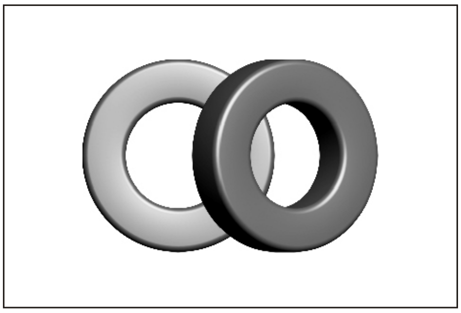

AMORPHOUS POWDER CORE SERIES PRODUCTS

APPENDIX

Unit and Conversions

cgs units	cgs units
$B=H+4\pi M$ B in gauss H in oersteds M in emu/cm³ μ_0(vacuum)=1	**$B=\mu_0H+M$** B in webers/meter²(tesla) H in amperes/meter M in webers/meter² μ_0(vacuum)=$4\pi \times 10^{-7}$(weber/ampere meter)

cgs to mks	mks to cgs
B: 1 gauss=10^{-4} weber/meter² H: 1 oersted=79.58 amperes/meter M: 1 emu/cm³=12.57×10^{-4} weber/meter² Φ: 1 maxwell=10^{-8} weber	1 weber/meter²=10^{4} gauss 1 ampere/meter=12.57×10^{-3} Oe 1 weber/meter²=796 emu/cm³ 1 weber=10^{8}maxwells

Permeability(μ)

In magnetics, permeability is the ability of a material to conduct flux.
The magnetitude of the permeability at a given induction is a measure
of the ease with which a core material can be magnetized to that induction.
It is defined as the ratio of the flux density B to the magnetizing force H.

$$\mu = \frac{B}{H}$$

μ=permeability
B=flux density(gauss)
H=magnetizing force(oersteds)

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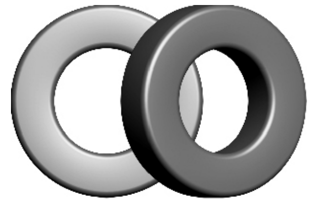

Flux Density, B(Gauss; Tesla)

The corresponding parameter for the induced magnetic field in an area perpendicular to the flux path. Flux density is determined by the field strength permeability of the medium in which it is measured.
$1T = 10^4$ Gauss

$$B_{\max} = \frac{E_{rms} \times 10^8}{4.44 f A N}$$ **: Faraday's Law**

B_{max}=maximum flux density(gauss)
E_{rms}=voltage across coil(volts)
f=frequency(hertz)
A=effective cross section area(cm^2)
N=number of turns

Magnetizing Force, H(Oe; A/m)

The magnetic field strength which produces magnetic flux. The mmf per unit length. H can be considered to be a measure of the strength or effort that the magnetomotive force applies to magnetic circuit to establish a magnetic field. H may be expressed as $H=NI/l$, where l is the mean length of the magnetic circuit in meters. 1 Oersted=79.58A/m

$$H = \frac{0.4\pi NI}{l}$$ **: Ampere's Law**

H= magnetizing force(oersteds)
N= number of turns
I = peak magnetizing current(amperes)
l = mean magnetic path lenth(cm)

Inductance of Wound core

The inductance of a wound core at a given number of turns is calculated using the following formula

$$L = \frac{0.4\pi\mu N^2 A \times 10^{-2}}{l}$$

$$L_N = A_L N^2 10^{-3}$$

L=inductance(μH)
μ=permeability
N=number of turns
A=effective cross section area(cm^2)
l =mean magnetic path length(cm)
L_N=Inductance at n turns(μH)
A_L=nominal Inductance(nH/N^2)

Core Loss

Power cores have low hysteresis loss, minimizing signal distortion, and low residual loss. The total core loss at low flux densities is the sum of hysteresis loss, residual loss, and eddy current loss. The core loss is calculated from the following Legg's equation.

$$\frac{R_{ac}}{\mu L} = aB_{max} f + cf + ef^2$$

$R_{ac}/\mu L$: Total loss factor
$aB_{max}f$: Hysteresis loss
cf: Residual loss
ef^2: Eddy current loss
R_{ac}= core loss resistance(ohms)
a= hysteresis loss coefficient
c= residual loss coffefficient
e= eddy current loss cofficient
μ= permeability
L= inductance(μH)
B_{max}= maximum flux density(gauss)
f= frequency(hertz)

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