*T3N3	3.3 @ 250MHz	10,5	50 @ 1500MHz	6.000	0.08	600	Black
TRWL05*T5N6	5.6 @ 250MHz	10,5	65 @ 1000MHz	5.500	0.08	600	Orange
TRWL05*T6N2	6.2 @ 250MHz	10,5	50 @ 1000MHz	5.500	0.11	600	Green
TRWL05*T6N8	6.8 @ 250MHz	10,5	50 @ 1000MHz	5.500	0.11	600	Brown
TRWL05*T7N5	7.5 @ 250MHz	10,5	50 @ 1000MHz	4.500	0.14	600	Green
TRWL05*T8N2	8.2 @ 250MHz	10,5	50 @ 1000MHz	4.700	0.12	600	Red
TRWL05*T8N7	8.7 @ 250MHz	10,5	50 @ 1000MHz	3.900	0.21	400	White
TRWL05*T10N	10.0 @ 250MHz	10,5,2	60 @ 500MHz	4.200	0.10	600	Blue
TRWL05*T12N	12.0 @ 250MHz	10,5,2	50 @ 500MHz	4.000	0.15	600	Orange
TRWL05*T15N	15.0 @ 250MHz	10,5,2	50 @ 500MHz	3.400	0.17	600	Yellow
TRWL05*T18N	18.0 @ 250MHz	10,5,2	50 @ 500MHz	3.300	0.20	600	Green
TRWL05*T22N	22.0 @ 250MHz	10,5,2	55 @ 500MHz	2.600	0.22	500	Blue
TRWL05*T24N	24.0 @ 250MHz	10,5,2	50 @ 500MHz	2.000	0.22	500	Gray
TRWL05*T27N	27.0 @ 250MHz	10,5,2	55 @ 500MHz	2.500	0.25	500	Violet
TRWL05*T33N	33.0 @ 250MHz	10,5,2	60 @ 500MHz	2.050	0.27	500	Gray
TRWL05*T36N	36.0 @ 250MHz	10,5,2	55 @ 500MHz	1.700	0.27	500	Orange
TRWL05*T39N	39.0 @ 250MHz	10,5,2	60 @ 500MHz	2.000	0.29	500	White
TRWL05*T43N	43.0 @ 200MHz	10,5,2	60 @ 500MHz	1.650	0.34	500	Yellow
TRWL05*T47N	47.0 @ 200MHz	10,5,2	60 @ 500MHz	1.650	0.31	500	Black
TRWL05*T56N	56.0 @ 200MHz	10,5,2	60 @ 500MHz	1.550	0.34	500	Brown
TRWL05*T68N	68.0 @ 200MHz	10,5,2	60 @ 500MHz	1.450	0.38	500	Red
TRWL05*T72N	72.0 @ 150MHz	10,5,2	65 @ 500MHz	1.400	0.40	500	Green
TRWL05*T82N	82.0 @ 150MHz	10,5,2	65 @ 500MHz	1.300	0.42	400	Orange
TRWL05*T91N	91.0 @ 150MHz	10,5,2	65 @ 500MHz	1.200	0.48	400	Black
TRWL05*TR10	100 @ 150MHz	10,5,2	65 @ 500MHz	1.200	0.46	400	Yellow
TRWL05*TR11	110 @ 150MHz	10,5,2	50 @ 250MHz	1.000	0.48	400	Brown
TRWL05*TR12	120 @ 150MHz	10,5,2	50 @ 250MHz	1.100	0.51	400	Green
TRWL05*TR15	150 @ 100MHz	10,5,2	50 @ 250MHz	0.920	0.56	400	Blue
TRWL05*TR18	180 @ 100MHz	10,5,2	50 @ 250MHz	0.870	0.64	400	Violet
TRWL05*TR20	200 @ 100MHz	10,5,2	50 @ 250MHz	0.860	0.66	400	Orange
TRWL05*TR22	220 @ 100MHz	10,5,2	50 @ 250MHz	0.850	0.70	400	Gray
TRWL05*TR24	240 @ 100MHz	10,5,2	44 @ 250MHz	0.690	1.00	350	Red
TRWL05*TR25	250 @ 100MHz	10,5,2	45 @ 250MHz	0.680	1.00	350	Green



Part Number	Inductance (nH)	Tolerance (%)	Q (min)	SRF (GHz)(min)	DCR (Ω)(max)	IDC (mA)	Color Code
TRWL05*TR27	270 @ 100MHz	10,5,2	48 @ 250MHz	0.650	1.00	350	White
TRWL05*TR30	300 @ 100MHz	10,5,2	48 @ 250MHz	0.620	1.20	330	Yellow
TRWL05*TR33	330 @ 100MHz	10,5,2	48 @ 250MHz	0.600	1.40	310	Black
TRWL05*TR36	360 @ 100MHz	10,5,2	48 @ 250MHz	0.580	1.45	300	Green
TRWL05*TR39	390 @ 100MHz	10,5,2	48 @ 250MHz	0.560	1.50	290	Brown
TRWL05*TR43	430 @ 50MHz	10,5,2	33 @ 100MHz	0.430	1.70	230	Blue
TRWL05*TR47	470 @ 50MHz	10,5,2	33 @ 100MHz	0.375	1.70	220	Red
TRWL05*TR56	560 @ 25MHz	10,5,2	23 @ 50MHz	0.340	1.90	210	Orange
TRWL05*TR60	600 @ 25MHz	10,5,2	23 @ 50MHz	0.260	1.60	450	White
TRWL05*TR62	620 @ 25MHz	10,5,2	23 @ 50MHz	0.220	2.20	210	Yellow
TRWL05*TR68	680 @ 25MHz	10,5,2	23 @ 50MHz	0.200	2.20	190	Green
TRWL05*TR75	750 @ 25MHz	10,5,2	23 @ 50MHz	0.200	2.30	180	Blue
TRWL05*TR82	820 @ 25MHz	10,5,2	23 @ 50MHz	0.200	2.35	180	Violet
TRWL05*T1R0	1000 @ 25MHz	10,5,2	20 @ 50MHz	0.100	2.50	170	Gray
TRWL05*T1R2	1200 @ 7.9MHz	10,5,2	18 @ 25MHz	0.100	2.50	170	White
TRWL05*T1R5	1500 @ 7.9MHz	10,5,2	16 @ 25MHz	0.100	2.50	170	Black
TRWL05*T1R8	1800 @ 7.9MHz	10,5,2	16 @ 7.9MHz	0.080	2.50	170	Brown
TRWL05*T2R2	2200 @ 7.9MHz	10,5,2	16 @ 7.9MHz	0.060	2.70	160	Red
TRWL05*T2R7	2700 @ 7.9MHz	10,5,2	16 @ 7.9MHz	0.050	2.95	150	Orange

● Note: Working Temperature Range: -40°C ~ 125°C



Standard Electrical Specifications Standard (TRWL06) - EIA 1206

Part Number	Inductance (nH)	Tolerance (%)	Q (min)	SRF (GHz)(min)	DCR (Ω)(max)	IDC (mA)	Color Code
TRWL06*T6N8	6.8 @ 100MHz	10,5	30 @ 300MHz	5.50	0.07	1000	Brown
TRWL06*T10N	10.0 @ 100MHz	10,5	40 @ 300MHz	4.00	0.08	1000	Red
TRWL06*T12N	12.0 @ 100MHz	10,5	40 @ 300MHz	3.20	0.08	1000	Orange
TRWL06*T15N	15.0 @ 100MHz	10,5	40 @ 300MHz	3.20	0.10	1000	Yellow
TRWL06*T18N	18.0 @ 100MHz	10,5	50 @ 300MHz	2.80	0.10	1000	Green
TRWL06*T22N	22.0 @ 100MHz	10,5	50 @ 300MHz	2.20	0.10	1000	Blue
TRWL06*T24N	24.0 @ 100MHz	10,5	50 @ 300MHz	2.00	0.10	1000	Red
TRWL06*T27N	27.0 @ 100MHz	10,5,2	50 @ 300MHz	1.80	0.11	1000	Violet
TRWL06*T33N	33.0 @ 100MHz	10,5,2	55 @ 300MHz	1.80	0.11	1000	Gray
TRWL06*T39N	39.0 @ 100MHz	10,5,2	55 @ 300MHz	1.80	0.12	1000	White
TRWL06*T47N	47.0 @ 100MHz	10,5,2	55 @ 300MHz	1.50	0.13	1000	Black
TRWL06*T56N	56.0 @ 100MHz	10,5,2	55 @ 300MHz	1.45	0.14	1000	Brown
TRWL06*T62N	62.0 @ 100MHz	10,5,2	55 @ 300MHz	1.20	0.20	1000	Violet
TRWL06*T68N	68.0 @ 100MHz	10,5,2	55 @ 300MHz	1.20	0.26	950	Red
TRWL06*T82N	82.0 @ 100MHz	10,5,2	55 @ 300MHz	1.20	0.21	920	Orange
TRWL06*T91N	91.0 @ 100MHz	10,5,2	55 @ 300MHz	1.10	0.24	900	White
TRWL06*TR10	100 @ 100MHz	10,5,2	55 @ 300MHz	1.10	0.26	850	Yellow
TRWL06*TR12	120 @ 100MHz	10,5,2	55 @ 300MHz	0.75	0.26	800	Green
TRWL06*TR15	150 @ 100MHz	10,5,2	60 @ 300MHz	0.95	0.31	750	Blue
TRWL06*TR18	180 @ 50MHz	10,5,2	55 @ 300MHz	0.90	0.43	700	Violet
TRWL06*TR22	220 @ 50MHz	10,5,2	55 @ 300MHz	0.76	0.50	670	Gray
TRWL06*TR27	270 @ 50MHz	10,5,2	55 @ 300MHz	0.74	0.56	630	White
TRWL06*TR30	300 @ 50MHz	10,5,2	50 @ 150MHz	0.68	0.60	600	Green
TRWL06*TR33	330 @ 50MHz	10,5,2	45 @ 150MHz	0.65	0.62	590	Black
TRWL06*TR36	360 @ 50MHz	10,5,2	45 @ 150MHz	0.60	0.65	550	Blue
TRWL06*TR39	390 @ 50MHz	10,5,2	45 @ 150MHz	0.60	0.75	530	Brown
TRWL06*TR47	470 @ 50MHz	10,5,2	45 @ 150MHz	0.55	1.30	490	Red
TRWL06*TR56	560 @ 35MHz	10,5,2	45 @ 150MHz	0.47	1.34	460	Orange
TRWL06*TR62	620 @ 35MHz	10,5,2	45 @ 150MHz	0.47	1.58	460	Gray
TRWL06*TR68	680 @ 35MHz	10,5,2	45 @ 150MHz	0.45	1.58	430	Yellow
TRWL06*TR75	750 @ 35MHz	10,5,2	45 @ 150MHz	0.44	2.25	320	White
TRWL06*TR82	820 @ 35MHz	10,5,2	45 @ 150MHz	0.42	1.82	400	Green
TRWL06*TR91	910 @ 35MHz	10,5,2	45 @ 150MHz	0.41	2.95	310	Green
TRWL06*T1R0	1000 @ 35MHz	10,5,2	45 @ 150MHz	0.40	2.80	320	Blue
TRWL06*T1R2	1200 @ 35MHz	10,5,2	45 @ 150MHz	0.38	3.20	300	Violet

● Note: Working Temperature Range: -40°C ~ 125°C



Standard Electrical Specifications Standard (TRWL08) - EIA 1008

Part Number	Inductance (nH)	Tolerance (%)	Q (min)	SRF (GHz)(min)	DCR (Ω)(max)	IDC (mA)	Color Code
TRWL08*T5N6	5.6 @ 50MHz	10,5	50 @ 1500MHz	4.000	0.15	1000	Black
TRWL08*T10N	10 @ 50MHz	10,5,2	50 @ 500MHz	4.100	0.08	1000	Brown
TRWL08*T12N	12 @ 50MHz	10,5,2	50 @ 500MHz	3.300	0.09	1000	Red
TRWL08*T15N	15 @ 50MHz	10,5,2	50 @ 500MHz	2.500	0.11	1000	Orange
TRWL08*T18N	18 @ 50MHz	10,5,2	50 @ 350MHz	2.400	0.12	1000	Yellow
TRWL08*T22N	22 @ 50MHz	10,5,2	55 @ 350MHz	2.400	0.12	1000	Green
TRWL08*T24N	24 @ 50MHz	10,5,2	55 @ 350MHz	1.900	0.12	1000	Blue
TRWL08*T27N	27 @ 50MHz	10,5,2	55 @ 350MHz	1.600	0.13	1000	Violet
TRWL08*T33N	33 @ 50MHz	10,5,2	60 @ 350MHz	1.600	0.14	1000	Gray
TRWL08*T36N	36 @ 50MHz	10,5,2	60 @ 350MHz	1.600	0.15	1000	Orange
TRWL08*T39N	39 @ 50MHz	10,5,2	60 @ 350MHz	1.500	0.15	1000	White
TRWL08*T47N	47 @ 50MHz	10,5,2	65 @ 350MHz	1.500	0.16	1000	Black
TRWL08*T56N	56 @ 50MHz	10,5,2	65 @ 350MHz	1.300	0.18	1000	Brown
TRWL08*T62N	59 @ 50MHz	10,5,2	65 @ 350MHz	1.250	0.20	1000	Blue
TRWL08*T68N	68 @ 50MHz	10,5,2	65 @ 350MHz	1.300	0.20	1000	Red
TRWL08*T75N	75 @ 50MHz	10,5,2	60 @ 350MHz	1.100	0.21	1000	White
TRWL08*T82N	82 @ 50MHz	10,5,2	60 @ 350MHz	1.000	0.22	1000	Orange
TRWL08*TR10	100 @ 25MHz	10,5,2	60 @ 350MHz	1.000	0.56	650	Yellow
TRWL08*TR12	120 @ 25MHz	10,5,2	60 @ 350MHz	0.950	0.63	650	Green
TRWL08*TR15	150 @ 25MHz	10,5,2	45 @ 100MHz	0.850	0.70	580	Blue
TRWL08*TR18	180 @ 25MHz	10,5,2	45 @ 100MHz	0.750	0.77	620	Violet
TRWL08*TR22	220 @ 25MHz	10,5,2	45 @ 100MHz	0.700	0.84	500	Gray
TRWL08*TR24	240 @ 25MHz	10,5,2	45 @ 100MHz	0.650	0.88	500	White
TRWL08*TR27	270 @ 25MHz	10,5,2	45 @ 100MHz	0.600	0.91	500	Black
TRWL08*TR30	300 @ 25MHz	10,5,2	45 @ 100MHz	0.585	1.00	450	Brown
TRWL08*TR33	330 @ 25MHz	10,5,2	45 @ 100MHz	0.570	1.05	450	Red
TRWL08*TR36	360 @ 25MHz	10,5,2	45 @ 100MHz	0.530	1.10	470	Orange
TRWL08*TR39	390 @ 25MHz	10,5,2	45 @ 100MHz	0.500	1.12	470	Yellow
TRWL08*TR43	430 @ 25MHz	10,5,2	45 @ 100MHz	0.480	1.15	470	Green
TRWL08*TR47	470 @ 25MHz	10,5,2	45 @ 100MHz	0.450	1.19	470	Blue
TRWL08*TR56	560 @ 25MHz	10,5,2	45 @ 100MHz	0.415	1.33	400	Violet
TRWL08*TR62	620 @ 25MHz	10,5,2	45 @ 100MHz	0.375	1.40	300	Gray
TRWL08*TR68	680 @ 25MHz	10,5,2	45 @ 100MHz	0.375	1.47	400	White
TRWL08*TR75	750 @ 25MHz	10,5,2	45 @ 100MHz	0.360	1.54	360	Black
TRWL08*TR82	820 @ 25MHz	10,5,2	45 @ 100MHz	0.350	1.61	400	Brown
TRWL08*TR91	910 @ 25MHz	10,5,2	35 @ 50MHz	0.320	1.68	380	Red
TRWL08*T1R0	1000 @ 25MHz	10,5,2	35 @ 50MHz	0.290	1.75	370	Orange
TRWL08*T1R2	1200 @ 7.9MHz	10,5,2	35 @ 50MHz	0.250	2.00	310	Yellow
TRWL08*T1R5	1500 @ 7.9MHz	10,5,2	28 @ 50MHz	0.200	2.30	330	Green
TRWL08*T1R8	1800 @ 7.9MHz	10,5,2	28 @ 50MHz	0.160	2.60	300	Blue
TRWL08*T2R2	2200 @ 7.9MHz	10,5,2	28 @ 50MHz	0.160	2.80	280	Violet
TRWL08*T2R7	2700 @ 7.9MHz	10,5,2	22 @ 25MHz	0.140	3.20	290	Gray
TRWL08*T3R3	3300 @ 7.9MHz	10,5,2	22 @ 25MHz	0.110	3.40	290	White
TRWL08*T3R9	3900 @ 7.9MHz	10,5,2	20 @ 25MHz	0.100	3.60	260	Black
TRWL08*T4R7	4700 @ 7.9MHz	10,5,2	18 @ 25MHz	0.090	4.00	260	Brown
TRWL08*T5R6	5600 @ 7.9MHz	10,5,2	16 @ 7.96MHz	0.020	4.00	240	Red
TRWL08*T6R8	6800 @ 7.9MHz	10,5,2	15 @ 7.96MHz	0.040	4.90	200	Orange
TRWL08*T8R2	8200 @ 7.9MHz	10,5,2	15 @ 7.96MHz	0.025	6.00	170	Yellow
TRWL08*T100	10000 @ 2.52MHz	10,5,2	15 @ 7.96MHz	0.020	9.00	150	Green
TRWL08*T120	12000 @ 2.52MHz	10,5,2	15 @ 7.96MHz	0.018	10.5	130	Blue
TRWL08*T150	15000 @ 2.52MHz	10,5,2	15 @ 7.96MHz	0.015	11.5	120	Violet

● Note: Working Temperature Range: -40°C ~ 125°C

Test Methods/Instrument: Network Spectrum Analyzer.



Standard Electrical Specifications Low Profile (TRWL05) - EIA 0805

Part Number	Inductance (nH)	Tolerance (%)	Q (min)	SRF (GHz)(min)	DCR (Ω)(max)	IDC (mA)	Color Code
TRWL05*TL1N8	1.8 @ 250MHz	10	55 @ 1500MHz	9.40	0.03	800	Black
TRWL05*TL3N9	3.9 @ 250MHz	10,5	50 @ 1000MHz	6.10	0.06	800	Brown
TRWL05*TL4N7	4.7 @ 250MHz	10,5	50 @ 1000MHz	5.50	0.06	800	Red
TRWL05*TL6N8	6.8 @ 250MHz	10,5	50 @ 1000MHz	5.50	0.08	800	Orange
TRWL05*TL8N2	8.2 @ 250MHz	10,5	50 @ 1000MHz	4.80	0.08	800	Yellow
TRWL05*TL10N	10.0 @ 250MHz	10,5,2	55 @ 750MHz	3.30	0.08	800	Green
TRWL05*TL12N	12.0 @ 250MHz	10,5,2	55 @ 750MHz	3.80	0.10	800	Blue
TRWL05*TL15N	15.0 @ 250MHz	10,5,2	50 @ 500MHz	2.95	0.10	800	Violet
TRWL05*TL18N	18.0 @ 250MHz	10,5,2	50 @ 500MHz	3.10	0.13	800	Gray
TRWL05*TL22N	22.0 @ 250MHz	10,5,2	50 @ 500MHz	2.90	0.15	800	Whit
TRWL05*TL27N	27.0 @ 250MHz	10,5,2	50 @ 500MHz	2.45	0.23	600	Black
TRWL05*TL33N	33.0 @ 250MHz	10,5,2	50 @ 500MHz	2.35	0.28	600	Brown
TRWL05*TL39N	39.0 @ 250MHz	10,5,2	50 @ 500MHz	2.20	0.33	600	Red
TRWL05*TL47N	47.0 @ 200MHz	10,5,2	50 @ 500MHz	2.00	0.39	600	Orange
TRWL05*TL56N	56.0 @ 200MHz	10,5,2	50 @ 500MHz	1.85	0.39	500	Yellow
TRWL05*TL68N	68.0 @ 200MHz	10,5,2	50 @ 500MHz	1.50	0.40	500	Green
TRWL05*TL82N	82.0 @ 150MHz	10,5,2	50 @ 500MHz	1.50	0.44	500	Blue
TRWL05*TLR10	100.0 @ 150MHz	10,5,2	50 @ 500MHz	1.20	0.64	400	Violet
TRWL05*TLR12	120.0 @ 150MHz	10,5,2	40 @ 250MHz	1.15	0.68	300	Gray
TRWL05*TLR15	150.0 @ 150MHz	10,5,2	40 @ 250MHz	1.05	0.80	300	Whit
TRWL05*TL1R0	1000.0 @ 25MHz	10,5,2	16 @ 50MHz	0.08	2.00	220	Black

● Note: Working Temperature Range: -40°C ~ 125°C



Standard Electrical Specifications Low Profile (TRWL08) - EIA 1008

Part Number	Inductance (nH)	Tolerance (%)	Q (min)	SRF (GHz)(min)	DCR (Ω)(max)	IDC (mA)	Color Code
TRWL08*TL4N2	4.2 @ 50MHz	10,5	42 @ 1500MHz	6.00	0.15	600	Black
TRWL08*TL6N8	6.8 @ 50MHz	10,5	50 @ 1500MHz	5.40	0.17	600	Brown
TRWL08*TL8N2	8.2 @ 50MHz	10,5	50 @ 1500MHz	5.00	0.22	600	Red
TRWL08*TL15N	15 @ 50MHz	10,5	57 @ 500MHz	3.00	0.22	600	Orange
TRWL08*TL20N	20 @ 50MHz	10,5	72 @ 500MHz	2.40	0.33	600	Yellow
TRWL08*TL27N	27 @ 50MHz	10,5	50 @ 350MHz	1.60	0.13	600	Green
TRWL08*TL30N	30 @ 50MHz	10,5	69 @ 500MHz	2.40	0.38	600	Blue
TRWL08*TL40N	40 @ 50MHz	10,5	67 @ 500MHz	2.00	0.43	600	Violet
TRWL08*TL50N	50 @ 50MHz	10,5,2	72 @ 500MHz	1.90	0.48	600	Gray
TRWL08*TL60N	60 @ 50MHz	10,5,2	75 @ 500MHz	1.80	0.52	600	White
TRWL08*TL70N	70 @ 50MHz	10,5,2	68 @ 500MHz	1.70	0.55	510	Black
TRWL08*TL80N	80 @ 50MHz	10,5,2	75 @ 500MHz	1.40	0.56	510	Brown
TRWL08*TLR56	560 @ 25MHz	10,5,2	40 @ 100MHz	0.40	1.33	400	Red

● Note: Working Temperature Range: -40°C ~ 125°C

Standard Electrical Specifications High Current (TRWL03) - EIA 0603

Part Number	Inductance (nH)	Tolerance (%)	Q (min)	SRF (GHz)(min)	DCR (Ω)(max)	IDC (mA)	Color Code
TRWL03*TH1N6	1.6 @ 250MHz	10,5	24	12.50	0.030	2400	Black
TRWL03*TH3N6	3.6 @ 250MHz	10,5	24	5.90	0.048	2300	Brown
TRWL03*TH3N9	3.9 @ 250MHz	10,5	25	5.90	0.054	2200	Red
TRWL03*TH6N8	6.8 @ 250MHz	10,5	35	5.80	0.054	2100	Orange
TRWL03*TH7N5	7.5 @ 250MHz	10,5	35	3.70	0.059	2100	Yellow
TRWL03*TH8N2	8.2 @ 250MHz	10,5	38	3.70	0.060	2000	White
TRWL03*TH10N	10.0 @ 250MHz	10,5,2	38	3.70	0.071	2000	Green
TRWL03*TH12N	12.0 @ 250MHz	10,5,2	38	3.00	0.075	2000	Blue
TRWL03*TH15N	15.0 @ 250MHz	10,5,2	38	2.80	0.080	1900	Violet
TRWL03*TH18N	18.0 @ 250MHz	10,5,2	40	2.80	0.099	1900	Gray
TRWL03*TH22N	22.0 @ 250MHz	10,5,2	42	2.40	0.099	1800	White
TRWL03*TH24N	24.0 @ 250MHz	10,5,2	42	2.40	0.105	1800	Black

● Note: Working Temperature Range: -40°C ~ 125°C

Standard Electrical Specifications High Q (TRWL05) - EIA 0805

Part Number	Inductance (nH)	Tolerance (%)	Q (min)	SRF (GHz)(min)	DCR (Ω)(max)	IDC (mA)	Color Code
TRWL05*TH2N5	2.5 @ 250MHz	10,5	80 @ 1500MHz	6.00	0.020	1600	Black
TRWL05*TH5N6	5.6 @ 250MHz	10,5	98 @ 1500MHz	6.00	0.035	1600	Brown
TRWL05*TH6N2	6.2 @ 250MHz	10,5	88 @ 1000MHz	4.75	0.035	1600	Red
TRWL05*TH6N8	6.8 @ 250MHz	10,5	80 @ 1000MHz	4.40	0.035	1600	White
TRWL05*TH8N2	8.2 @ 250MHz	10,5	75 @ 1000MHz	3.00	0.075	1000	Gray
TRWL05*TH12N	12 @ 250MHz	10,5	80 @ 1000MHz	3.00	0.045	1600	Orange
TRWL05*TH15N	15 @ 250MHz	10,5,2	80 @ 1000MHz	2.80	0.100	1200	Black
TRWL05*TH16N	16 @ 250MHz	10,5,2	72 @ 500MHz	2.95	0.060	1500	Yellow
TRWL05*TH18N	18 @ 250MHz	10,5,2	75 @ 500MHz	2.55	0.060	1400	Green
TRWL05*TH20N	20 @ 250MHz	10,5,2	70 @ 500MHz	2.05	0.055	1400	Blue
TRWL05*TH22N	22 @ 250MHz	10,5,2	80 @ 500MHz	2.00	0.100	1200	Black
TRWL05*TH27N	27 @ 250MHz	10,5,2	75 @ 500MHz	2.00	0.070	1300	Violet
TRWL05*TH30N	30 @ 250MHz	10,5,2	65 @ 500MHz	1.95	0.095	1200	Gray
TRWL05*TH39N	39 @ 250MHz	10,5,2	65 @ 500MHz	1.60	0.110	1100	White
TRWL05*TH48N	48 @ 200MHz	10,5,2	65 @ 500MHz	1.40	0.095	1200	Black
TRWL05*TH51N	51 @ 200MHz	10,5,2	65 @ 500MHz	1.40	0.120	1000	Brown

● Note: Working Temperature Range: -40°C ~ 125°C

Standard Electrical Specifications High Q (TRWL08) - EIA 1008

Part Number	Inductance (nH)	Tolerance (%)	Q (min)	SRF (GHz)(min)	DCR (Ω)(max)	IDC (mA)	Color Code
TRWL08*TH3N0	3.0 @ 50MHz	10,5	70 @ 1500MHz	6.00	0.04	1600	Black
TRWL08*TH4N1	4.1 @ 50MHz	10,5	75 @ 1500MHz	6.00	0.05	1600	Brown
TRWL08*TH7N8	7.8 @ 50MHz	10,5	75 @ 500MHz	3.80	0.05	1600	Red
TRWL08*TH10N	10 @ 50MHz	10,5,2	60 @ 500MHz	3.60	0.06	1600	Orange
TRWL08*TH12N	12 @ 50MHz	10,5,2	70 @ 500MHz	2.80	0.06	1500	Yellow
TRWL08*TH18N	18 @ 50MHz	10,5,2	62 @ 350MHz	2.70	0.07	1400	Green
TRWL08*TH22N	22 @ 50MHz	10,5,2	62 @ 350MHz	2.05	0.07	1400	Blue
TRWL08*TH33N	33 @ 50MHz	10,5,2	75 @ 350MHz	1.70	0.09	1300	Violet
TRWL08*TH39N	39 @ 50MHz	10,5,2	75 @ 350MHz	1.30	0.09	1300	Gray
TRWL08*TH47N	47 @ 50MHz	10,5,2	75 @ 350MHz	1.45	0.12	1200	White
TRWL08*TH56N	56 @ 50MHz	10,5,2	75 @ 350MHz	1.23	0.12	1200	Black
TRWL08*TH68N	68 @ 50MHz	10,5,2	80 @ 350MHz	1.15	0.13	1100	Brown
TRWL08*TH82N	82 @ 50MHz	10,5,2	80 @ 350MHz	1.06	0.16	1100	Red
TRWL08*THR10	100 @ 50MHz	10,5,2	52 @ 350MHz	0.82	0.16	1000	Orange

● Note: Working Temperature Range: -40°C ~ 125°C

Parts (3.0nH, 7.8nH) are wound on a low profile bobbin with High Q.



Order Codes

Order Codes (TRWL)

TRWL	08			J		TR		L		1N6		G	
Part Number	Dimensions (L×W) (mm)			Resistance Tolerance		Package		Design code		Inductance		Terminal	
TRWL	02	1.00×0.50	EIA0402	G	±2%	TR	Taping Reel	S	Standard Inductor	1N6	1.6nH	G	Mo / Mn Or W with Gold plated.
	03	1.60×0.80	EIA0603	J	±5%			L	Low Profile Inductor	82N	82nH		
	05	2.00×1.20	EIA0805	K	±10%					R27	270nH		
	06	3.20×1.60	EIA1206	M	±20%					1R0	1000nH	S	Pd / Ag with Tin plated.
	08	2.50×2.00	EIA1008					H	High Current and High Q	100	10000nH		



▶ 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.

