

Ferrite and Accessories

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 $DF = d/\mu_i$	
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_i^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

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$\Delta L/L$	Relative inductance change	H
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
Z_n	Normalized impedance $ Z _n = Z /N^2 \times \epsilon (l_e/A_e)$	Ω/mm

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α	Temperature coefficient (TK)	1/K
α_F	Relative temperature coefficient of material	1/K
α_e	Temperature coefficient of effective permeability	1/K
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	
μ_i	Relative initial permeability	for series components
μ'_p	Relative real (inductive) component of $\bar{\mu}$	Ωm^{-1}
μ''_p	Relative imaginary (loss) component of $\bar{\mu}$	mm ⁻¹
μ_r	Relative permeability	s
μ_{rev}	Relative reversible permeability	s ⁻¹
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	
$\Sigma I/A$	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.

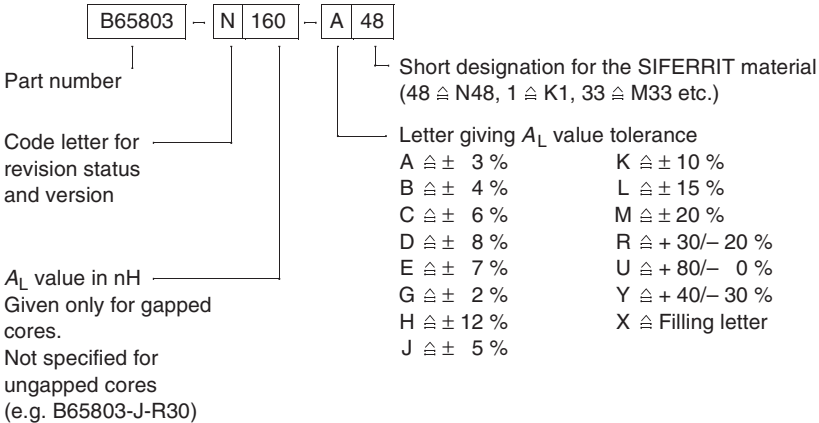
All dimensions are given in mm.

SMD Surface-mount device

Ordering code structure

1 *RM, P, TT/PR, EP, ER9,5, ER11 cores*

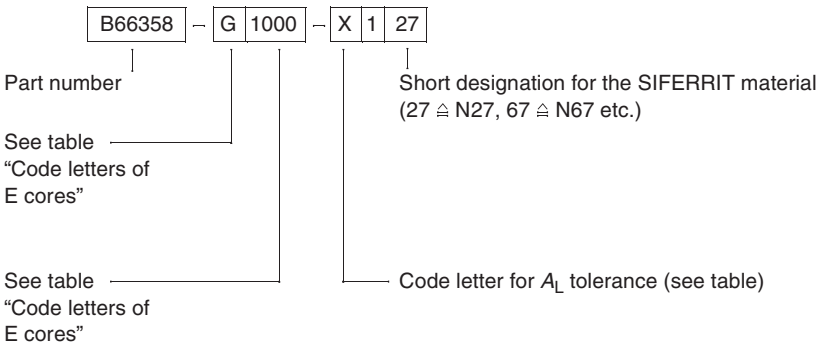
(Example here RM 4)



2 *E, ELP, ER, ETD, EC, EFD, EV cores*

These cores are supplied as single units; each packing unit contains only cores either with or without shortened center leg (gap dimension »g«). The typical value given in the tables for the A_L value applies to a core set consisting of one core with a shortened center leg and one core without a shortened center leg (dimension »g« approx. 0). E cores with a toleranced A_L value are available on request. We then prefer a symmetrical air gap distribution.

Ordering example (here ETD 29)



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Versions (code letters) of RM cores

Type	with center hole (without threaded sleeve)	with center hole (with threaded sleeve)	without center hole	low-profile version
RM 4	A	N	J	P
RM 5	C	N	J	P
RM 6	C	N	J	P
RM 7	A	N	J	P
RM 8	D	F	J	P
RM 10	D	N	J	P
RM 12	—	—	E	P
RM 14	—	—	E	P

Versions (code letters) of P cores

Type	with center hole (without threaded sleeve)	with center hole (with threaded sleeve)	without center hole
P 3,3 × 2,6	—	—	C
P 4,6 × 4,1	B	—	—
P 5,8 × 3,3	D	—	—
P 7 × 4	A	—	—
P 9 × 5	D	T	W
P 11 × 7	D	T	W
P 14 × 8	D	T	W
P 18 × 11	D	T	W
P 22 × 13	D	T	W
P 26 × 16	D	T	W
P 30 × 19	D	T	W
P 36 × 22	D	T	W
P 41 × 25	J	—	—

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Versions (code letters) of E cores

Code letter	Pairing	Code number	Tolerance
G	E - E	Air gap dimensions in μm Not specified f. ungapped cores	Air gap toleranced
U	E - E	A_L value in nH	A_L value, asymmetric air gap
A	E - E	A_L value in nH	A_L value, symmetric air gap
W	E - I (ELP cores)	A_L value in nH	A_L value
P	I core (plate f. ELP cores)	—	—
E	customized set	—	—
F	mirror polished	—	—

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