



## **Ferrites and accessories**

SIFERRIT material M33

Date: September 2006

**SIFERRIT materials**
**M33**
**Material properties**

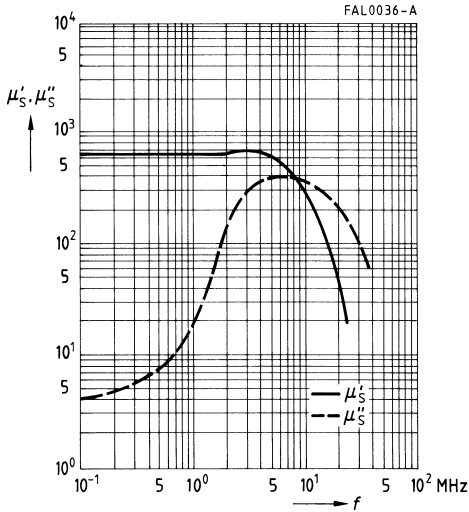
Preferred application		Resonant circuit inductors	
Material		M33 <sup>1)</sup>	
Base material		MnZn	
Color code (adjuster)		white	
	Symbol	Unit	
Initial permeability (T = 25 °C)	$\mu_i$		750 ±25%
Meas. field strength Flux density (near saturation) (f = 10 kHz)	H	A/m	2000
	$B_S$ (25 °C) $B_S$ (100 °C)	mT mT	400 310
Coercive field strength (f = 10 kHz)	$H_c$ (25 °C)	A/m	80
	$H_c$ (100 °C)	A/m	65
Optimum frequency range	$f_{min}$	MHz	0.2 ...
	$f_{max}$		1.0
Relative $f_{min}$ loss factor at $f_{max}$	$\tan \delta/\mu_i$	$10^{-6}$	<12
		$10^{-6}$	<20
Hysteresis material constant	$\eta_B$	$10^{-6}/mT$	<1.8
Curie temperature	$T_C$	°C	>200
Relative temperature coefficient at 25 ... 55 °C at 5 ... 25 °C	$\alpha_F$	$10^{-6}/K$	0.5 ... 2.6
			—
Mean value of $\alpha_F$ at 25 ... 55 °C		$10^{-6}/K$	1.6
Density (typical values)		kg/m <sup>3</sup>	4700
Disaccommodation factor at 25 °C	DF	$10^{-6}$	8
Resistivity	$\rho$	$\Omega m$	5
Core shapes		RM, P, Toroid, Double-aperture, P core half	

1) For threaded cores  $\mu_i = 600 \pm 20\%$

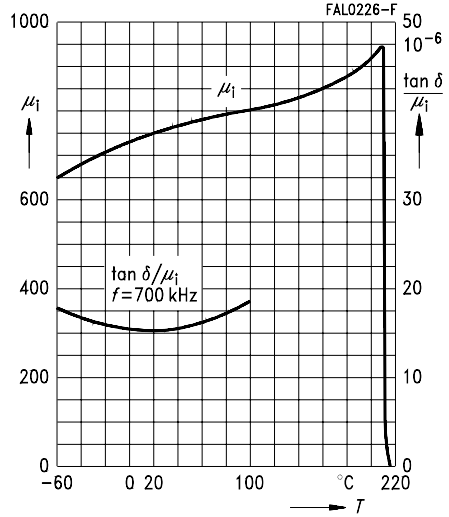
## SIFERRIT materials

### M33

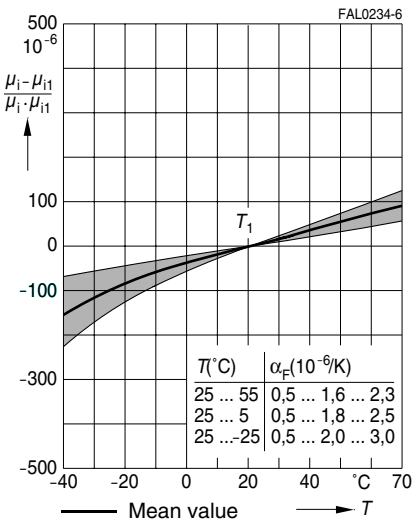
Complex permeability  
versus frequency  
(measured on R10 toroids,  $\hat{B} \leq 0.25$  mT)



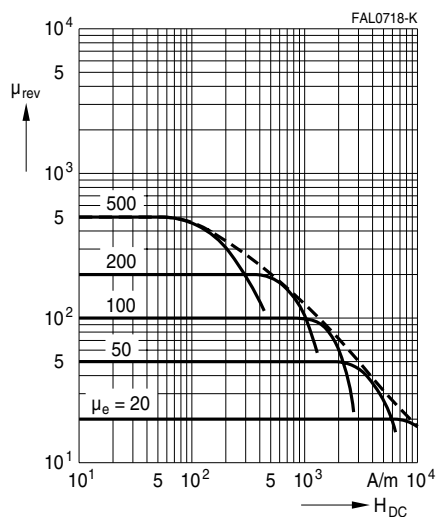
Initial permeability  $\mu_i$  and relative loss factor  
 $\tan \delta / \mu_i$  versus temperature  
(measured on R10 toroids,  $\hat{B} \leq 0.25$  mT)



Permeability factor versus temperature  
(measured on P and RM cores,  
 $\hat{B} \leq 0.25$  mT),  $\mu_i \approx 750$



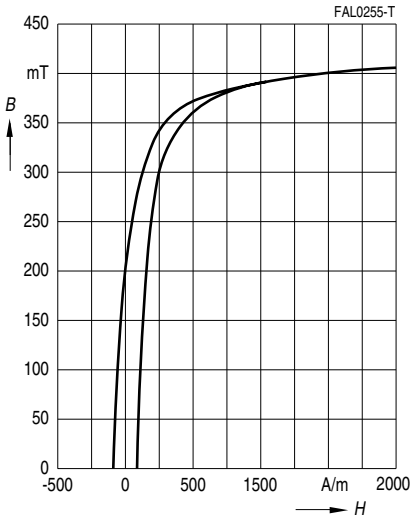
DC magnetic bias of P and RM cores  
(typical values)  
( $\hat{B} \leq 0.25$  mT,  $f = 10$  kHz,  $T = 25$  °C)



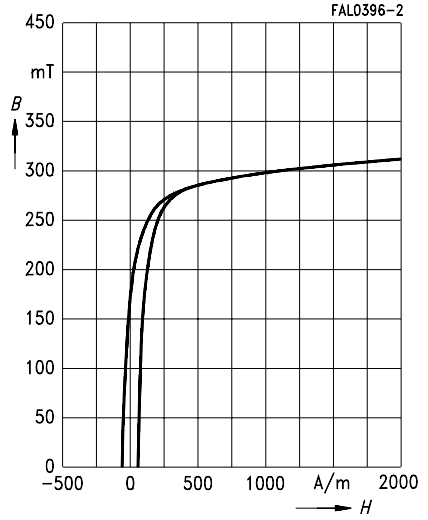
SIFERRIT materials

M33

Dynamic magnetization curves  
(typical values)  
( $f = 10 \text{ kHz}$ ,  $T = 25 \text{ }^\circ\text{C}$ )



Dynamic magnetization curves  
(typical values)  
( $f = 10 \text{ kHz}$ ,  $T = 100 \text{ }^\circ\text{C}$ )



### 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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