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DIRECT

Electronics Tech.

(TRMA)

Multilayer Ferrite Beads Chip Inductors

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▶ Product Introduction**Direct 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.

Direct TRMA series multilayer ferrite bead SMD inductor is one popular high current version of Direct chips products. Ceramic materials and process technologies have allowed Direct 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.

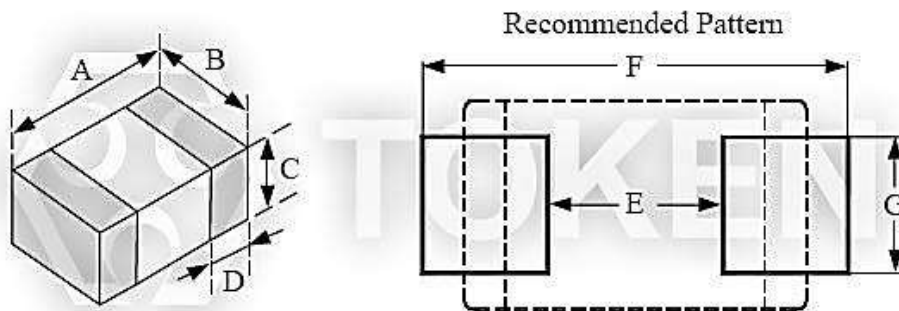
Custom parts are available on request. Direct will also produce devices outside these specifications to meet specific customer requirements, please contact our sales or link to Direct official website "[RF Inductors](#)" for more information.



► 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

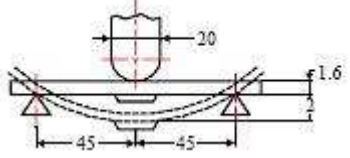

Standard Electrical Specifications (TRMA453215) - EIA 1812 Size

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								
TRMA322513	1210										
TRMA451616	1806										
TRMA453215	1812										



► General Information

Direct Cuts Inductor Size and Cost

Direct 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. Direct'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. Direct'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. Direct's ferrite inductors with open magnetic structures, will not saturate, even at full rated current.

