



## Ferrites and accessories

RM 5, RM 5 LP  
Cores and accessories

**Series/Type:** B65805, B65806, B65822, B65539

**Date:** September 2006/October 2007

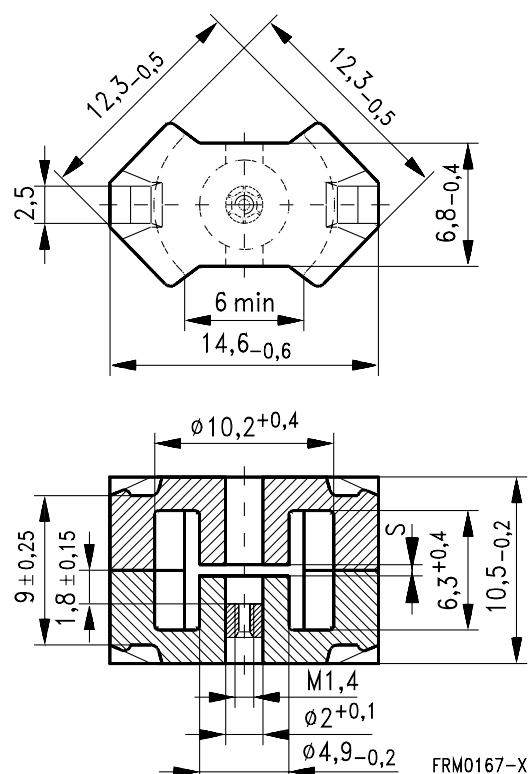
- To IEC 62317-4
- Core without center hole  
for transformer applications
- Delivery mode: sets

**Magnetic characteristics (per set)**

|              | with<br>center hole | without<br>center hole |                  |
|--------------|---------------------|------------------------|------------------|
| $\Sigma l/A$ | 1.0                 | 0.93                   | mm <sup>-1</sup> |
| $l_e$        | 20.8                | 22.1                   | mm               |
| $A_e$        | 20.8                | 23.8                   | mm <sup>2</sup>  |
| $A_{min}$    | —                   | 18                     | mm <sup>2</sup>  |
| $V_e$        | 433                 | 526                    | mm <sup>3</sup>  |

**Approx. weight (per set)**

|   |     |     |   |
|---|-----|-----|---|
| m | 2.9 | 3.0 | g |
|---|-----|-----|---|


**Gapped**

| Material | $A_L$ value<br>nH             | s<br>approx.<br>mm   | $\mu_e$           | Ordering code <sup>1)</sup><br>-C with center hole<br>-N with threaded sleeve |
|----------|-------------------------------|----------------------|-------------------|-------------------------------------------------------------------------------|
| K1       | 25 ±3%<br>40 ±3%              | 1.0<br>0.40          | 19.9<br>31.8      | B65805+0025A001<br>B65805+0040A001                                            |
| M33      | 63 ±3%<br>100 ±3%             | 0.4<br>0.2           | 50.2<br>79.6      | B65805+0063A033<br>B65805+0100A033                                            |
| N48      | 160 ±3%<br>250 ±3%<br>315 ±3% | 0.12<br>0.06<br>0.03 | 127<br>199<br>251 | B65805+0160A048<br>B65805+0250A048<br>B65805+0315A048                         |

1) Replace the + by the code letter "C" or "N" for the required version.

**Ungapped**

| Material | A <sub>L</sub> value | $\mu_e$ | P <sub>V</sub>                   | Ordering code                                 |
|----------|----------------------|---------|----------------------------------|-----------------------------------------------|
|          | nH                   |         | W/set                            | -C with center hole<br>-J without center hole |
| N48      | 1800 +30/-20%        | 1430    |                                  | B65805C0000R048                               |
| N45      | 2600 +30/-20%        | 1920    |                                  | B65805J0000R045                               |
| N30      | 3500 +30/-20%        | 2590    |                                  | B65805J0000R030                               |
| T38      | 6700 +40/-30%        | 4950    |                                  | B65805J0000Y038                               |
| T66      | 9600 +40/-30%        | 7090    |                                  | B65805J0000Y066                               |
| N49      | 1300 +30/-20%        | 960     | < 0.06 ( 50 mT, 500 kHz, 100 °C) | B65805J0000R049                               |
| N87      | 2000 +30/-20%        | 1480    | < 0.32 (200 mT, 100 kHz, 100 °C) | B65805J0000R087                               |
| N97      | 2000 +30/-20%        | 1480    | < 0.24 (200 mT, 100 kHz, 100 °C) | B65805J0000R097                               |
| N41      | 2600 +30/-20%        | 1920    | < 0.10 (200 mT, 100 kHz, 100 °C) | B65805J0000R041                               |

## Coil former

Material: GFR thermosetting plastic (UL 94 V-0, insulation class to IEC 60085:  
 $H \triangleq$  max. operating temperature 180 °C), color code blue  
 Bakelite UP 3420® [E61040 (M)], HEXION SPECIALTY CHEMICALS GMBH

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

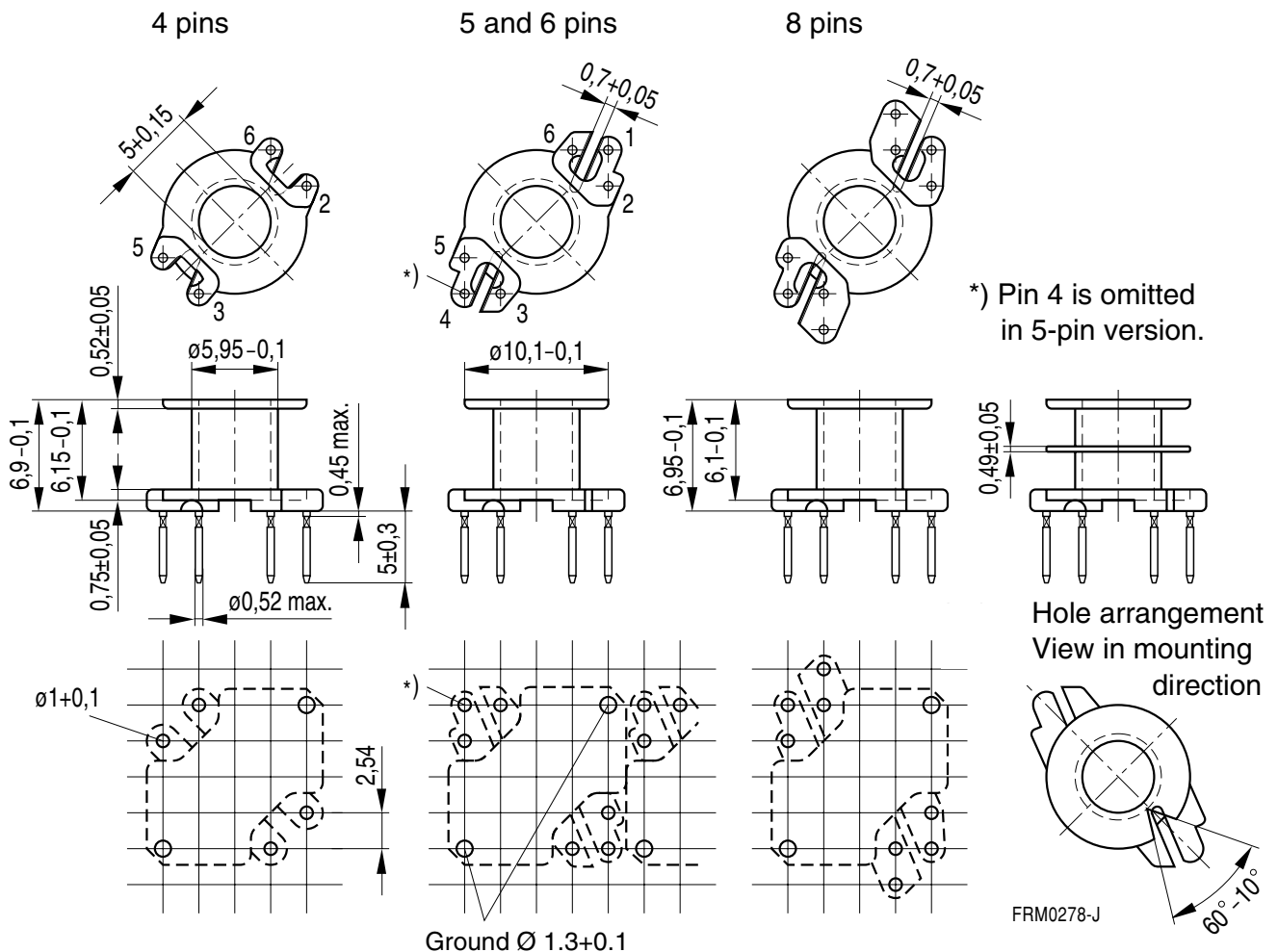
Resistance to soldering heat: to IEC 60068-2-20, test Tb, method 1B: 350 °C, 3.5 s

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

Pins squared in the start-of-winding area.

For matching clamps and insulating washers see page 5.

| Sections | $A_N$<br>mm <sup>2</sup> | $l_N$<br>mm | $A_R$ value<br>$\mu\Omega$ | Pins             | Ordering code                                                            |
|----------|--------------------------|-------------|----------------------------|------------------|--------------------------------------------------------------------------|
| 1        | 9.5                      | 25          | 90                         | 4<br>5<br>6<br>8 | B65806K1004D001<br>B65806K1005D001<br>B65806K1006D001<br>B65806K1008D001 |
| 2        | 8.7                      | 25          | 94                         | 6                | B65806K1006D002                                                          |



### Clamp

- With ground terminal, made of stainless spring steel (tinned), 0.335 mm thick
- Solderability to IEC 60068-2-20, test Ta, method 1 (aging 3): 235 °C, 2 s
- Also available as strip clamp on reels on request

### Insulating washer 1 between core and coil former

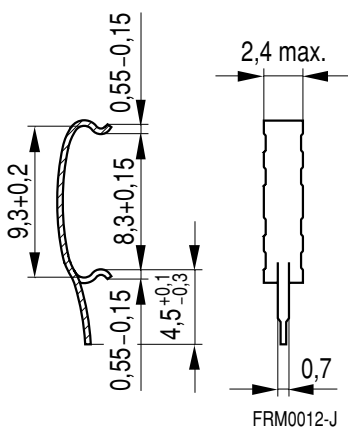
- For tolerance compensation and for insulation
- Made of polycarbonate (UL 94 V-0, insulation class to IEC 60085: E  $\triangleq$  120 °C), 0.08 mm thick Aryphan F685, [E167358 (M)], natural color, LOFO HIGH TECH FILM GMBH

### Insulating washer 2 for double-clad PCBs

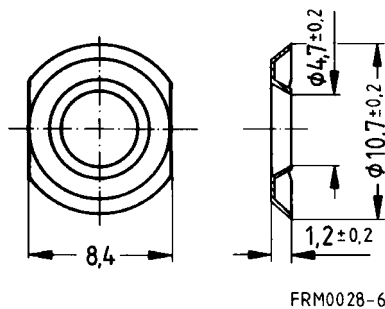
- Made of polycarbonate (UL 94 V-0, insulation class to IEC 60085: E  $\triangleq$  120 °C), 0.3 mm thick Makrofol FR, [E118859(M)], natural color, BAYER MATERIALSCIENCE L L C

|                                                 | Ordering code   |
|-------------------------------------------------|-----------------|
| Clamp (ordering code per piece, 2 are required) | B65806A2203X000 |
| Insulating washer 1 (reel packing, PU = 1 reel) | B65806A5000X000 |
| Insulating washer 2 (bulk)                      | B65806D2005X000 |

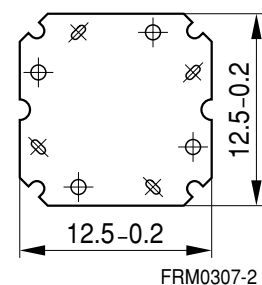
### Clamp



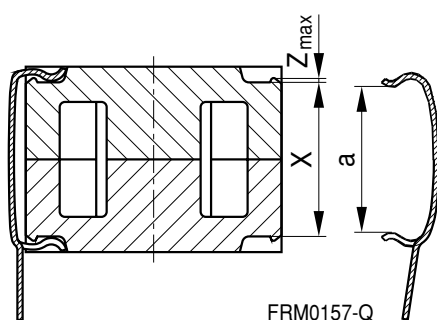
### Insulating washer 1 (preliminary data)



### Insulating washer 2



### Clamping forces for RM 5



$F_{\min}$ : Extension of clamp from a to  $a_2 = X_{\min}$   
 $F_{\max}$ : Extension of clamp from a to  $a_1 = X_{\max}$

|                            |                                    |
|----------------------------|------------------------------------|
| Clamp opening a (mm)       | 8.3 ± 0.15                         |
| Core nose $Z_{\max}$ (mm)  | 0.15                               |
| Height of core pair X (mm) | $X_{\min}$ 8.75<br>$X_{\max}$ 9.25 |
| Clamping force F (N)       | $F_{\min}$ 5<br>$F_{\max}$ 40      |



### SMD coil former with gullwing terminals

Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085:

$F \triangleq$  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 Data Book 2007, chapter "Processing notes, 2.1"

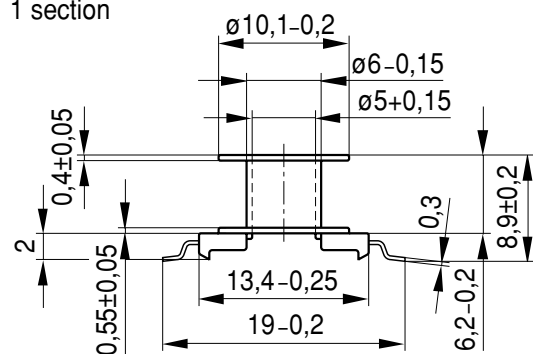
### Clamp

- Without ground terminal, made of stainless spring steel, 0.335 mm thick
- Also available as strip clamp (each carton containing 2 reels) on request

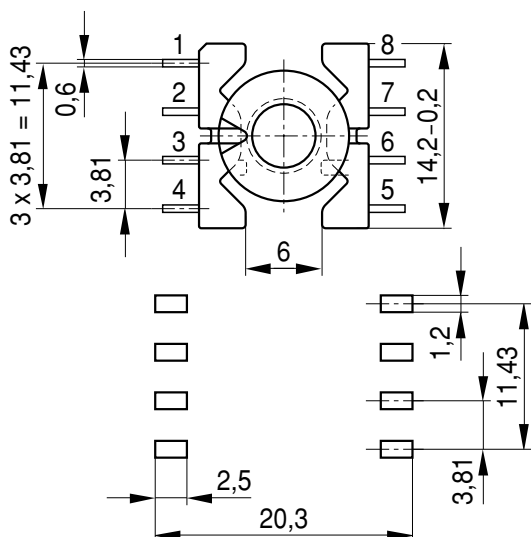
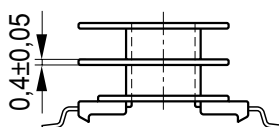
| Sections                                        | $A_N$<br>mm <sup>2</sup> | $l_N$<br>mm | $A_R$ value<br>$\mu\Omega$ | Terminals | Ordering code   |
|-------------------------------------------------|--------------------------|-------------|----------------------------|-----------|-----------------|
| 1                                               | 11.1                     | 25          | 77                         | 8         | B65822F1008T001 |
| 2                                               | 10.2                     | 25          | 85                         | 8         | B65822F1008T002 |
| Clamp (ordering code per piece, 2 are required) |                          |             |                            |           | B65806J2204X000 |

### Coil former

1 section



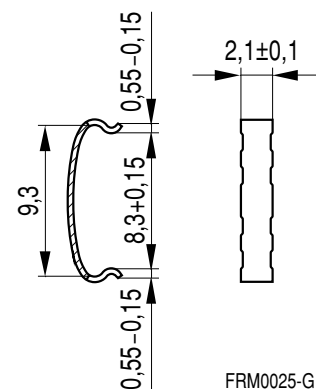
2 sections



Recommended  
PCB layout

FRM0296-H

### Clamp



FRM0025-G



### SMD coil former with J terminals

Material: GFR liquid crystal polymer (UL 94 V-0, insulation class to IEC 60085:

$F \triangleq$  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 Data Book 2007, chapter "Processing notes, 2.1"

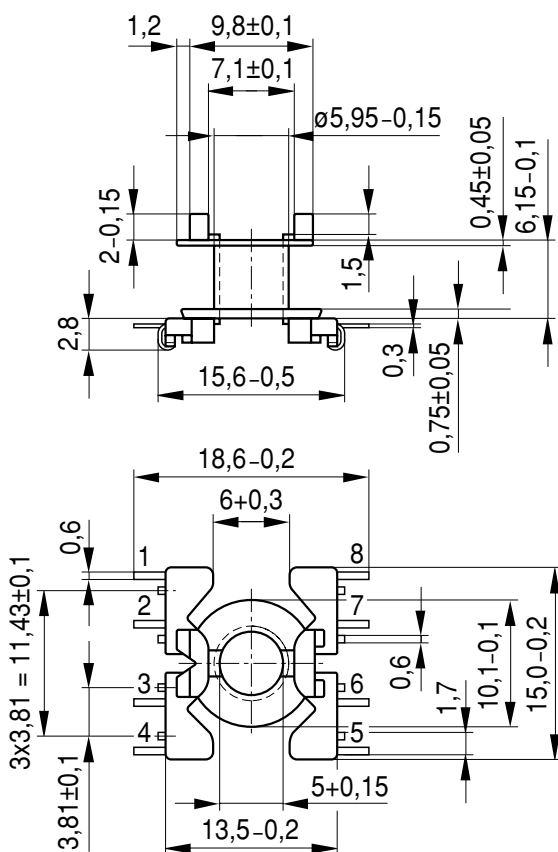
### Clamp

■ Without ground terminal, made of stainless spring steel, 0.335 mm thick

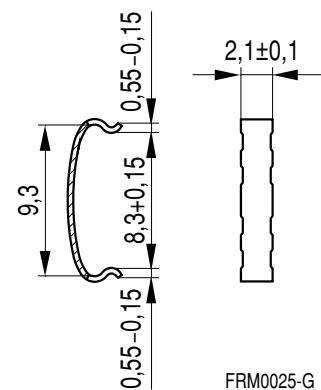
■ Also available as strip clamp (each carton containing 2 reels) on request

| Sections                                        | $A_N$<br>mm <sup>2</sup> | $l_N$<br>mm | $A_R$ value<br>$\mu\Omega$ | Terminals | Ordering code   |
|-------------------------------------------------|--------------------------|-------------|----------------------------|-----------|-----------------|
| 1                                               | 11.1                     | 25          | 73                         | 8         | B65822J1008T001 |
| Clamp (ordering code per piece, 2 are required) |                          |             |                            |           | B65806J2204X000 |

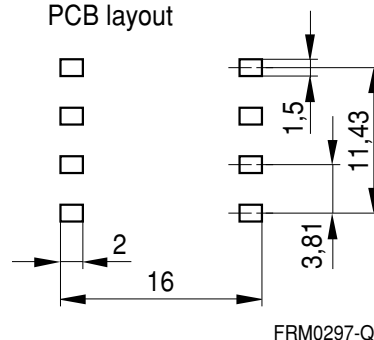
### Coil former



### Clamp



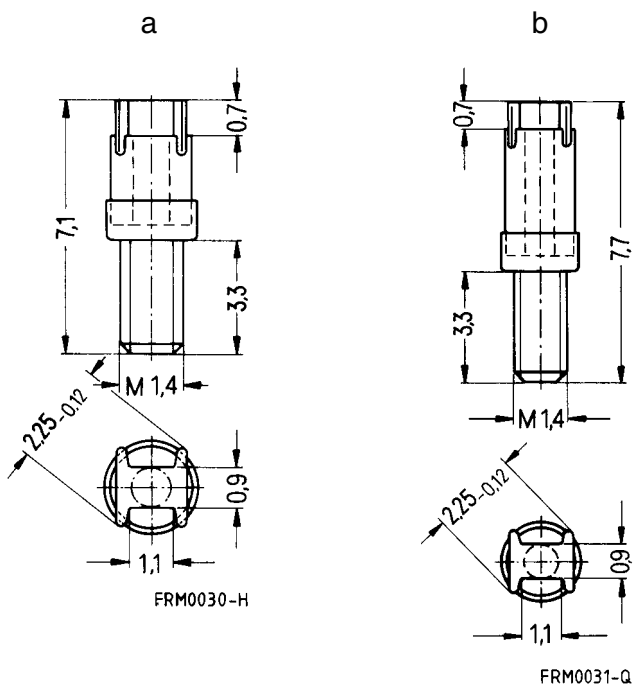
### Recommended PCB layout



### Adjusting screw

- Tube core with thread and core brake made of GFR polyterephthalate  
Pocan B3235® [E245249 (M)], LANXESS AG

| Figure | Tube core<br>$\varnothing \times \text{length (mm)}$ | Material | Color code | Ordering code   |
|--------|------------------------------------------------------|----------|------------|-----------------|
| a      | 1.81 × 2.0                                           | K1       | yellow     | B65539C1003X001 |
| a      | 1.81 × 2.7                                           | K1       | gray       | B65539C1002X001 |
| a      | 1.81 × 2.7                                           | N22      | red        | B65539C1002X022 |
| b      | 1.81 × 3.4                                           | N22      | green      | B65806C3001X022 |



- To IEC 62317-4
- For compact transformers
- Without center hole
- Delivery mode: sets

**Magnetic characteristics (per set)**

$$\Sigma l/A = 0.71 \text{ mm}^{-1}$$

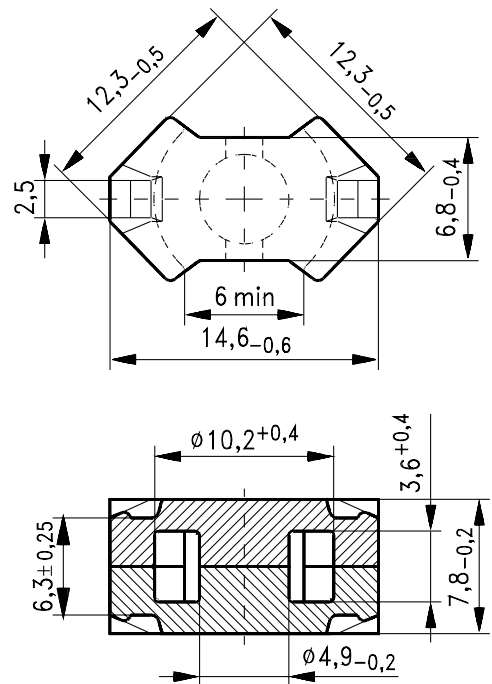
$$l_e = 17.5 \text{ mm}$$

$$A_e = 24.5 \text{ mm}^2$$

$$A_{\min} = 18 \text{ mm}^2$$

$$V_e = 430 \text{ mm}^3$$

**Approx. weight** 2.6 g/set



FRM0168-6

**Ungapped**

| Material          | $A_L$ value<br>nH | $\mu_e$ | $P_V$<br>W/set                   | Ordering code   |
|-------------------|-------------------|---------|----------------------------------|-----------------|
| T38 <sup>1)</sup> | 7700 +40/-30%     | 4380    |                                  | B65805P0000Y038 |
| N49               | 1700 +30/-20%     | 970     | < 0.09 ( 50 mT, 500 kHz, 100 °C) | B65805P0000R049 |
| N92               | 1900 +30/-20%     | 1080    | < 0.29 (200 mT, 100 kHz, 100 °C) | B65805P0000R092 |
| N87               | 2400 +30/-20%     | 1360    | < 0.26 (200 mT, 100 kHz, 100 °C) | B65805P0000R087 |

1) Preliminary data

**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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