



Ferrites and accessories

EFD 15/8/5
Core and accessories

Series/Type: **B66413, B66414**
Date: September 2006/June 2007

- E core with flattened, lower center leg for especially flat transformer design
- For DC/DC converters
- Delivery mode: single units

Magnetic characteristics (per set)

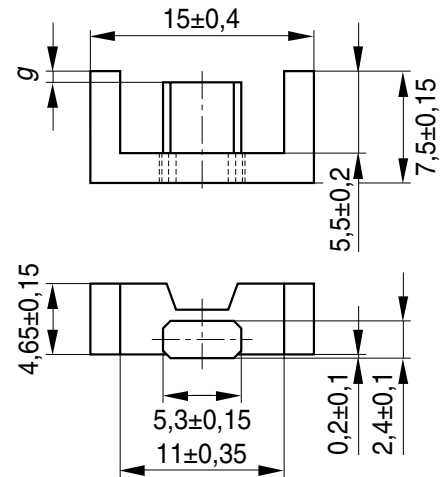
$$\Sigma l/A = 2.27 \text{ mm}^{-1}$$

$$l_e = 34 \text{ mm}$$

$$A_e = 15 \text{ mm}^2$$

$$A_{\min} = 12.2 \text{ mm}^2$$

$$V_e = 510 \text{ mm}^3$$

Approx. weight 2.8 g/set


FEK0417-2

Ungapped

Material	A_L value nH	μ_e	P_V W/set	Ordering code
N49	600 +30/-20%	1080	< 0.11 (50 mT, 500 kHz, 100 °C)	B66413G0000X149
N87	780 +30/-20%	1400	< 0.28 (200 mT, 100 kHz, 100 °C)	B66413G0000X187
N97	820 +30/-20%	1480	< 0.23 (200 mT, 100 kHz, 100 °C)	B66413G0000X197

Gapped

Material	A_L value nH	μ_e	g approx. mm	Ordering code
N87	100 ±10%	180	0.17	B66413U0100K187
	160 ±15%	288	0.08	B66413U0160L187

The A_L value in the table applies to a core set comprising one ungapped core (dimension $g = 0$) and one gapped core (dimension $g > 0$).

Calculation factors (for formulas, see "E cores: general information")

Material	Relationship between air gap – A_L value		Calculation of saturation current			
	K1 (25 °C)	K2 (25 °C)	K3 (25 °C)	K4 (25 °C)	K3 (100 °C)	K4 (100 °C)
N87	29.7	-0.676	44.2	-0.796	33.2	-0.873

Validity range: K1, K2: 0.10 mm < s < 1.00 mm
K3, K4: 30 nH < A_L < 280 nH

Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085: H \triangleq max. operating temperature 180 °C), color code black
 Sumikon PM 9630® [E41429 (M)], SUMITOMO BAKELITE CO LTD

Solderability: to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s

Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

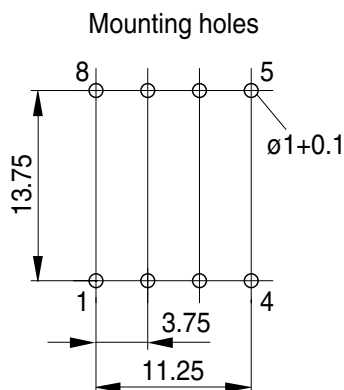
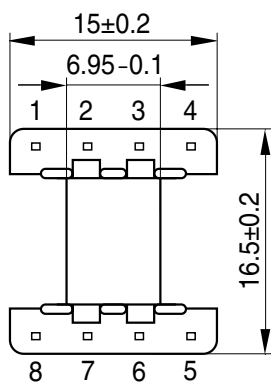
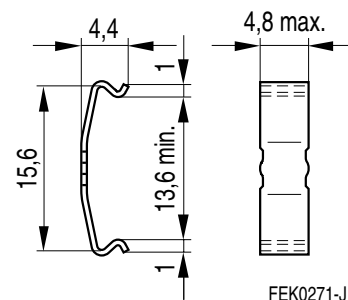
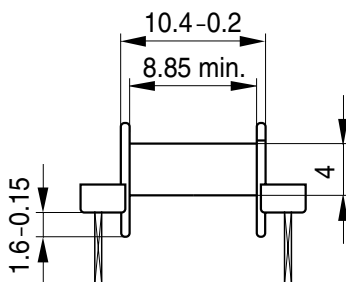
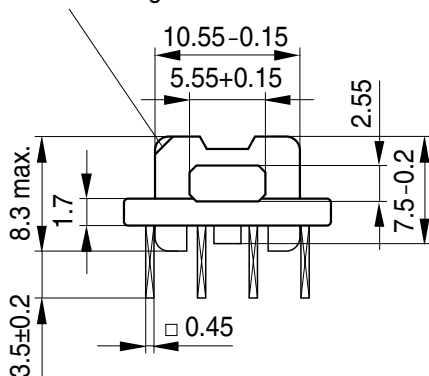
Winding: see Data Book 2007, chapter "Processing notes, 2.1"

Squared pins.

Yoke

Material: Stainless spring steel (0.25 mm)

Coil former					Ordering code
Sections	A _N mm ²	l _N mm	A _R value μΩ	Pins	
1	15.5	35.9	79.7	8	B66414W1008D001
Yoke (ordering code per piece, 2 are required)					B66414B2000X000

Coil former

Yoke

Pin 1 marking


FEK0418-A-E

SMD coil former with J terminals

Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085:
 $F \cong$ max. operating temperature 155 °C), color code black
 Vectra C 130 [E83005 (M)], TICONA

Solderability: to IEC 60068-2-58, test Td, method 6 (Group 3): 245 °C, 3 s

Resistance to soldering heat: to IEC 60068-2-58, test Td, method 6 (Group 3): 255 °C, 10 s
 permissible soldering temperature for wire-wrap connection on coil former: 400 °C, 1 s

Winding: see "Processing notes, 2.1"

Yoke

Material: Stainless spring steel (0.25 mm)

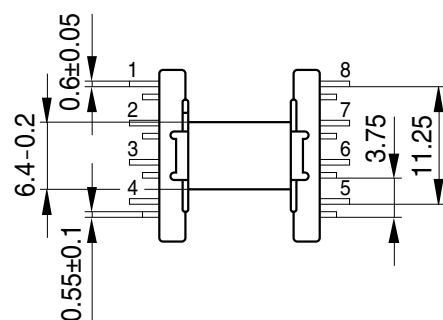
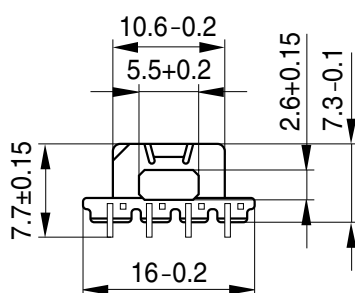
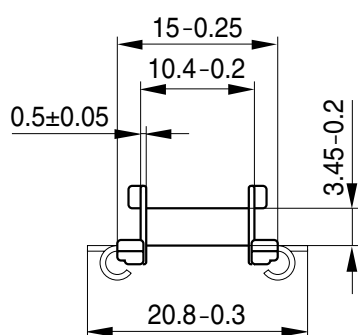
Mounting: Preferred assembly direction from the top

Cover plate

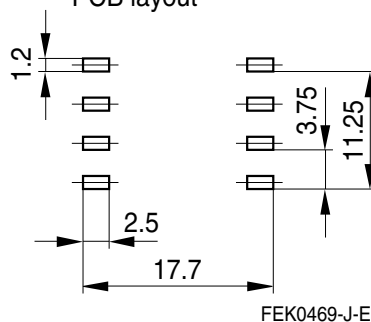
For marking and improved processing on assembly machines.

See under coil former for material and resistance to soldering heat.

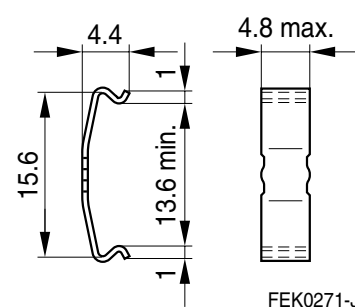
Coil former					Ordering code
Sections	A_N mm ²	l_N mm	A_R value $\mu\Omega$	Terminals	
1	18.1	35.1	66.7	8	B66414B6008T001
Yoke (ordering code per piece, 2 are required)					B66414B2000X000
Cover plate					B66414A7000X000

Coil former


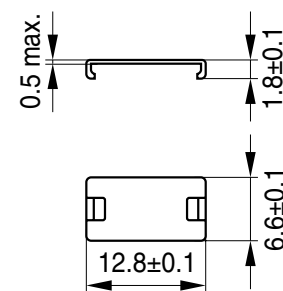
Recommended PCB layout



FEK0469-J-E

Yoke


FEK0271-J

Cover plate


FEK0187-Y

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 Data Book 2007, chapter “General – Definitions, 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 Data Book 2007, chapter “General – Definitions, 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 destroyed.
- 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 Data Book 2007, chapter “Processing notes, 2.2”.
- The dimensions of the hole arrangement have fixed values and should be understood as a 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.

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