




## **Ferrites and accessories**

SIFERRIT material N51

Date: September 2006

**SIFERRIT materials**
**N51**
**Material properties**

Preferred application			Power transformers
Material			N51 <sup>1)</sup>
Base material			MnZn
	Symbol	Unit	
Initial permeability (T = 25 °C)	$\mu_i$		3000 ±25%
Flux density (H = 1200 A/m, f = 10 kHz)	$B_S$ (25 °C)	mT	480
	$B_S$ (100 °C)	mT	380
Coercive field strength (f = 10 kHz)	$H_c$ (25 °C)	A/m	5
	$H_c$ (100 °C)		5
Optimum frequency range		kHz	25 ... 150
Hysteresis material constant	$\eta_B$	$10^{-6}/\text{mT}$	<0.4
Curie temperature	$T_C$	°C	>220
Mean value of $\alpha_F$ at 25 ... 55 °C		$10^{-6}/\text{K}$	2
Density (typical values)		kg/m <sup>3</sup>	4800
Relative core losses (typical values)	$P_V$		
25 kHz, 200 mT, 25 °C		kW/m <sup>3</sup>	75
100 kHz, 200 mT, 25 °C		kW/m <sup>3</sup>	450
300 kHz, 100 mT, 25 °C		kW/m <sup>3</sup>	400
500 kHz, 50 mT, 25 °C		kW/m <sup>3</sup>	—
25 kHz, 200 mT, 100 °C		kW/m <sup>3</sup>	110
100 kHz, 200 mT, 100 °C		kW/m <sup>3</sup>	700
300 kHz, 100 mT, 100 °C		kW/m <sup>3</sup>	630
500 kHz, 50 mT, 100 °C	kW/m <sup>3</sup>	—	
Resistivity	$\rho$	$\Omega\text{m}$	6
Core shapes			E, ER, ETD

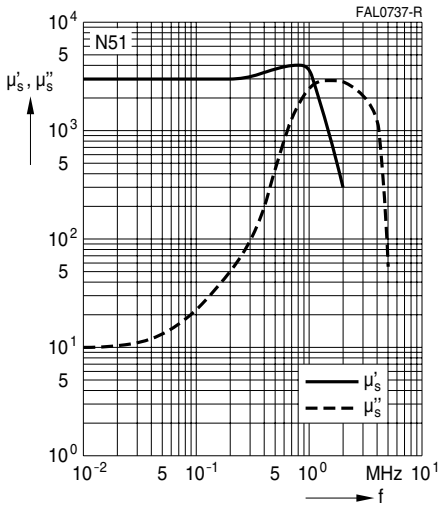
1) Preliminary data

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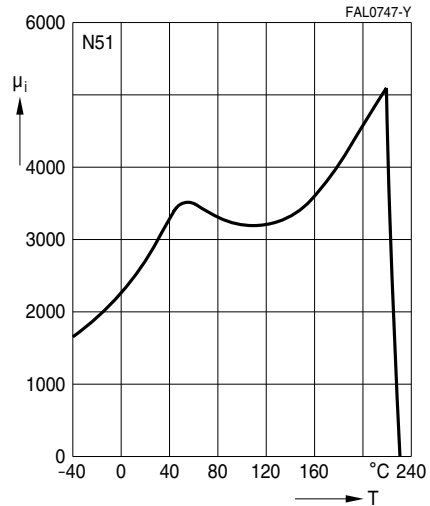
N51

Preliminary data

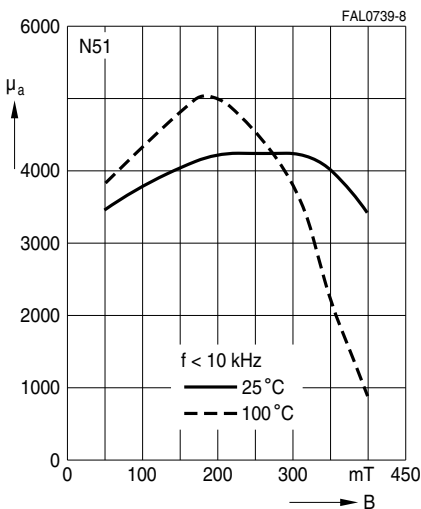
Complex permeability  
versus frequency  
(measured on R34 toroids,  $\hat{B} \leq 0.25$  mT)



Initial permeability  $\mu_i$   
versus temperature  
(measured on R34 toroids,  $\hat{B} \leq 0.25$  mT)



Amplitude permeability  
versus AC field flux density  
(measured on R34 toroids,  $\hat{B} \leq 0.25$  mT)



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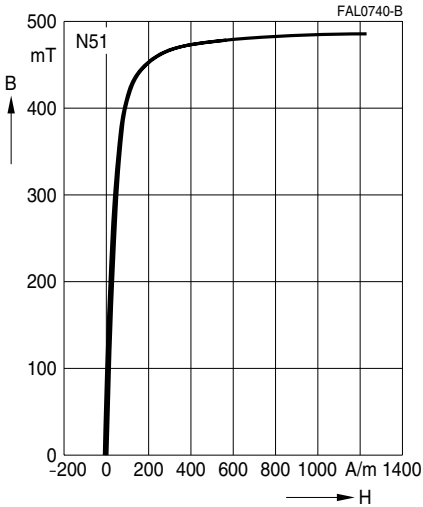
### N51

#### Preliminary data

Dynamic magnetization curves

(typical values)

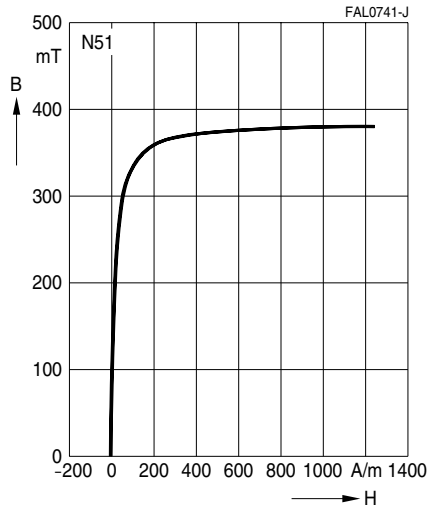
( $f = 10 \text{ kHz}$ ,  $T = 25 \text{ }^\circ\text{C}$ )



Dynamic magnetization curves

(typical values)

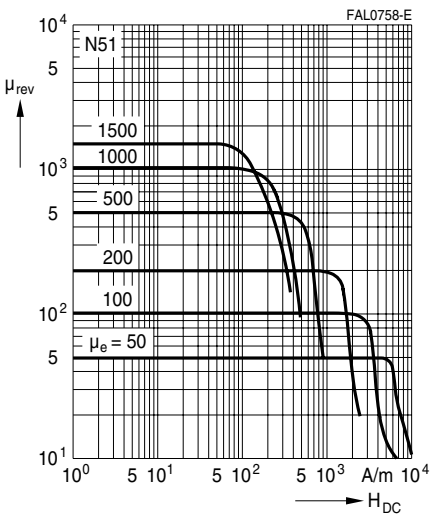
( $f = 10 \text{ kHz}$ ,  $T = 100 \text{ }^\circ\text{C}$ )



DC magnetic bias

measured on E cores

( $\dot{B} \leq 0.25 \text{ mT}$ ,  $f = 10 \text{ kHz}$ ,  $T = 25 \text{ }^\circ\text{C}$ )

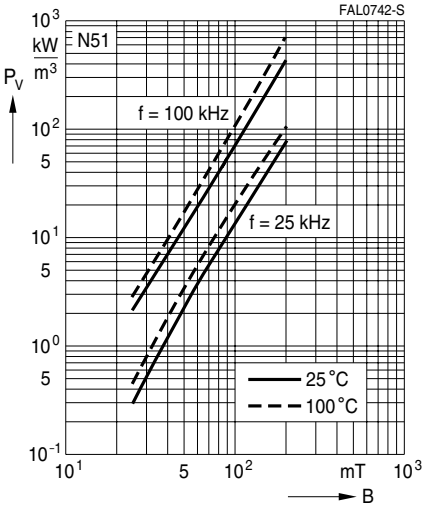


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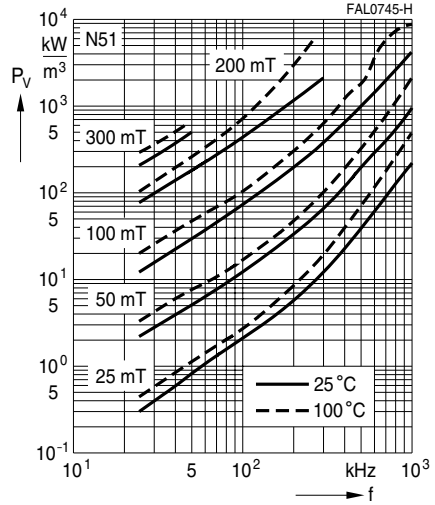
### N51

#### Preliminary data

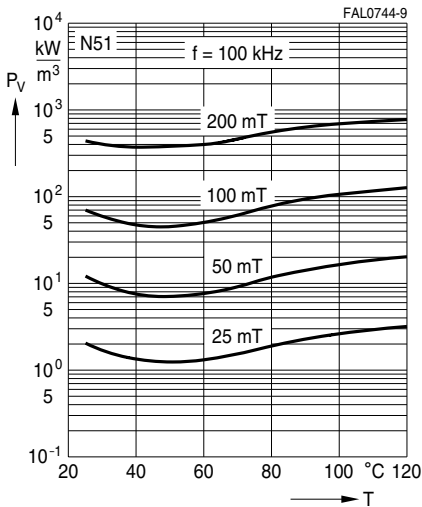
Relative core losses  
versus AC field flux density  
(measured on R34 toroids)



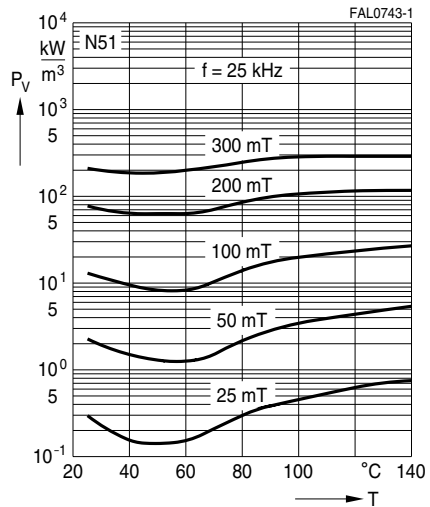
Relative core losses  
versus frequency  
(measured on R34 toroids)



Relative core losses  
versus temperature  
(measured on R34 toroids)



Relative core losses  
versus temperature  
(measured on R34 toroids)



### General

Based on IEC 60401-3, the data specified here are typical data for the material in question, which have been determined principally on the basis of toroids (ring cores).

The purpose of such characteristic material data is to provide the user with improved means for comparing different materials.

There is no direct relationship between characteristic material data and the data measured using other core shapes and/or core sizes made of the same material. In the absence of further agreements with the manufacturer, only those specifications given for the core shape and/or core size in question are binding.

### Effects of core combination on $A_L$ value

Stresses in the core affect not only the mechanical but also the magnetic properties. It is apparent that the initial permeability is dependent on the stress state of the core. The higher the stresses are in the core, the lower is the value for the initial permeability. Thus the embedding medium should have the greatest possible elasticity.

For detailed information see Data Book 2007, chapter "General – Definitions, 8.2".

### Heating up

Ferrites can run hot during operation at higher flux densities and higher frequencies.

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