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Pairui-Fuan is a manufacturer of two types of soft magnetic cores: powder cores and ferrite cores. Each material type has unique attributes and varying applications, but a commonality among the materials is that their primary purpose is power conversion in electronic appliances. A brief overview is provided below. A comparison of powder cores, ferrites and powder iron cores is also available in the Powder Core Materials flash presentation.

Powder Core products are distributed air gap cores that are primarily used in power inductor applications, specifically in switched-mode power supply (SMPS) output filters, also known as DC inductors. Other power applications include differential inductors, boost inductors, buck inductors, and flyback transformers. Notable characteristics of Powder Core materials are high resistivity, low hysteresis and eddy current losses, and excellent inductance stability under both DC and AC conditions. Fuan Powder Core products are available in three materials; Kool M μ [®], Molypermalloy (MPP), High Flux. These materials range in permeability from 14 μ thru 550 μ and are available in a variety of shapes including toroids, E cores, U cores, and blocks. For an overview of powder core materials and a comparison with ferrites and powder iron

Fuan soft ferrite cores are an oxide made from Iron (Fe), Manganese (Mn), and Zinc (Zn) and are commonly referred to as manganese zinc ferrites. They have a low coercivity and are also known as soft magnetic ferrites. Because of their comparatively low losses at high frequencies, they are extensively used in switched-mode power supply (SMPS) and radio frequency (RF) transformers and inductors. Ferrite cores for the high frequency power supply and high quality communication markets are produced in a variety of shapes and sizes for inductors, pulse transformers, high frequency transformers, and noise filters. Notable characteristics of ferrite materials are high permeability, good temperature properties, and low disaccommodation. Fuan offers twelve materials. The materials range in permeability from 900 μ to 10,000 μ and are available in a variety of geometries including toroids, shapes, and pot cores.

— Fuan Powder cores

Powder Core products, Kool Mu[®], MPP, High Flux are distributed air gap cores that are primarily used in power inductor applications, specifically in switched-mode power supply (SMPS) output filters, also known as DC inductors. Other power applications include differential inductors, boost inductors, buck inductors, and flyback transformers. Notable characteristics of Powder Core materials are high resistivity, low hysteresis and eddy current losses and excellent inductance stability under both DC and AC conditions. In addition, Powder Core materials are not pressed with an organic binder, therefore, there is no thermal aging.

While all three materials are used in power applications, each has its own advantage:

- For the lowest loss inductor, MPP material should be used since it has the lowest core loss.

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- For the smallest core size in a DC bias dominated design, High Flux material should be used since it has the highest flux capacity.
- Kool Mu (sendust core) is well known for the moderate cost and has significantly lower losses and substantially better thermal properties when compared to powdered iron cores.

(1) Kool Mu Cores

Kool M μ ® material's low loss and relatively high saturation level (10,500 gauss) make it excellent for use in power factor correction circuits (PFC) as well as unidirectional drive applications such as Pulse Transformers and Flyback Transformers. The near zero magnetostriction makes Kool M μ ideal for eliminating audible frequency noise in In-Line Noise Filters and Inductors. View PFC Boost design example using Kool Mu.

(2) High Flux Cores

High Flux cores offer the highest biasing capability of all powder core materials. The high saturation flux density (15,000 gauss) and relatively low losses of High Flux cores make them quite useful for applications involving high power, high DC bias, or high AC bias at high power frequencies such as Switching Regulator Inductors, In-Line Noise Filters, Flyback Transformers, Power Factor Correction (PFC), and Pulse Transformers.

(3) MPP Cores

MPP cores possess many outstanding magnetic characteristics, such as high resistivity, low hysteresis and eddy current losses, excellent inductance stability after high DC magnetization or under high DC bias conditions and minimal inductance shift up to 2000 gauss under AC conditions. Applications for MPP cores include; Flyback Transformers, Buck/Boost and Power Factor Correction (PFC), Inductors, In-Line Noise Filters, High Q Filters, and Resonant Circuits.

二. Ferrite Cores

Fuan soft ferrite cores are an oxide made from Iron (Fe), Manganese (Mn), and Zinc (Zn) which are commonly referred to as manganese zinc ferrites. They have a low coercivity and are also known as soft magnetic ferrites. Because of their comparatively low losses at high frequencies, they are extensively used in switched-mode power supply (SMPS) and radio frequency (RF) transformers and inductors. Ferrite cores for the high frequency power supply and high quality communication markets are produced in a variety of shapes and sizes for inductors, pulse transformers, high frequency transformers, and noise filters. Notable characteristics of ferrite materials are high permeability, good temperature properties, and low disaccommodation. Fuan offers twelve materials. The materials range in permeability from 900 μ to 10,000 μ and are available in a variety of geometries including toroids, shapes and pot cores. Hardware accessories such as bobbins, printed circuit bobbins, clamps,

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mounts and headers are also available.

(1) Ferrite Toroids

Ferrite toroids offer high magnetic efficiency as there is no air gap and the cross-sectional area is uniform. Fuan toroids are available in many sizes (outside diameters ranging from 2 mm to 140 mm) and materials (permeabilities ranging from 900μ to $10,000\mu$). Different coatings can be applied to ferrite toroids to increase winding ease and improve voltage breakdown. Hardware, such as toroid mounts and headers, is available.

(2) Ferrite Shapes

Ferrites for high frequency power supply and high quality communication markets are produced in a variety of shapes and sizes for inductors, pulse transformers, high frequency transformers, and noise filters. Fuan offers ferrite cores in a variety of geometries which are categorized as Shapes; E, I, EFD, ETD, EER, EC, U, UR, Planar E and I, and ER cores. Hardware is available for most sizes.

(3) Ferrite Pot Cores

The pot core shape provides a convenient means of adjusting the ferrite structure to meet the specific requirements of the inductor. Fuan classifies the following cores as a pot core type; PQ, Pot Cores, RS, DS, RM and EP. Hardware is available for most sizes. Because of their design and composition, pot cores offer a number of advantages, including: self-shielding, space efficiency, convenience, good temperature stability, low losses, and high Q. Typical applications for pot cores include power transformers, power inductors, converter and inverter transformers, switched-mode power supplies and filter inductors.

