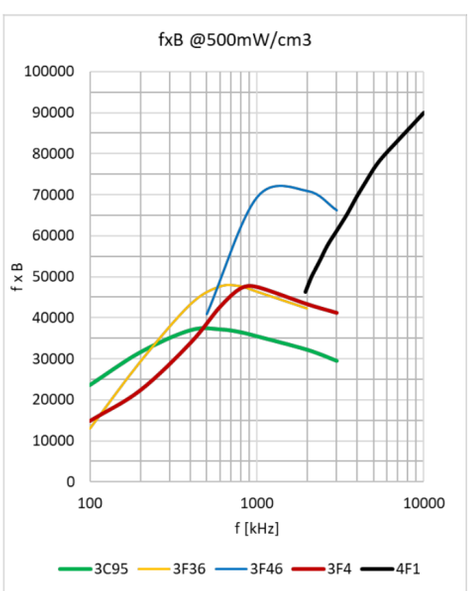
FERRITE MATERIALS FOR HIGH-FREQUENCY POWER APPLICATIONS 0.3 to 15MHz

The new Wide-Band-Gap semiconductors GaN and SiC have triggered a revolution in power conversion devices, increasing their switching frequencies to outstanding levels. These new requirements have pushed ferrite materials toward the highest frequency performance.

Ferroxcube offers 4 materials to cope with this new challenge:

Property	Conditions	3F36	3F46	3F4	4F1
μi	25°C, 10 kHz, 0.25 mT	≈ 1600	≈ 650	≈ 900	≈ 80
μa	100°C, 25 kHz, 200 mT	≈ 2400	≈ 1500	≈ 1700	≈ 300
B (mT)	100°C, 10 kHz, 1200 (A/m)	≈ 420	≈ 430	≈ 350	≈ 260 (3kA/m)
Pv (kw/m3)	100°C, 500 kHz, 50 mT	≈ 90	≈ 70		
	100°C, 500 kHz, 100 mT	≈ 700	≈ 1000		
	100°C, 800 kHz, 100 mT	≈ 960	≈ 1150		
	100°C, 1 MHz, 50 mT	≈ 600	≈ 150	≈ 450	
	100°C, 3 MHz, 10 mT		≈ 120	≈ 220	≈ 200
	100°C, 10 MHz, 5 mT				≈ 200
ρ (Ωm)	DC	≈ 12	≈ 5	≈ 10	≈ 10^5
Tc (C)		≥ 260	≥ 260	≥ 220	≥ 260

The Power Performance chart shows the working conditions for each material as a function of frequency. The chart plots the factor Frequency x Flux Density (which is proportional to the throughput power) under a power loss density of 500 mW/cc. It shows how the power handling increases with frequency, even when the flux density has to decrease to keep the same losses (losses increase with B). For reference, 3C95 material is included as the preferred low frequency material, to show the transition from 3C material family to 3F.



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Ferroxcube 3F36

Ferrite MnZn material intended for operation below 1 MHz. Shows its best performance under high flux conditions, and thanks to its relatively high resistivity, the impact of eddy current losses on mid to large cores is not severe. Available in the full standard range.

Ferroxcube 3F46

Ferrite MnZn material with very good performance from 0.5 to 3 MHz, the preferred choice from 1 to 3 MHz. Maximum efficiency is shown under flux density below 100 mT. This material is available only for small and mid sizes (limit approx. Ae < 200 mm2).

Ferroxcube 3F4

Ferrite MnZn material with very good performance above 1 MHz, is the preferred choice for larger cores due to its high resistivity.

Ferroxcube 4F1

Ferrite NiZn is intended for applications in the range of 3 to 15 MHz.

Preferred shapes for these materials are low-profile cores with large back wall surfaces (typically planar cores). These shapes easily remove heat from the core and allow it to work under relatively high flux density and yield a compact design. Apart from the standard shapes and sizes, they are also available in custom shapes for large-quantity projects.

Visit our website for full material details.

Brochure download

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