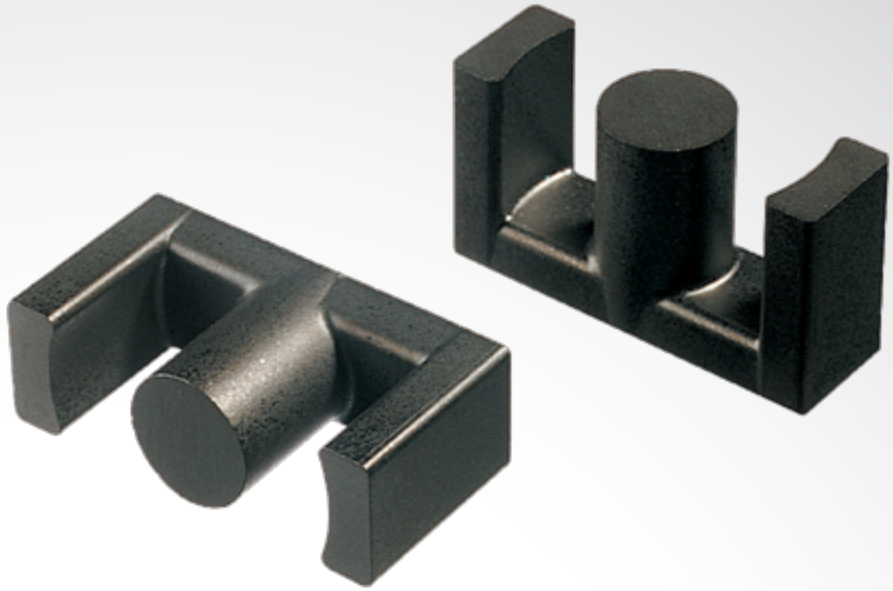
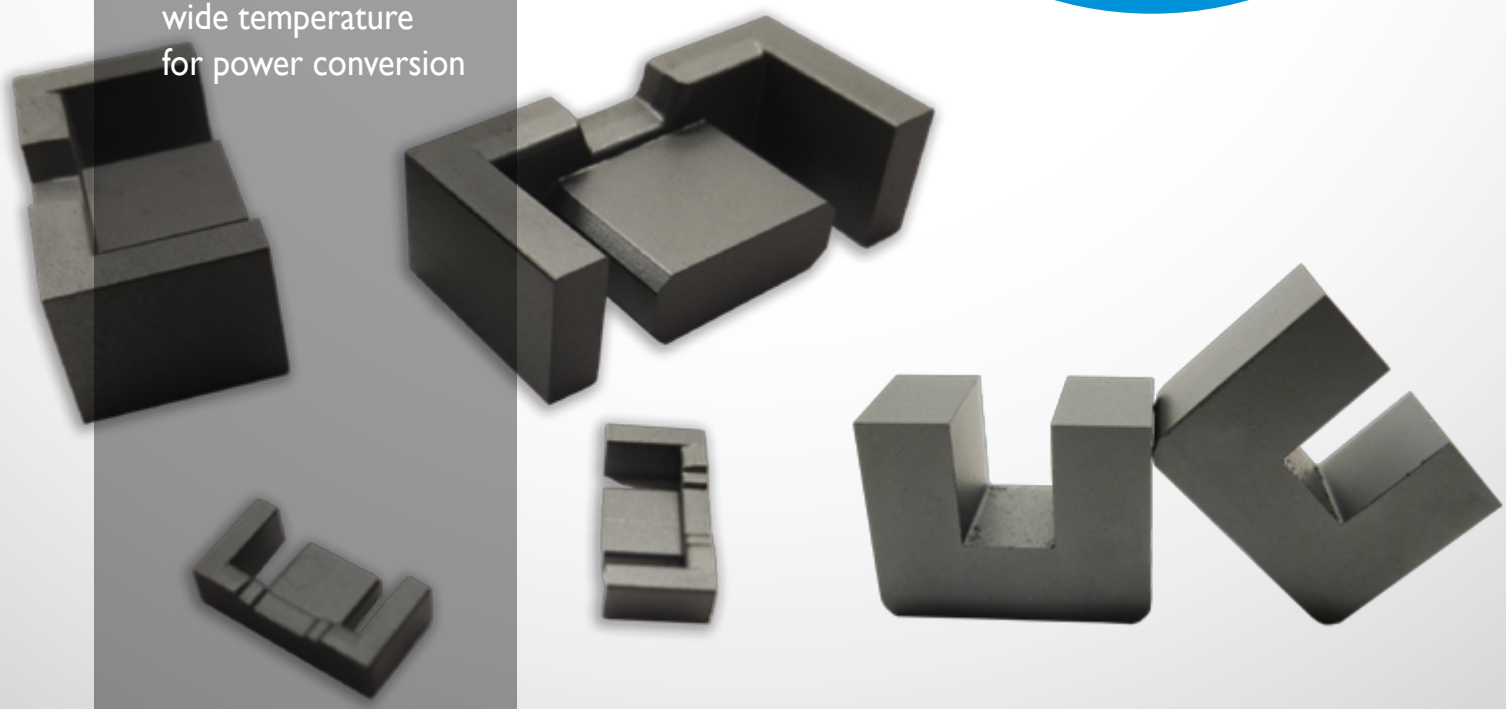
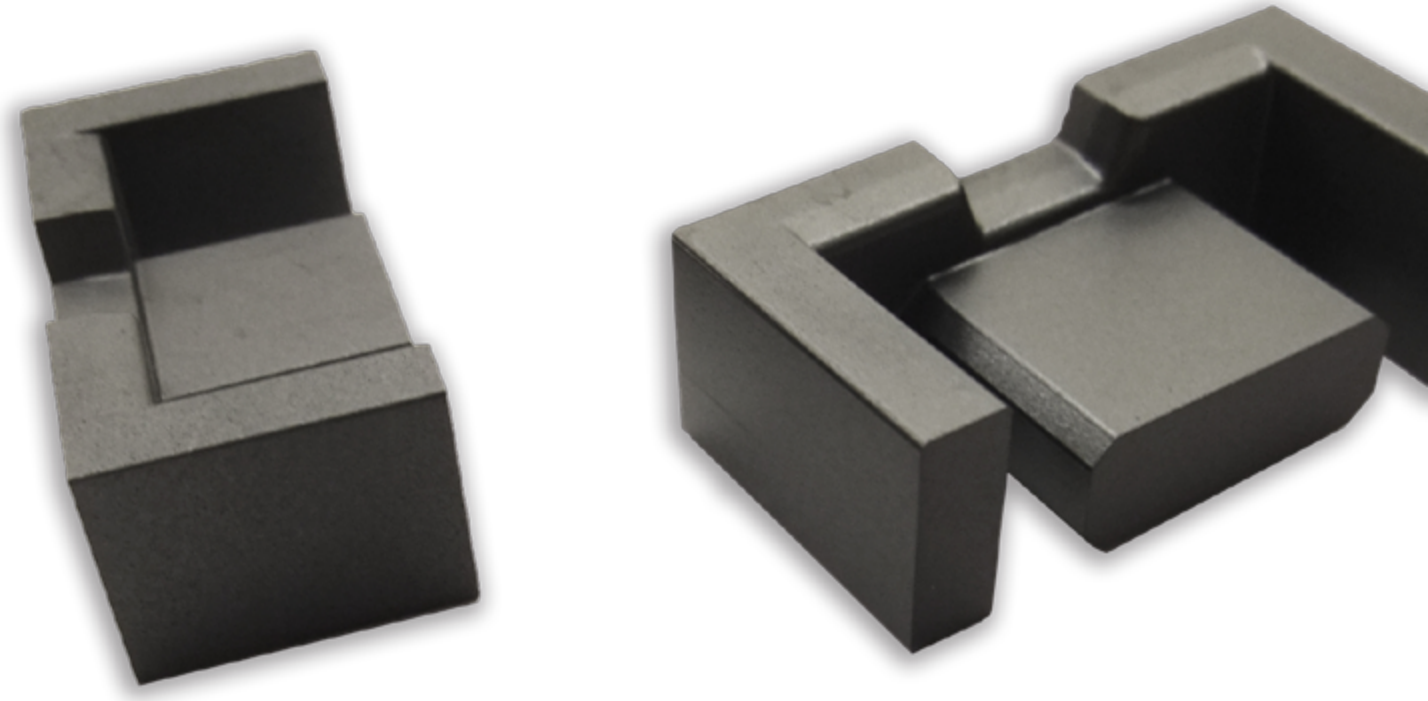


3C95
3C97

FERROXCUBE
A YAGEO COMPANY

Low power loss,
wide temperature
for power conversion

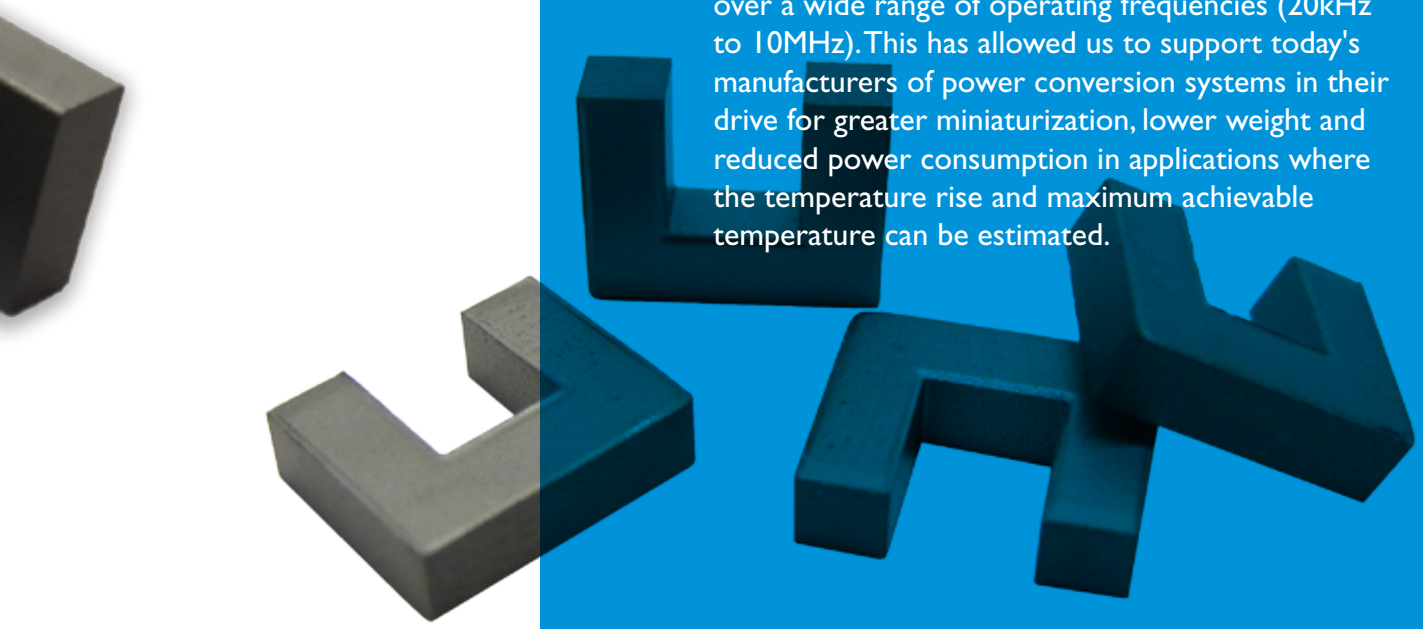




FERROXCUBE is a member of the Yageo Group, which is among the world's strongest suppliers of high quality passive components. As a leading supplier of ferrite components. FERROXCUBE has manufacturing operations, sales offices, and customer service centers all over the world.

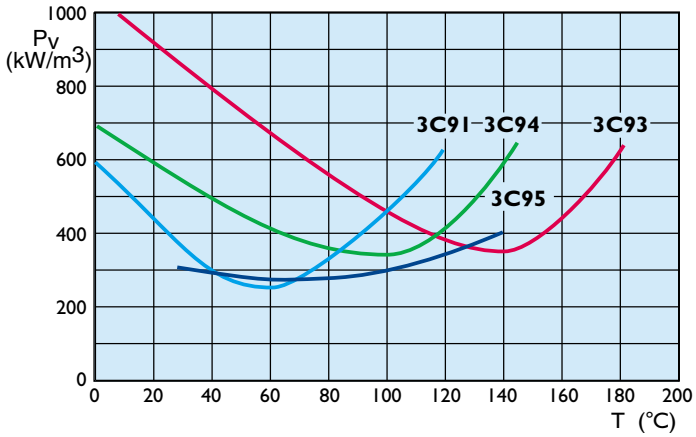
We supply one of he broadest ranges of high-quality, innovative products and place strong emphasis on miniaturization of magnetic functions. Ferrite components and accessories from FERROXCUBE are used in a wide range of applications, from telecommunications and computing electronics through consumer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

FERROXCUBE as the leading manufacturer in the ferrite industry, has been providing to the power conversion industry ferrite cores with low power losses and high saturation magnetic flux density over a wide range of operating frequencies (20kHz to 10MHz). This has allowed us to support today's manufacturers of power conversion systems in their drive for greater miniaturization, lower weight and reduced power consumption in applications where the temperature rise and maximum achievable temperature can be estimated.



The power loss density versus temperature curves for 3C95 is very flat and losses vary little from room temperature to over 100 °C . This holds for various conditions of frequency and flux density. Traditionally, power material is optimized at 100 °C for use in industrial equipment and special materials are developed for other temperature ranges. This does not solve the problem for applications where large variations in operating temperatures occur for which the 3C95 material has been developed. Typical examples are electronic lighting ballast, and automotive electronics which are mounted in the proximity of engine.

Power loss comparison



Ferroxcube has started the introduction of the new material in regular core shapes for power applications such as E, U, EFD, ER, EQ, PQ, RM and planar shapes. The loss level competes with most current Ferroxcube grades and so does the saturation level. See below for a comparison of the loss density of different materials with that of 3C95.

Applications for 3C95 can be found in various areas:

- Automotive electronics near the engine

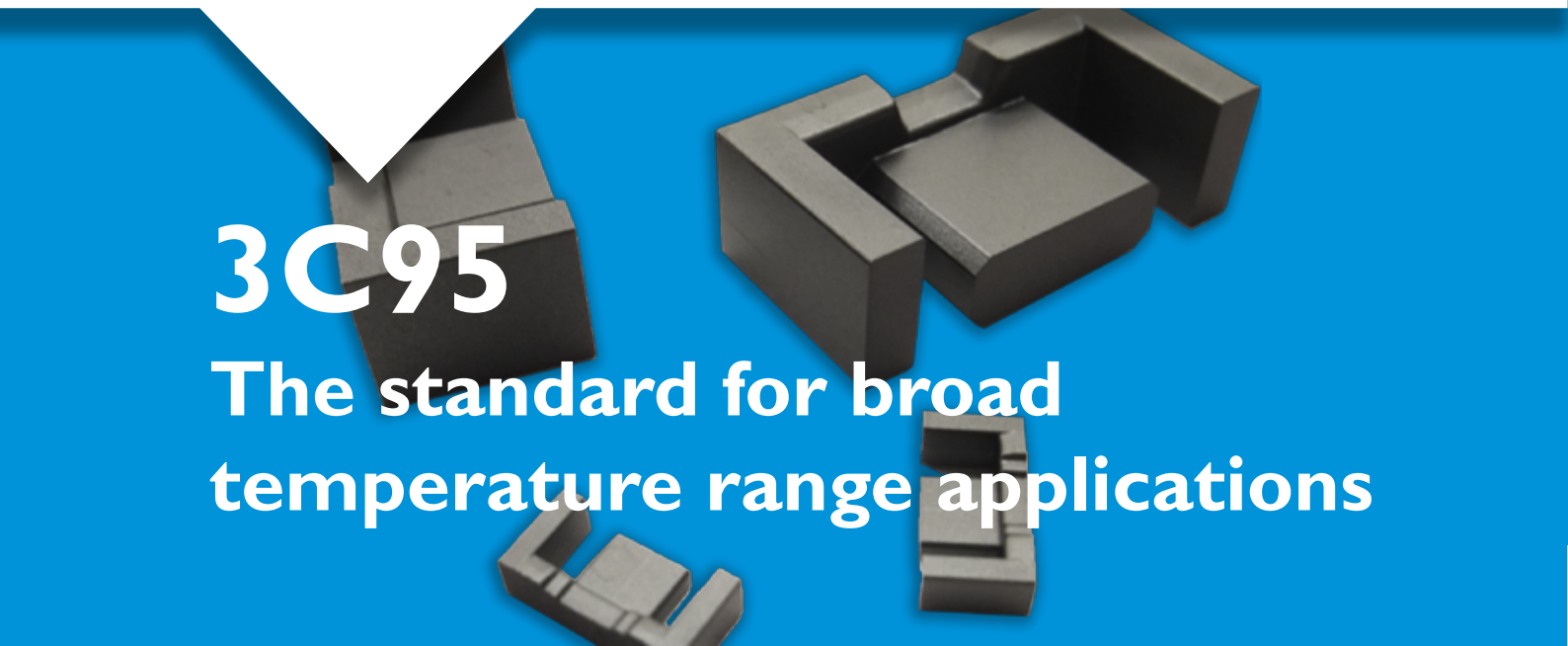
  Temperatures vary from ambient temperature at motor start, which might be below zero, to far over 100°C for a steadily running motor. More power applications appear on the horizon like DC/ DC converters for 42V systems in hybrid vehicles.

- Electronic lighting ballasts

  Also here temperatures vary from ambient temperature at lamp ignition (e.g. outdoor lighting) to well over 100°C for a steady state of operation in certain discharge lamps. Conditions can be especially challenging in hot restart situations.

- Mobile/handheld devices

  Working temperatures have to be lower than in industrial equipment and are typically in the 50~60°C range. This range is perfectly covered by 3C95.



3C95

The standard for broad temperature range applications

Material Specifications

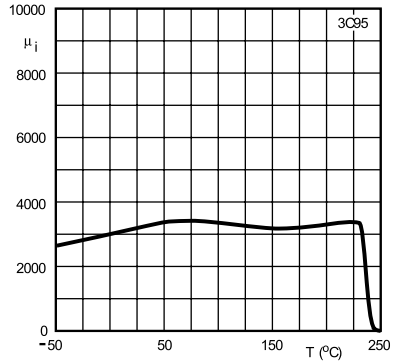


Fig. 1 Initial permeability as a function of temperature

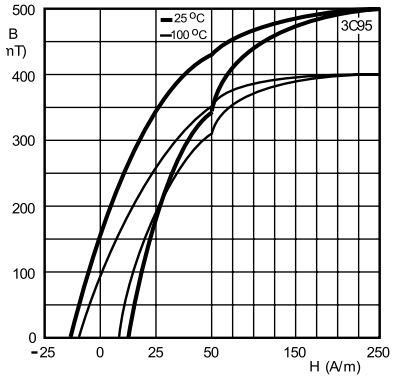


Fig. 2 Typical B-H loops

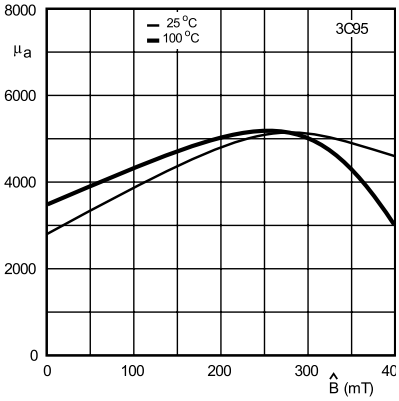


Fig. 3 Amplitude permeability as a function of peak flux density

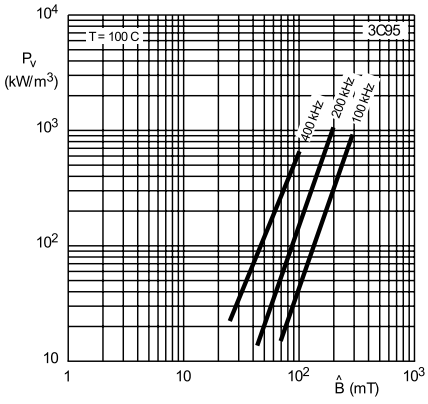


Fig. 4 Specific power losses as a function of peak flux density with frequency as a parameter

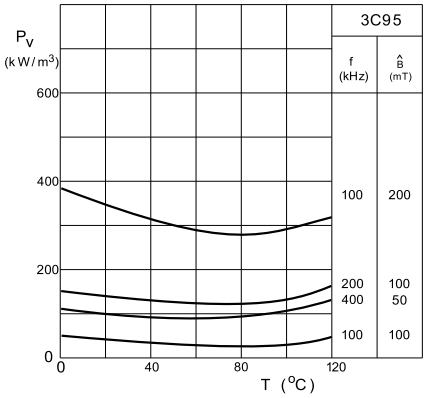
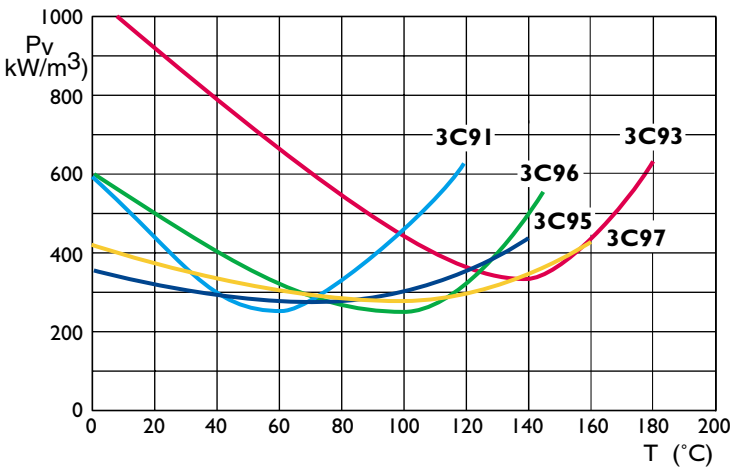


Fig. 5 Specific power losses for several frequency/flux density combinations as a function of temperature

Symbol	Conditions	Value	Unit
μ_i	25 °C; ≤ 10 kHz, 0.25 mT	3000±20%	
μ_a	100 °C; 25 kHz, 200 mT	≈ 5000	
Bsat	25 °C; 10 kHz, 1200 A/m	≈ 530	mT
	100 °C; 10 kHz, 1200 A/m	≈ 410	
P_V	25 °C; 100 kHz; 200 mT	≈ 350	kW/m^3
	100 °C; 100 kHz; 200 mT	≈ 290	
ρ	DC; 25 °C	≈ 5	Ωm
T_C		≥ 215	°C
Density		≈ 4800	kg/m^3

Ferroxcube extends its all temperature power ferrite range with a new power material: 3C97 will not only offer high power density and reduced volume, but also increased efficiency when used in harsh environmental applications with high ambient temperatures and wide temperature fluctuations.

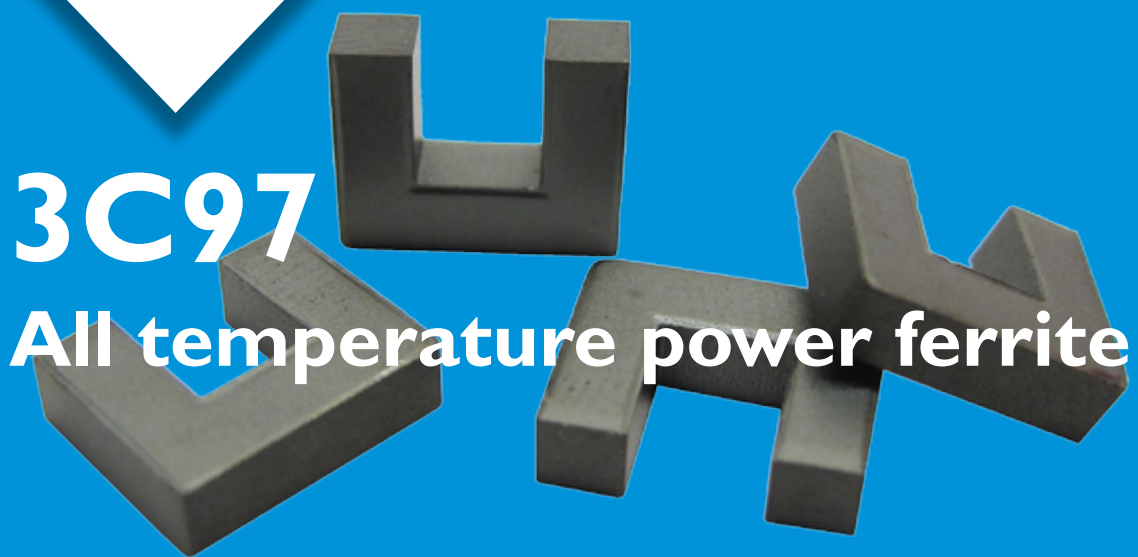
Power loss comparison



Ferroxcube's all temperature power ferrite range will make the design of true high energy-efficient products possible, since the transformer will keep the industry´s lowest loss levels independently of the environmental temperature and loading. The new 3C97 power material is characterized by a flat Power density vs. Temperature curve between 60°C and 140°C achieving an improved efficiency over 3C95 in this temperature range.

Applications for 3C97 can be found in various areas:

- Outdoor solar inverters, power-charging systems for electric vehicles
- DC/DC converters for electric and hybrid cars, automotive electronics in general
- Rugged systems suited to railways, heavy industry as well as other applications in adverse environments



3C97

All temperature power ferrite

Material Specifications

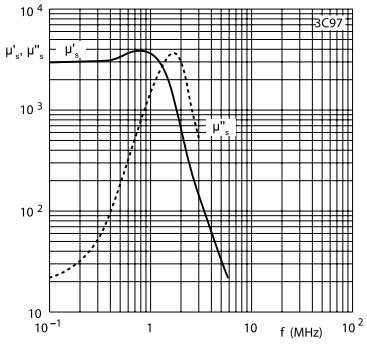


Fig. 1 Complex permeability as a function of frequency

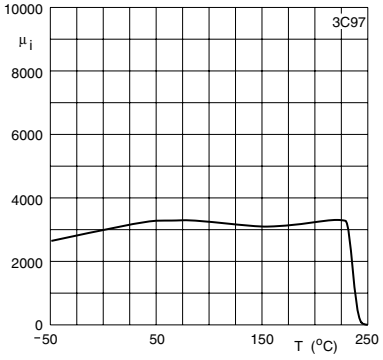
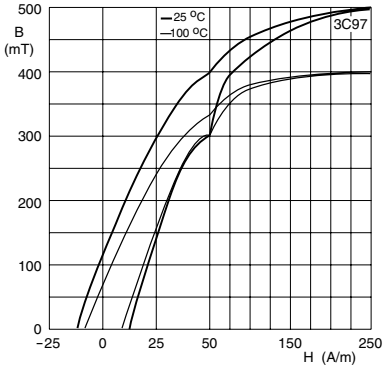


Fig. 2 Initial permeability as a function of temperature



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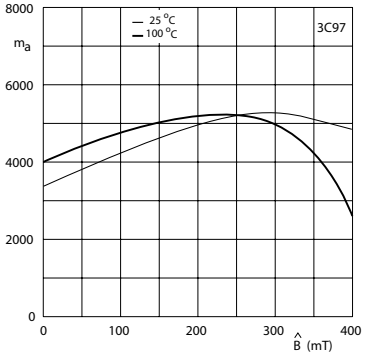

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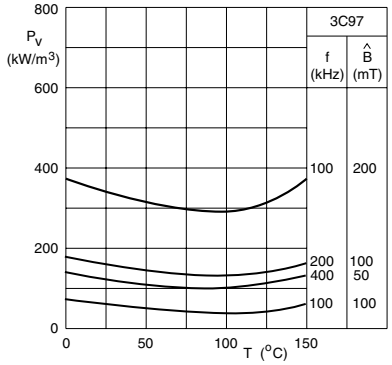

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ρ	DC; 25 °C	≈ 5	Ωm
T_C		≥ 215	°C
Density		≈ 4800	kg/m^3

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