

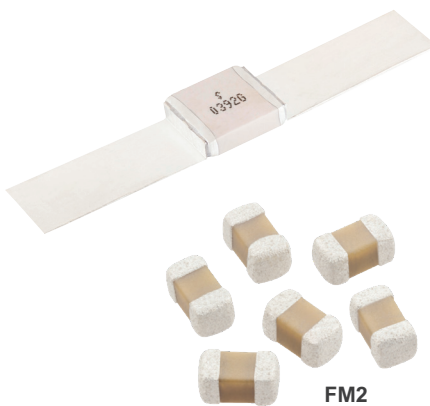
Non-Magnetic, High Power RF Capacitors and Trimmers

At Knowles, we offer precision multi-turn trimmer capacitors, fixed and variable inductors, multi-layer capacitors and hardware for applications requiring non-magnetic high performance components. Our expertise in non-magnetic and low magnetic design allows us to support applications ranging from MRI and NMR to base station antenna systems designed with low PIM in mind.

Our half turn and single turn trimmer ranges offer low magnetic content, resulting in a cost effective solution suitable for many MRI applications.

Due to the severe non-magnetism requirements in the magnetic resonance industries, we only use high purity metals that exhibit no measurable magnetism. We do not use commercial brass and plating materials are carefully selected. Our strict traceability and testing regimes ensure this essential parameter.

Non-Magnetic and High Power RF Capacitors



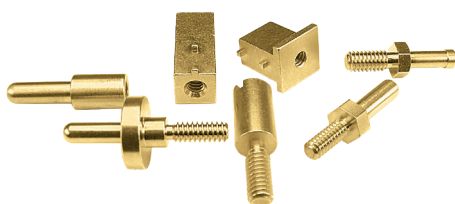
Characteristics

- A range of ultra-low High Q ceramic capacitors with C0G/ Porcelain P90/ $\pm 15\text{ppm}/^\circ\text{C}$
- 1111, 2225 and 4040 available in chip or ribbon lead format
- Non-magnetic termination is offered with selected non-magnetic C0G/NP0
- Very low ESR X7R MLCC series designed for LNA applications called FM2
- High Q and X7R dielectrics, providing a fully non-magnetic component
- To meet high temperature 260°C soldering reflow profiles as detailed in J-STD-020
- C0G/NP0 dielectrics are supplied with FlexiCap™ or sintered termination whilst X7R dielectrics are supplied only with the FlexiCap™ termination

Applications

- High power applications where minimal power loss and very low self heating is demanded
- MRI body coils
- Wireless charging systems operating in the kHz and MHz frequencies

Hardware and Assorted Non-Magnetic Components



Characteristics

- Only high purity metals that exhibit no measurable magnetism are used
- Come in many sizes, styles, and lengths – such as Cheese Head, Round Head and set screws
- Offer flat washers
- Custom-designed coils including, inserts, pins, and special shapes to specific requirements
- Quickly and precisely supply custom designs with the screws, washers and nuts, we use only high purity metals that exhibit no measurable magnetism

Applications

- Mechanical fixings
- MRI
- NMR
- Quantum Computing

Non-Magnetic Trimmer Summary

- » **MATERIALS:** We use only materials that exhibit no measurable magnetism. We do not use commercial brass nor plating materials.
- » **CHARACTERISTICS:** Most of our trimmers are internally sealed so that they withstand immersion in flux and solvents without leaking. Additionally, many of our non-magnetic trimmers can be offered in cryogenic format to be used and tuned at temperatures as low as 4K.
- » **CUSTOM:** We develop trimmers for specific customer needs.
- » **TESTING:** We've developed a unique test setup to allow for Q and RF Voltage breakdown measurement at MRI operational frequencies. This has allowed for development of improved parts designed specifically to meet the stringent requirements of the application.



NMNT Series - Non-Magnetic PTFE Trimmer Capacitors



Designed for applications requiring greater capacitance and voltage ratings than the popular smaller trimmers but without the large size and expense of vacuum capacitors.

Characteristics

- 4kV to 20kV
- High voltage
- Non-rotating piston, long life and no tuning noise
- Extremely stable under shock and vibration
- Screw head does not move in and out
- Flatted shaft option for knob or motor attach

Applications

- MRI body coils
- NMR equipment
- RF power transfer

JZ & JZ_HV Series - Ceramic Chip Trimmer Capacitors



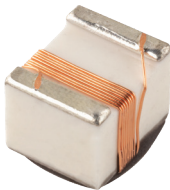
Characteristics

- Very low magnetic material content
- Proven performer that delivers uncompromising stability
- Available in standard and HV ranges up to 50pF and 300Vdc working voltage

Applications

- MRI
- RFID
- Medical devices
- Cellular technology
- Timing

CL Series - Non-Magnetic Ceramic Core Inductors



Characteristics

- Inductance range at 10nH - 10uH
- Very High-Q and High SRF
- Meets MRI non-magnetic requirements, RoHS Compliant
- Available in case sizes 0402 - 1210
- Ideal combination with Knowles High-Q MLCC's for RF circuits
- Custom solutions available upon request

Applications

- MRI body coils
- RF Tuning Circuits
- Impedance Matching Networks

Non-Magnetic Variable Inductors



Characteristics

- Balun coaxial cable variable inductor available for LNA circuits within cable trap assembly application
- Precision machined design. US Patent No. 8,248,198
- 7mm high horizontal SMD
- Vertical SMD and thru-hole versions for both air core and variable
- Nominal values of 32 to 118nH, 2 to 7 turns
- Q as high as 121 @ 100MHz, SRF 0.7 to 1.2GHz
- Superb shock, vibration and thermal tolerances -40°C to +85°C
- Customized version requests welcomed

Applications

- MRI / NMR Systems
- Radios / Jammers
- Power Amplifiers
- Radar
- Avionics Instrumentation
- Test Equipment