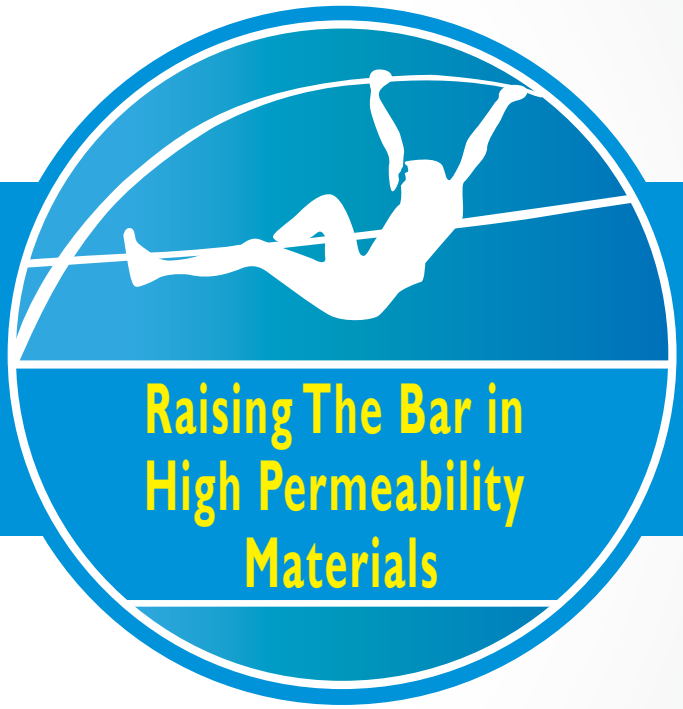
# 3E10
# 3E12

FERROXCUBE
A YAGEO COMPANY




Tight tolerance, increased impedance, extended bandwidth, enhanced performance in EMC.

FERROXCUBE is a member of the Yageo Group, which is among the world's strongest suppliers of high quality passive components. As a leading supplier of ferrite components, FERROXCUBE has manufacturing operations, sales offices, and customer service centers all over the world.

We supply one of the broadest ranges of high-quality, innovative products and place strong emphasis on miniaturization of magnetic functions. Ferrite components and accessories from FERROXCUBE are used in a wide range of applications, from telecommunications and computing electronics through consumer electronic products to automotive.

FERROXCUBE offers a wide range of materials for different frequency bands, thermal conditions and type of noise to be suppressed, with complete data and characterization to ease the design process. Materials can be found in most appropriate shapes for its use: toroids for common mode chokes, cable shields, beads, rods and several ready to mount solutions like SMD beads, through hole wideband chokes and encapsulated cable shields.

3E10 is a high permeability material optimized for wideband transformers as well as in EMI-suppression filters, the base material is MnZn. It achieves the tightest tolerance in your final products (only 20%), so winding and potting operations have less impact on the permeability. This means better control of the final characteristics of the component in your specific application.

3E10 is the choice when looking for a robust manufacturing process and maximum frequency stability. Extensive material research at Ferroxcube has lead to the improvement in permeability stability with frequency, which in turn creates reduced magnetic losses and higher common mode impedance over a wider frequency range.

| Symbol | Conditions | Value | Unit |
|---|---|---|---|
| | | 3E10 | |
| $\mu_i$ | 25 °C; ≤10 kHz, 0.25 mT | 10000±20% | |
| Bsat | 25 °C; 10 kHz, 1200 A/m | ≈ 460 | mT |
| | 100 °C; 10 kHz, 1200 A/m | ≈ 270 | |
| $\tan\delta/\mu_i$ | 25 °C; 30 kHz; 0.25 mT | ≤ $5 \times 10^{-6}$ | |
| | 25 °C; 100 kHz; 0.25 mT | ≤ $20 \times 10^{-6}$ | |
| $\eta_B$ | 25 °C; 10 kHz; 1.5 to 3 mT | ≤ $0.5 \times 10^{-3}$ | $T^{-1}$ |
| ρ | DC; 25 °C | ≈ 0.5 | Ωm |
| $T_C$ | | ≥130 | °C |
| Density | | ≈ 5000 | $kg/m^3$ |

# 3E10

## The Best Process Control with Extended Bandwidth

## Material Specifications

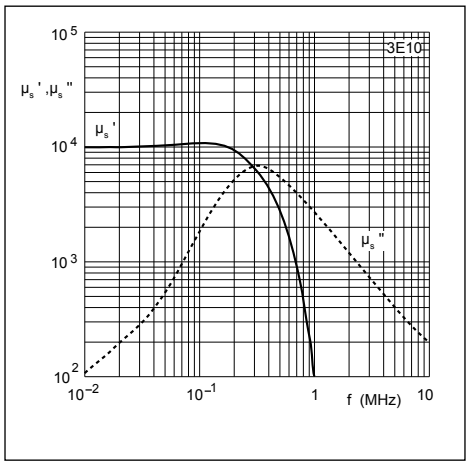



Fig. 1 Complex permeability as a function of frequency

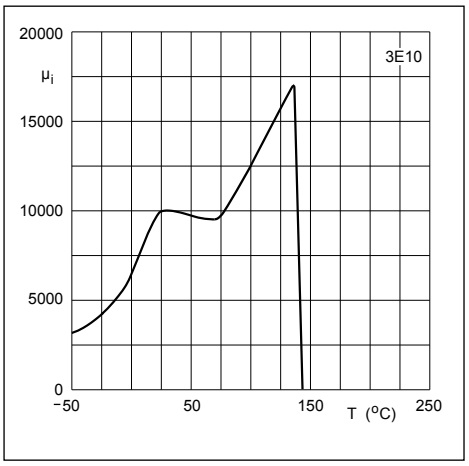



Fig. 2 Initial permeability as a function of temperature

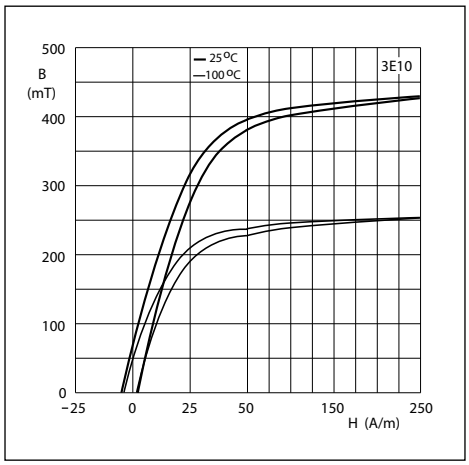



Fig. 3 Typical B-H loops

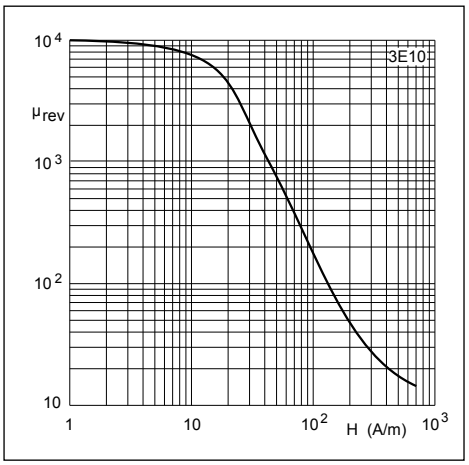



Fig. 4 Reversible permeability as a function of magnetic field strength

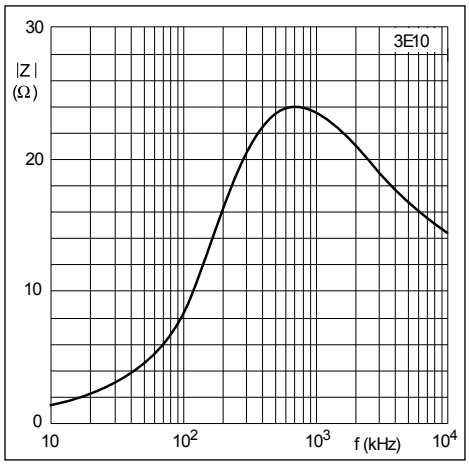



Fig. 5 Impedance as a function of frequency, measured on a toroid T25/15/10

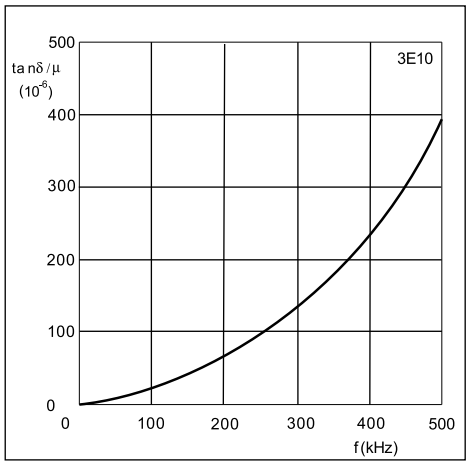



Fig. 6 Loss factor in function of frequency

A selection of raw materials and optimum process control have enabled Ferroxcube to offer the highest permeability on ferrite toroids for EMI suppression and wideband transformers. 3E12 reaches 12k on final product (there is no difference between material and product specification) in a complete product range up to large sizes. This improved performance results in several benefits for the inductor:

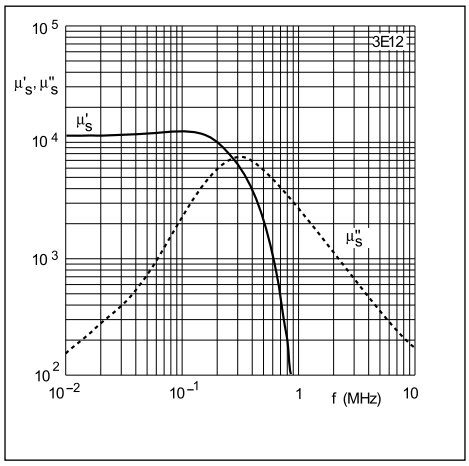
— The possibility of reducing the size of the component keeping the same inductance and turns, resulting in smaller footprint and reduced Rdc (shorter turns)
— Keeping the same size, reducing the number of turns to reach the same inductance, resulting in a lower winding cost and Rdc (less turns)
— Improved performance: higher permeability leads to better coupling between windings.

| Symbol | Conditions | Value | Unit |
|---|---|---|---|
| | | 3E12 | |
| $\mu_i$ | 25 °C; ≤10 kHz, 0.25 mT | 12000±20% | |
| Bsat | 25 °C; 10 kHz, 1200 A/m | ≈ 470 | mT |
| | 100 °C; 10 kHz, 1200 A/m | ≈ 290 | |
| $\tan\delta/\mu_i$ | 25 °C; 30 kHz; 0.25 mT | ≤ $7 \times 10^{-6}$ | |
| | 25 °C; 100 kHz; 0.25 mT | ≤ $25 \times 10^{-6}$ | |
| $\eta_B$ | 25 °C; 10 kHz; 1.5 to 3 mT | ≤ $0.5 \times 10^{-3}$ | $T^{-1}$ |
| ρ | DC; 25 °C | ≈ 0.5 | Ωm |
| $T_C$ | | ≥130 | °C |
| Density | | ≈ 5000 | $kg/m^3$ |

# 3E12

## The Highest Impedance and Permeability

## Material Specifications

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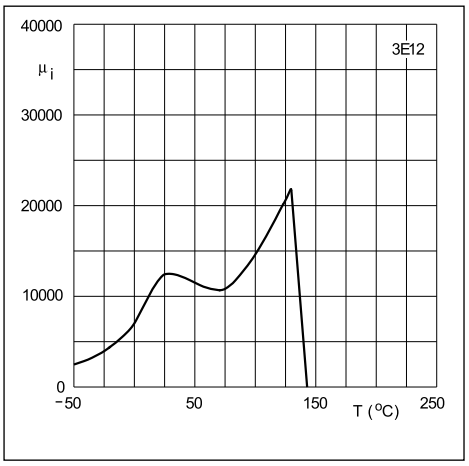


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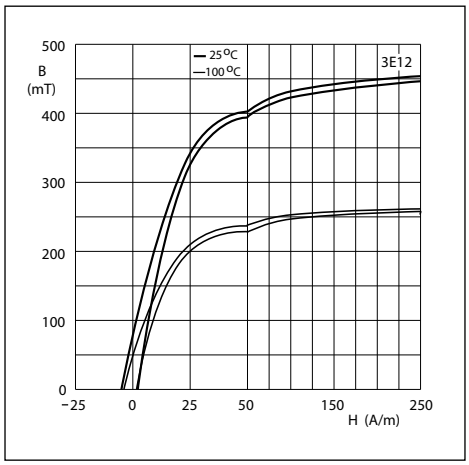


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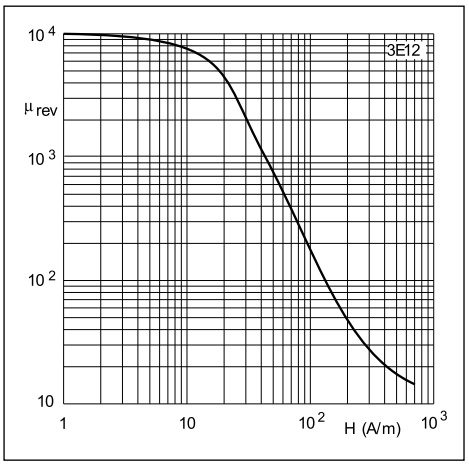


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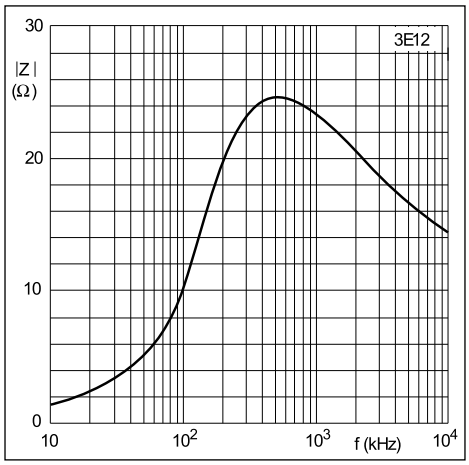


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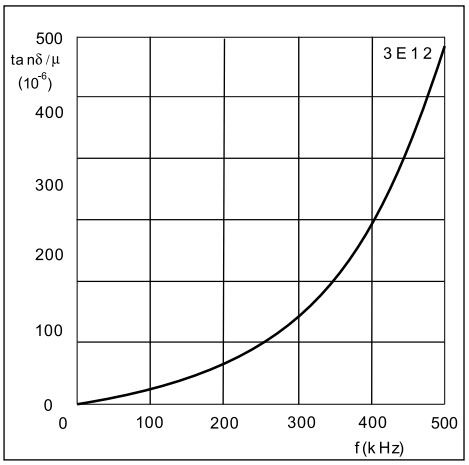


Fig. 6 Loss factor in function of frequency

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