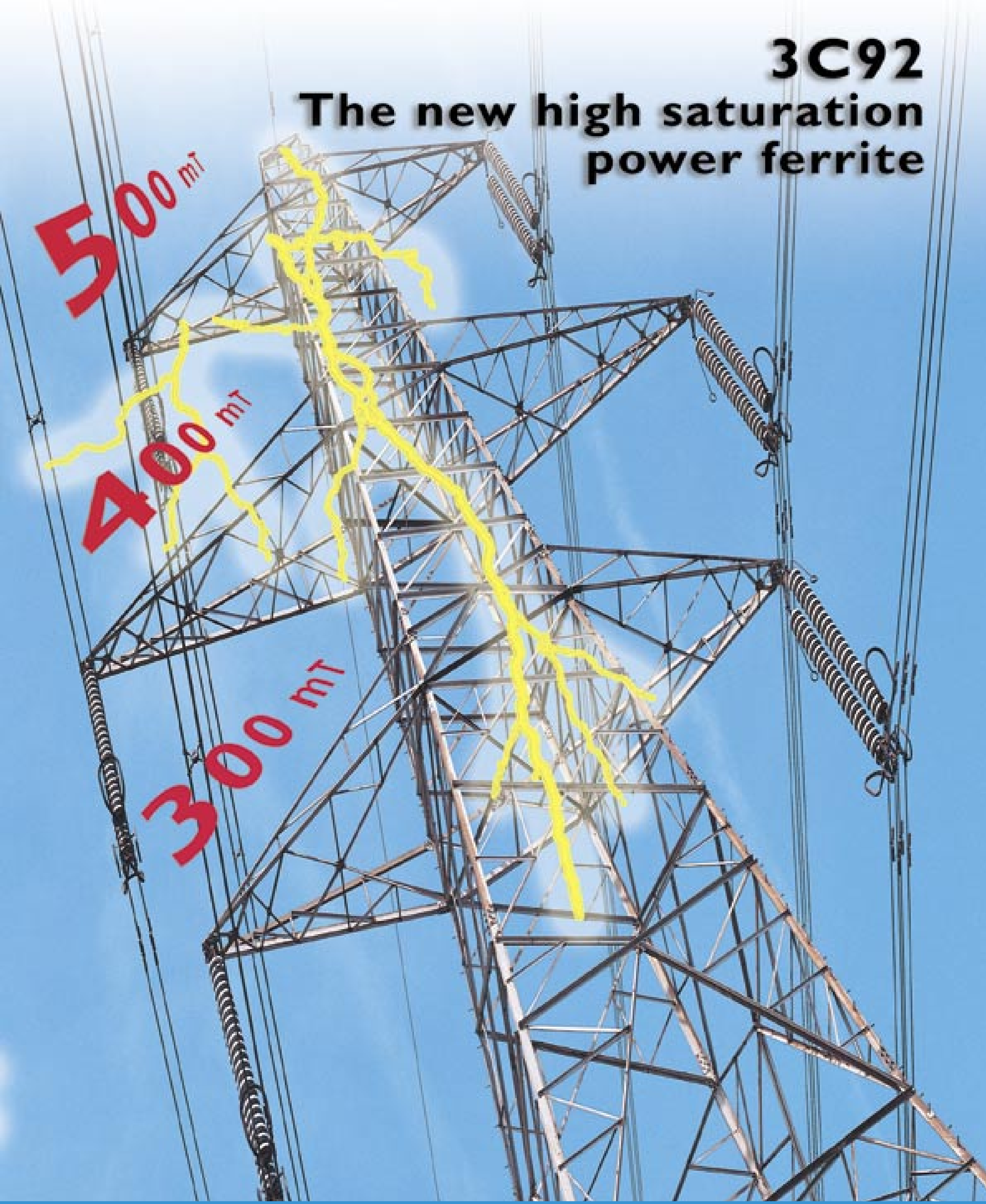
3C92
The new high saturation power ferrite



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3C92 - The new standard for high flux density applications

FERROXCUBE makes a move forward in high flux density applications with the introduction of the new material 3C92. This material is primarily intended for output chokes in power supplies These carry mainly dc current with a small ac ripple, so core losses are generally not the first worry. Required is a high saturation level to accomodate a high dc current without too much inductance loss. The energy storage value of a choke is proportional to the square of peak flux density and determines the core volume required. Whenever space is limited, this is an important consideration.

FERROXCUBE has now introduced the new power material 3C92 for high flux density applications. It has an increased Curie temperature compared to the general purpose power material 3C94. Because of this, 3C92 has a higher saturation flux density than 3C94 and the difference increases with temperature. Losses are the same as for 3C94 which makes 3C92 also suitable for high flux density transformers.

High flux density performance

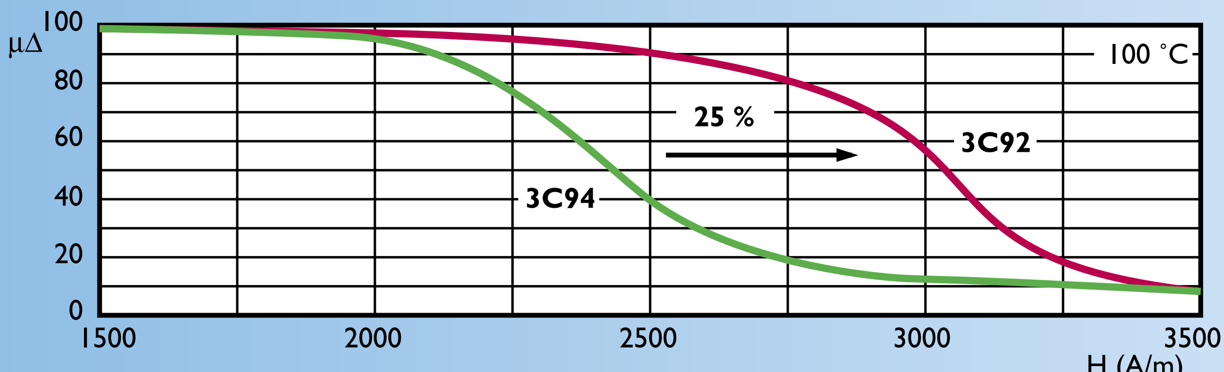
In the graph below the current carrying capabilities of 3C92 and 3C94 are compared. The magnetic field strength H is proportional to the current I and the effective permeability μ_e is proportional to the inductance. All curves have been measured on gapped toroids with the same μ_e value to make them directly comparable. In the fall-off region 3C92 gains about 25 % on 3C94.

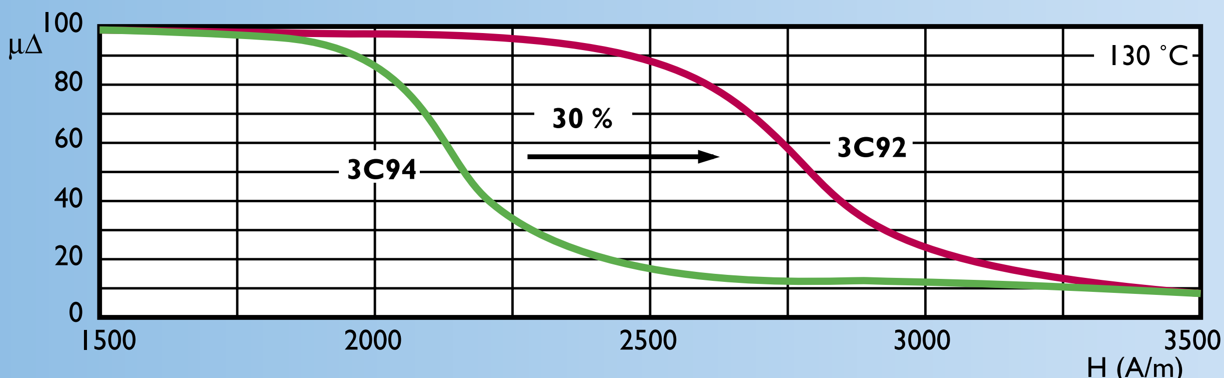
Preferred applications are:

- High current output chokes
Wherever space is at a premium like in low profile converter modules, core volume can be reduced. The advantage increases with temperature.

- High voltage ignition transformers
For example in electronic lighting ballast where high flux density occurs during ignition, but losses have to be low during steady state operation.

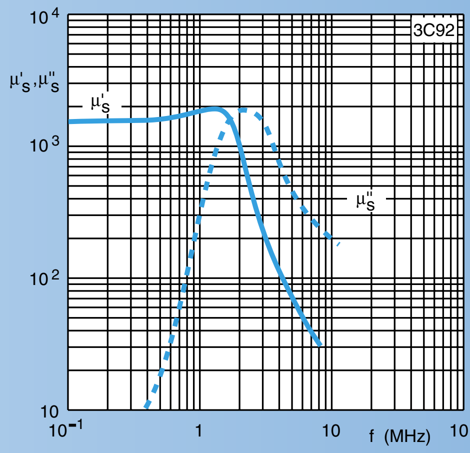
Incremental permeability as a function of magnetic field strength compared



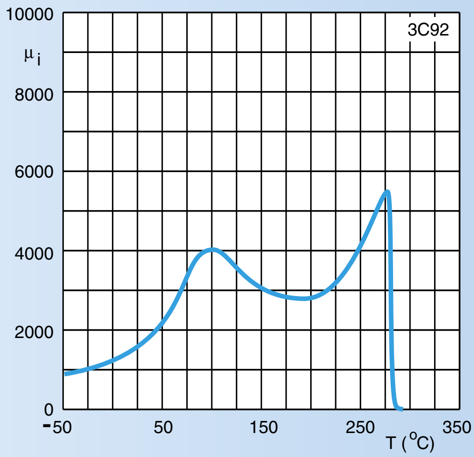


3C92 - Material Characteristics

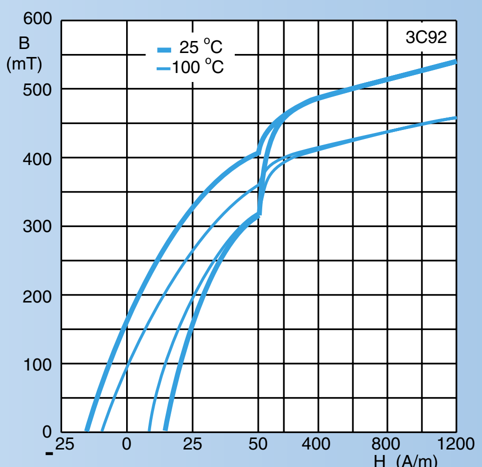
	CONDITIONS	VALUE	UNIT
μ_i	25 °C, ≤ 10 kHz, 0.1 mT	1500 ± 20 %	
μ_a	100 °C, 25 kHz, 200 mT	≈ 5000	
B	25 °C, 10 kHz, 1200 A/m 100 °C, 10 kHz, 1200 A/m 140 °C, 10 kHz, 1200 A/m	≈ 540 ≈ 460 ≈ 400	mT
P_v	100 °C, 25 kHz, 200 mT 100 °C, 100 kHz, 200 mT	≈ 50 ≈ 350	kW/m^3
ρ	DC, 25 °C	≈ 5	Ωm
T_c		≥ 280	°C
density		≈ 4800	kg/m^3



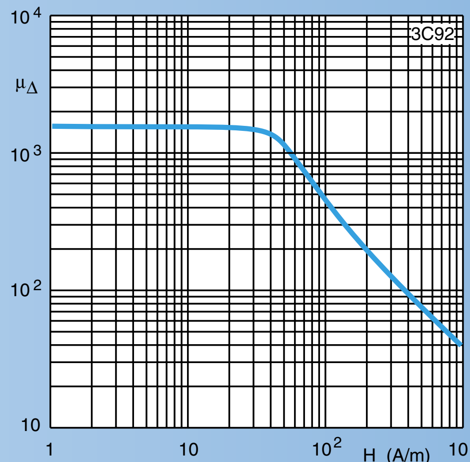
Complex permeability as a function of frequency



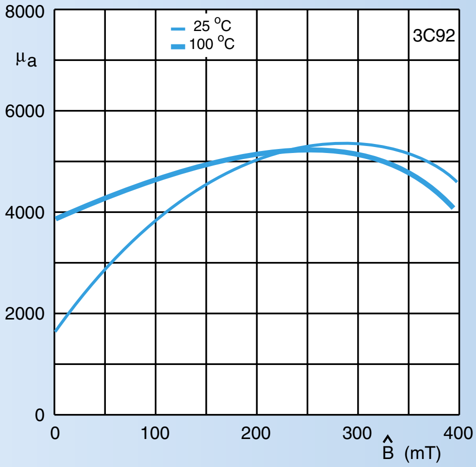
Initial permeability as a function of temperature



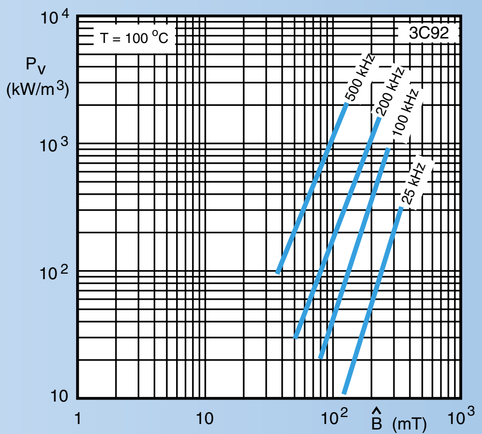
Typical B-H loops.



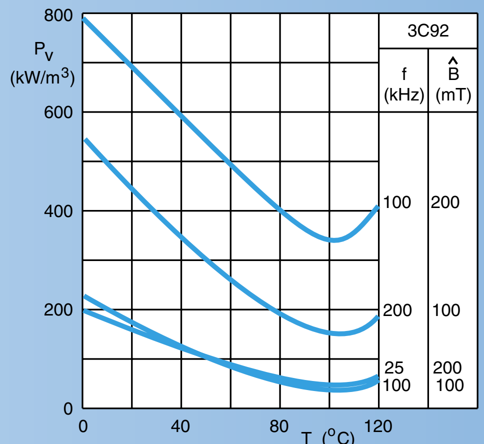
Incremental permeability as a function of magnetic field strength



Amplitude permeability as a function of peak flux density



Specific power loss as a function of peak flux density with frequency as a parameter



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

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