

Symbols and Terms

Symbol	Meaning	Unit
A	Cross section of coil	mm ²
A_e	Effective magnetic cross section	mm ²
A_L	Inductance factor; $A_L = L/N^2$	nH
A_{L1}	Minimum inductance at defined high saturation ($\hat{=} \mu_a$)	nH
A_{min}	Minimum core cross section	mm ²
A_N	Winding cross section	mm ²
A_R	Resistance factor; $A_R = R_{Cu}/N^2$	$\mu\Omega = 10^{-6} \Omega$
B	RMS value of magnetic flux density	Vs/m ² , mT
ΔB	Flux density deviation	Vs/m ² , mT
\hat{B}	Peak value of magnetic flux density	Vs/m ² , mT
$\Delta \hat{B}$	Peak value of flux density deviation	Vs/m ² , mT
B_-	DC magnetic flux density	Vs/m ² , mT
B_R	Remanent flux density	Vs/m ² , mT
B_S	Saturation magnetization	Vs/m ² , mT
C_0	Winding capacitance	F = As/V
CDF	Core distortion factor	mm ^{-4.5}
DF	Relative disaccommodation coefficient $DF = d/\mu_1$	
d	Disaccommodation coefficient	
E_a	Activation energy	J
f	Frequency	s ⁻¹ , Hz
f_{cutoff}	Cut-off frequency	s ⁻¹ , Hz
f_{max}	Upper frequency limit	s ⁻¹ , Hz
f_{min}	Lower frequency limit	s ⁻¹ , Hz
f_r	Resonance frequency	s ⁻¹ , Hz
f_{Cu}	Copper filling factor	
g	Air gap	mm
H	RMS value of magnetic field strength	A/m
\hat{H}	Peak value of magnetic field strength	A/m
H_-	DC field strength	A/m
H_c	Coercive field strength	A/m
h	Hysteresis coefficient of material	10 ⁻⁶ cm/A
h/μ_1^2	Relative hysteresis coefficient	10 ⁻⁶ cm/A
I	RMS value of current	A
I_-	Direct current	A
\hat{I}	Peak value of current	A
J	Polarization	Vs/m ²
k	Boltzmann constant	J/K
k_3	Third harmonic distortion	
k_{3c}	Circuit third harmonic distortion	
L	Inductance	H = Vs/A
$\Delta L/L$	Relative inductance change	

Symbol	Meaning	Unit
L_0	Inductance of coil without core	H
L_H	Main inductance	H
L_p	Parallel inductance	H
L_{rev}	Reversible inductance	H
L_s	Series inductance	H
l_e	Effective magnetic path length	mm
l_N	Average length of turn	mm
N	Number of turns	
P_{Cu}	Copper (winding) losses	W
P_{trans}	Transferrable power	W
P_V	Relative core losses	mW/g
PF	Performance factor	
Q	Quality factor ($Q = \omega L/R_s = 1/\tan \delta_L$)	
R	Resistance	Ω
R_{Cu}	Copper (winding) resistance ($f = 0$)	Ω
R_h	Hysteresis loss resistance of a core	Ω
ΔR_h	R_h change	Ω
R_i	Internal resistance	Ω
R_p	Parallel loss resistance of a core	Ω
R_s	Series loss resistance of a core	Ω
R_{th}	Thermal resistance	K/W
R_V	Effective loss resistance of a core	Ω
s	Total air gap	mm
T	Temperature	$^{\circ}\text{C}$
ΔT	Temperature difference	K
T_C	Curie temperature	$^{\circ}\text{C}$
t	Time	s
t_v	Pulse duty factor	
$\tan \delta$	Loss factor	
$\tan \delta_L$	Loss factor of coil	
$\tan \delta_r$	(Residual) loss factor at $H \rightarrow 0$	
$\tan \delta_e$	Relative loss factor	
$\tan \delta_h$	Hysteresis loss factor	
$\tan \delta/\mu_i$	Relative loss factor of material at $H \rightarrow 0$	
U	RMS value of voltage	V
\hat{U}	Peak value of voltage	V
V_e	Effective magnetic volume	mm ³
Z	Complex impedance	Ω
α	Temperature coefficient (TK)	1/K
α_F	Relative temperature coefficient of material	1/K
α_e	Temperature coefficient of effective permeability	1/K

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ϵ_r	Relative dielectric constant	
Φ	Magnetic flux	Vs
η	Efficiency of a transformer	
η_B	Hysteresis material constant	mT ⁻¹
η_i	Hysteresis core constant	A ⁻¹ H ^{-1/2}
λ_s	Magnetostriction at saturation magnetization	
μ	Relative complex permeability	
μ_0	Magnetic field constant	Vs/Am
μ_a	Relative amplitude permeability	
μ_{app}	Relative apparent permeability	
μ_e	Relative effective permeability	for series components Ωm^{-1}
μ_i	Relative initial permeability	mm ⁻¹
μ'_p	Relative real (inductive) component of $\bar{\mu}$	s
μ''_p	Relative imaginary (loss) component of $\bar{\mu}$	s ⁻¹
μ_r	Relative permeability	for parallel components
μ_{rev}	Relative reversible permeability	
μ'_s	Relative real (inductive) component of $\bar{\mu}$	
μ''_s	Relative imaginary (loss) component of $\bar{\mu}$	
μ_{tot}	Relative total permeability derived from the static magnetization curve	
ρ	Resistivity	
Σ/A	Magnetic form factor	
τ_{Cu}	DC time constant $\tau_{Cu} = L/R_{Cu} = A_L/A_R$	
ω	Angular frequency; $\omega = 2\pi f$	

The commas used in numerical values denote decimal points.

All dimensions are given in mm.



Surface-mount device