Ferrites and accessories

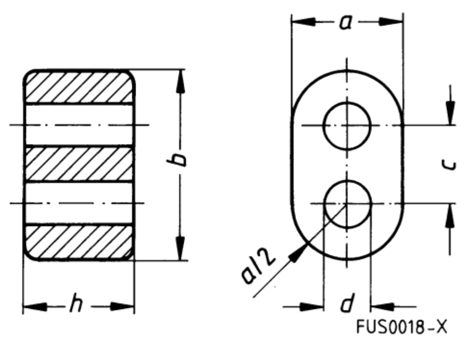
Double-aperture cores

Series/Type: **B62152**
Date: June 2013

Primarily used for broadband transformers up to high frequencies

Application examples

- SIFERRIT material N30 for low frequencies and for pulse applications
- SIFERRIT material K1 for matching transformers and baluns up to about 250 MHz in antenna feeders or in input circuits of VHF and TV receivers



Dimensions[1]	Magnetic characteristics	Weight

[1]) Cores made of NiZn ferrite may exceed the specified dimensions by up to 5%.

Double-aperture cores

B62152

h (mm)	b (mm)	a (mm)	c (mm)	d (mm)	□l/A[1] mm^{-1}	l_e[2] mm	A_e[2] mm^2	V_e[2] mm^2	g
14.5 – 1.0	14.50 – 1.0	8.5 – 0.5	5.85 □0.25	3.4 + 0.60	0.31	15.3	49.7	760	4.0
8.3 – 0.6	14.50 – 1.0	8.5 – 0.5	5.85 □0.25	3.4 + 0.60	0.54	15.3	28.4	435	2.5
6.2 – 0.5	7.25 – 0.5	4.2 – 0.4	2.90 □0.15	1.7 + 0.30	0.75	7.6	10.2	78	0.4
2.5 – 0.2	3.60 – 0.3	2.1 – 0.3	1.45 □0.10	0.8 + 0.15	1.78	3.7	2.1	7.8	0.1
2.0 – 0.2	3.60 – 0.3	2.1 – 0.3	1.45 □0.10	0.8 + 0.15	2.20	3.7	1.7	6.3	0.1
1.4 – 0.2	3.60 – 0.3	2.1 – 0.3	1.45 □0.10	0.8 + 0.15	3.22	3.7	1.2	4.5	0.05

Dimensions with parylene coating[3]

Core	Max. coated h (mm)	Max. coated b (mm)	Max. coated a (mm)	Min. coated d (mm)
DL 14.5/14.5 /8.5	14.55	14.55	8.55	3.35
DL 8.3/14.5 /8.5	8.35	14.55	8.55	3.35
DL 6.2/ 7.25/4.2	6.25	7.30	4.25	1.65
DL 2.5/ 3.6 /2.1	2.55	3.65	2.15	0.75
DL 2.0/ 3.6 /2.1	2.05	3.65	2.15	0.75
DL 1.4/ 3.6 /2.1	1.45	3.65	2.15	0.75

Overview of available types

Core height h (mm)	Material	A_L value[3] nH (Tol. □30%)	Ordering code[4]
14.5 –1.0	K1	330	B62152A0001X001
8.3 –0.6	K1 N30	190 10000	B62152A0004X001 B62152A0004X030
6.2 –0.5	K1 N30	140 7300	B62152A0007X001 B62152A0007X030

[1]) Magnetic characteristics and A_L value are based on winding of center leg.
[2]) Double-aperture cores are available with parylene coating on request. Ordering code for coated version: B62152P…

Please read *Cautions and warnings* and
Important notes at the end of this document.

[3]) Magnetic characteristics and A_L value are based on winding of center leg.
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2.5 –0.2	K1 N30 M13	60 3100 1440	B62152A0008X001 B62152A0008X030 B62152A0008X013
2.0 –0.2	K1 N30 M13	42 2400 1100	B62152A0027X001 B62152A0027X030 B62152A0027X013
1.4 –0.2	N30	1600	B62152A0015X030

Mechanical stress and mounting

Ferrite cores have to meet mechanical requirements during assembling and for a growing number of applications. Since ferrites are ceramic materials one has to be aware of the special behavior under mechanical load.

As valid for any ceramic material, ferrite cores are brittle and sensitive to any shock, fast changing or tensile load. Especially high cooling rates under ultrasonic cleaning and high static or cyclic loads can cause cracks or failure of the ferrite cores.

For detailed information see chapter *"Definitions"*, section 8.1.

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 chapter *"Definitions"*, section 8.2.

Heating up

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

NiZn-materials

The magnetic properties of NiZn-materials can change irreversible in high magnetic fields.

Processing notes

- The start of the winding process should be soft. Else the flanges may be destroid.
- To strong winding forces may blast the flanges or squeeze the tube that the cores can no more be mount.
- To long soldering time at high temperature (>300 °C) may effect coplanarity or pin arrangement.
- Not following the processing notes for soldering of the J-leg terminals may cause solderability problems at the transformer because of pollution with Sn oxyd of the tin bath or burned insulation of the wire. For detailed information see chapter *"Processing notes"*, section 8.2.
- The dimensions of the hole arrangement have fixed values and should be understood asa recommendation for drilling the printed circuit board. For dimensioning the pins, the group of holes can only be seen under certain conditions, as they fit into the given hole arrangement. To avoid problems when mounting the transformer, the manufacturing tolerances for positioning the customers' drilling process must be considered by increasing the hole diameter.

Symbol	Meaning	Unit

Ferrites and accessories

Symbols and terms

	Cross section of coil	
A	Effective magnetic cross section	mm^2
A_e	Inductance factor; $A_L = L/N^2$	mm^2
A_L	Minimum inductance at defined high saturation (□a)	nH
A_{L1}	Minimum core cross section	nH
A_{min}	Winding cross section	mm^2
A_N	Resistance factor; $A_R = R_{Cu}/N^2$	mm^2
A_R	RMS value of magnetic flux density	□□ = 10^{-}
B	Flux density deviation	^{6}□□ Vs/m^2,
□B	Peak value of magnetic flux density	mT
B̂	Peak value of flux density deviation	Vs/m^2, mT
□B̂	DC magnetic flux density	Vs/m^2, mT
	Remanent flux density	Vs/m^2, mT
B_{DC}	Saturation magnetization	Vs/m^2, mT
B_R	Winding capacitance	Vs/m^2, mT
B_S	Core distortion factor	Vs/m^2, mT
C_0	Relative disaccommodation coefficient DF = d/□i	F = As/V
CDF	Disaccommodation coefficient	$mm^{-4.5}$
DF	Activation energy	
d	Frequency	
E_a	Cut-off frequency	
f	Upper frequency limit	J s^{-1},
f_{cutoff}	Lower frequency limit	Hz s^{-1},
f_{max}	Resonance frequency	Hz s^{-1},
f_{min}	Copper filling factor	Hz s^{-1},
f_r	Air gap	Hz s^{-1},
f_{Cu}	RMS value of magnetic field strength	Hz
g	Peak value of magnetic field strength	
H	DC field strength	mm
Ĥ	Coercive field strength	A/m
H_{DC}	Hysteresis coefficient of material	A/m
H_c h	Relative hysteresis coefficient	A/m
h/□i2	RMS value of current	A/m
I	Direct current	10^{-6} cm/A
I_{DC}	Peak value of current	10^{-6} cm/A
Î	Polarization	A
	Boltzmann constant	A
	Third harmonic distortion	A
	Circuit third harmonic distortion	
	Inductance	

Symbols and terms

J k		Vs/m²
k_3		J/K
k_{3c}		
L		H = Vs/A

Symbols and terms

Symbol	Meaning	Unit
□L/L	Relative inductance change	
L_0	Inductance of coil without core	H
L_H	Main inductance	H
L_p	Parallel inductance	H
	Reversible inductance	H
L_{rev} L_s	Series inductance	H 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
	Relative core losses	mW/g
P_V	Performance factor	
PF	Quality factor (Q = □L/R_s = 1/tan□□$_L$)	
Q	Resistance	□
R	Copper (winding) resistance (f = 0)	□
R_{Cu}	Hysteresis loss resistance of a core	□
R_h	R_h change	□
□R_h	Internal resistance	□
R_i	Parallel loss resistance of a core	□
R_p	Series loss resistance of a core	□
	Thermal resistance	K/W
R_s	Effective loss resistance of a core	□ mm
R_{th}	Total air gap	°C
R_V	Temperature	K
s T	Temperature difference	°C
□T	Curie temperature	s
T_C	Time	
t	Pulse duty factor	
t_v	Loss factor	
tan□□	Loss factor of coil	
	(Residual) loss factor at H □ 0	
tan□□$_L$	Relative loss factor	
tan□□$_r$	Hysteresis loss factor	
tan□□$_e$	Relative loss factor of material at H □ 0	V V
tan□□$_h$	RMS value of voltage	mm^3
tan□□/□$_i$	Peak value of voltage	□
U	Effective magnetic volume	□/mm
Û	Complex impedance	

Symbols and terms

Symbol	Meaning	Unit
V_e Z Z_n	Normalized impedance $\|Z\|_n = \|Z\| / N^2$ □ □ (l_e/A_e)	

Symbols and terms

□	Temperature coefficient (TK)	1/K
$□_F$	Relative temperature coefficient of material	1/K
$□_e$	Temperature coefficient of effective permeability	1/K
$□_r$	Relative permittivity	
□	Magnetic flux	Vs
□	Efficiency of a transformer	
$□_B$	Hysteresis material constant	mT^{-1}
$□_i$	Hysteresis core constant	$A^{-1}H^{-1/2}$
$□_s$	Magnetostriction at saturation magnetization	
□	Relative complex permeability	
$□_0$	Magnetic field constant	Vs/Am
$□_a$	Relative amplitude permeability	
$□_{app}$	Relative apparent permeability	
$□_e$	Relative effective permeability	
$□_i$	Relative initial permeability	
$□_p'$	Relative real (inductive) component of □ (for parallel components)	
$□_p''$	Relative imaginary (loss) component of □ (for parallel components)	
$□_r$	Relative permeability	
$□_{rev}$	Relative reversible permeability	
$□_s'$	Relative real (inductive) component of □ (for series components)	
$□_s''$	Relative imaginary (loss) component of □ (for series components)	
$□_{tot}$	Relative total permeability derived from the static magnetization curve	
□	Resistivity	□m
□l/A	Magnetic form factor	mm^{-1}
$□_{Cu}$	DC time constant $□_{Cu} = L/R_{Cu} = A_L/A_R$	s
□	Angular frequency; □□= 2 □f	s^{-1}

All dimensions are given in mm.

SMD Surface-mount device

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