MAGNETIC PRODUCTS

DATA HANDBOOK

Soft Ferrites

BOOK MA01 1991

Philips Components

PHILIPS

SOFT FERRITES
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Introduction

1.0 THE NATURE OF SOFT FERRITES

1.1 Composition

Ferrites are dark grey or black ceramic materials. They are very hard, brittle and chemically inert. Most modern magnetically soft ferrites have a cubic (spinel) structure.

The general composition of such ferrites is $MeFe_2O_4$ where Me represents one or several of the divalent transition metals such as manganese (Mn), zinc (Zn), nickel (Ni), cobalt (Co), copper (Cu), iron (Fe) or magnesium (Mg).

The most popular combinations are manganese and zinc (MnZn) or nickel and zinc (NiZn). These compounds exhibit good magnetic properties below a certain temperature, called the Curie Temperature (T_C). They can easily be magnetized and have a rather high intrinsic resistivity. These materials can be used up to very high frequencies without laminating as is the normal requirement for magnetic metals.

NiZn ferrites have a very high resistivity and are therefore most suitable for frequencies over 1 MHz but MnZn ferrites exhibit higher permeabilities (μ_i) and saturation induction levels (B_S).

For certain special applications, single crystal ferrites can be produced but the majority of ferrites are manufactured as polycrystalline ceramics.

1.2 Manufacturing process

The following description of the production process is typical for the manufacture of our range of soft ferrites, which is marketed under the trade name "Ferroxcube".

1.2.1 Raw materials

The raw materials used are oxides or carbonates of the constituent metals. The final material grade determines the necessary purity of the raw materials used, which, as a result is reflected in the overall cost.

1.2.2 Proportions of the composition

The base materials are weighed into the correct proportions required for the final composition.

1.2.3 Mixing

The powders are mixed to obtain a uniform distribution of the components.

1.2.4 Pre-sintering

The mixed oxides are calcined at approximately 1000 °C. A solid state reaction takes place between the constituents and, at this stage, a ferrite is already formed.

Pre-sintering is not essential but provides a number of advantages during the remainder of the production process.

1.2.5 Milling and granulation

The pre-sintered material is milled to a specific particle size, usually in a slurry with water. A small proportion of organic binder is added and then the slurry is spray-dried to form granules suitable for the forming process.

1.2.6 Forming

Most ferrite parts are formed by pressing. The granules are poured into a suitable die and then compressed. The organic binder acts in a similar way to an adhesive and a so-called "green" product is formed. It is still very fragile and requires sintering to obtain the real ferrite properties.

For some products, for example, long rods or tubes, the material is mixed into a dough and extruded through a suitable orifice. The final products are cut to the required length before or after sintering.

1.2.7 Sintering

The "green" cores are loaded on refractory plates and sintered at a temperature between 1150 °C and 1300 °C depending on the ferrite grade. A linear shrinkage of up to 20% (50% in volume) takes place. The sintering may take place in tunnel kilns having a fixed temperature and atmosphere distribution or in box kilns where temperature and atmosphere are computer controlled as a function of time. The latter type is more suitable for high grade ferrites which need a very stringent control in conditions.

1.2.8 Finishing

After sintering, the ferrite core has the required magnetic properties, and dimensions are typically within 2% of nominal because of spread in shrinkage. If this tolerance is too large or if some surfaces require a smooth finish (e.g. mating faces between core halves) a grinding operation is necessary. Usually diamond-coated wheels are used. For high permeability materials very smooth, glossy polished, pole faces are required. If an artificial airgap is called for in the application, it may be provided by undercutting the appropriate pole face.

1.3 Magnetism in ferrites

A sintered ferrite consists of small crystals, typically 10 - 20 μm in dimension. Domains exist within these crystals (Weiss domains) in which the molecular magnets are already aligned (ferrimagnetism). When a driving magnetic field (H) is applied to the material the domains progressively align with it, as shown in Fig.1.1.

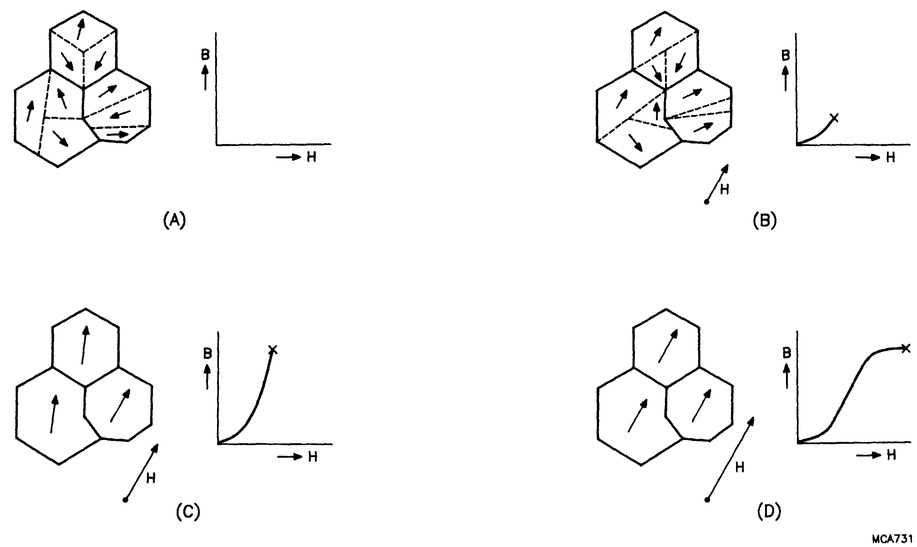


Fig.1.1 Alignment of domains.

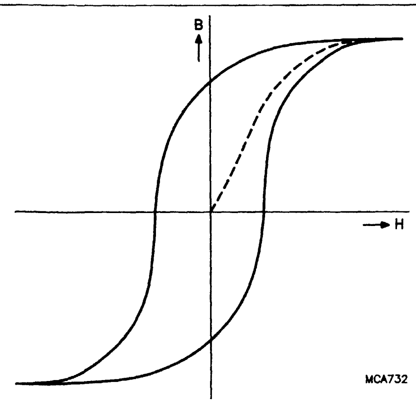


Fig.1.2 Hysteresis loop.

During this magnetization process energy barriers have to be overcome. Therefore the magnetization will always lag behind the field. A so-called hysteresis loop (Fig.1.2) is the result.

If the resistance against magnetization is small, a large induced flux will result at a given magnetic field. The value of the permeability is high. Also the shape of the hysteresis loop has a marked influence on other properties, for example, power losses.

2.0 EXPLANATION OF TERMS AND FORMULAE

2.1 Symbols and units

SYMBOL	UNIT	DESCRIPTION
A_e	mm^2	effective cross-sectional area of a core
A_{min}	mm^2	minimum cross-sectional area of a core
A_L	nH	inductance factor
B	T	magnetic flux density
B_r	T	remanence
B_s	T	saturation flux density
$\hat{B}$	T	peak flux density
C	F	capacitance
D_F	-	disaccommodation factor
f	Hz	frequency
G	µm	gap length
H	A/m	magnetic field strength
H_c	A/m	coercivity
$\hat{H}$	A/m	peak magnetic field strength
I	A	current
l_e	mm	effective magnetic path length
L	H	inductance
N	-	number of turns
P_v	mW/cm^3	specific power loss of core material
Q	-	quality factor
T_c	°C	Curie temperature
V_e	mm^3	effective volume of a core
α_F	K^{-1}	temperature factor of permeability
$\tan\delta/\mu_i$	-	loss factor
η_B	T^{-1}	hysteresis magnetic constant
µ	-	absolute permeability
μ_o	Hm^{-1}	magnetic constant ($4\pi . 10^{-7}$)
μ_s'	-	real component of complex series permeability
μ_s''	-	imaginary component of complex series permeability
μ_a	-	amplitude permeability
μ_e	-	effective permeability
μ_i	-	initial permeability
μ_r	-	relative permeability
μ_Δ	-	incremental permeability
ρ	Ωm	resistivity
Σ(l/A)	mm^{-1}	core factor (C1)

2.2 Definition of terms

2.2.1 PERMEABILITY

When a magnetic field is applied to a soft magnetic material, the resulting flux density is composed of that of free space plus the contribution of the aligned domains.

$B = \mu_o H + J$, or
$B = \mu_o (H + M)$

where $\mu_o = 4\pi . 10^{-7}$ H/m,

J is the magnetic polarization, and
M is the magnetization.

The ratio of flux density and applied field is called absolute permeability.

$$\frac{B}{H} = \mu_o \left(1 + \frac{M}{H}\right) = \mu_{absolute}$$

It is usual to express this absolute permeability as the product of the magnetic constant of free space (μ_o) and the relative permeability (μ_r).

$$\frac{B}{H} = \mu_o \mu_r$$

Since there are several versions of μ_r depending on conditions, the index 'r' is generally removed and replaced by the applicable symbol e.g. μ_i, μ_a, μ_Δ etc.

2.2.2 INITIAL PERMEABILITY (μ_i)

The initial permeability is measured in a closed magnetic circuit (ring core) using a very low field strength.

$$\mu_i = \frac{1}{\mu_o} \cdot \frac{\Delta B}{\Delta H} (\Delta H \; . \; 0)$$

Initial permeability is dependent on temperature and frequency.

2.2.3 EFFECTIVE PERMEABILITY (μ_e)

If an airgap is introduced in a closed magnetic circuit, magnetic polarization becomes more difficult. As a result, the flux density for a given magnetic field strength is lower.

Effective permeability is dependent on the initial permeability (μ_i) of the soft magnetic material and the dimensions of airgap and circuit.

$$\mu_e = \frac{\mu_i}{1 + (G/1_e \cdot \mu_i)}$$

where
G is the gap length, and
l_c is the effective length of magnetic circuit.

2.2.4 AMPLITUDE PERMEABILITY (μ_a)

The relationship between higher field strength and flux densities without the presence of a bias field is given by the amplitude permeability.

$$\mu_a = \frac{1}{\mu_o} \cdot \frac{\hat{B}}{\hat{H}}$$

Since the BH loop is far from linear, values depend on the applied field peak strength.

2.2.5 INCREMENTAL PERMEABILITY (μ_Δ)

The permeability observed when an alternating magnetic field is superimposed on a static bias field H_{DC} is called the incremental permeability.

$$\mu_\Delta = \frac{1}{\mu_o} \left[\frac{\Delta B}{\Delta H}\right] H_{DC}$$

If the amplitude of the alternating field is negligibly small, the permeability is then called the reversable permeability (μ_{rev}).

2.2.6 COMPLEX PERMEABILITY (μ)

A coil consisting of windings on a soft magnetic core will never be an ideal inductance with phase angle + 90°. There will always be losses of some kind, causing a phase shift δ, which can be represented by a series or parallel resistance as shown in Figs 2.1 and 2.2.

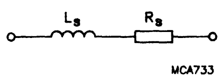


Fig.2.1 Series representation.

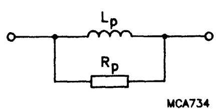


Fig.2.2 Parallel representation.

For series representation,

$$\bar{Z} = j\omega L_s + R_s$$

and for parallel representation,

$$\bar{Z} = \frac{1}{1/j\omega L_p + 1/R_p}$$

The magnetic losses are accounted for if a resistive term is added to the permeability.

$$\mu = \mu_s' - j\mu_s'' \text{ or}$$

$$\frac{1}{\mu} = \frac{1}{\mu_p'} - \frac{1}{\mu_p''}$$

The phase shift caused by magnetic losses is given by:

$$\tan \delta_m = \frac{R_s}{\omega L_s} = \frac{\mu_s''}{\mu_s'} \text{ or}$$

$$\tan \delta_m = \frac{\omega L_p}{R_p} = \frac{\mu_p'}{\mu_p''}$$

For calculations on inductors and also to characterise ferrites, the series representation is generally used (μ_s' and μ_s"). In some applications e.g. signal transformers, the use of the parallel representation (μ_p' and μ_p") is more convenient.

The relationship between the representations is given by:

$$\mu_p' = \mu_s' (1 + \tan^2 \delta) \text{, and}$$

$$\mu_p'' = \mu_s'' (1 + \frac{1}{\tan^2 \delta})$$

2.2.7 LOSS FACTOR ($\tan\delta/\mu_i$)

The magnetic losses which cause the phase shift δ can be split up into three components:

- hysteresis losses
- Eddy current losses
- residual losses.

This gives the formula:

$$\tan\delta_m = \tan\delta_h + \tan\delta_F + \tan\delta_r$$

Figure 2.3 shows the magnetic losses as a function of frequency.

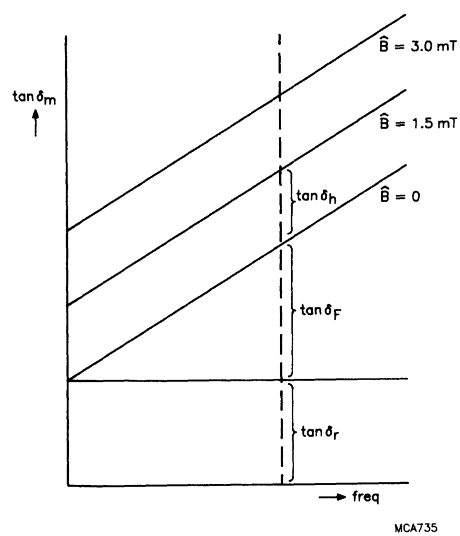


Fig.2.3 Magnetic losses ($\tan\delta_m$) as a function of frequency.

Hysteresis losses vanish for very low field strength. Eddy current losses increase with frequency and are negligible at very low frequency. The remaining part is called residual loss. It can be proven that for a gapped magnetic circuit, the following relationship is valid:

$$\frac{(\tan\delta_m)_{gapped}}{\mu_e - 1} = \frac{\tan\delta_m}{\mu_i - 1}$$

Since μ_i and μ_e are usually much greater than 1, a good approximation is:

$$\frac{(\tan\delta_m)_{gapped}}{\mu_e} = \frac{\tan\delta_m}{\mu_i}$$

From this formula, the magnetic losses in a gapped circuit can be derived from:

$$(\tan\delta_m)_{gapped} = \frac{\tan\delta_m}{\mu_i} \cdot \mu_e$$

Normally, the index 'm' is dropped when material properties are discussed:

$$(\tan\delta)_{gapped} = \frac{\tan\delta}{\mu_i} \cdot \mu_e$$

In material specifications, the loss factor ($\tan\delta/\mu_i$) is used to describe the magnetic losses. These include residual and Eddy current losses, but not hysteresis losses.

For inductors used in filter applications, the quality factor (Q) is often used as a measure of performance. It is defined as:

$$\Omega = \frac{1}{\tan\delta} = \frac{\omega L}{R_{tot}} = \frac{\text{reactance}}{\text{total resistance}}$$

The total resistance includes the effective resistance of the winding at the design frequency.

2.2.8 HYSTERESIS MATERIAL CONSTANT (η_B)

If the flux density of a core is increased, hysteresis losses are more noticeable. Their contribution to the total losses can be obtained by means of two measurements, usually at the induction levels of 1.5 mT and 3 mT. The hysteresis constant is found from:

$$\eta_B = \frac{\Delta \tan\delta_m}{\mu_e \cdot \Delta \hat{B}}$$

The hysteresis loss factor for a certain flux can be calculated using η_B.

$$\frac{\tan\delta_h}{\mu_e} = \eta_{\hat{B}} \cdot B$$

This formula is also the IEC definition for the hysteresis constant.

2.2.9 EFFECTIVE CORE DIMENSIONS ($\Sigma(l/A)$, A_e, l_e, V_e)

To facilitate calculations on non-uniform soft magnetic cores, a set of effective dimensions is given on each data sheet. These dimensions, namely effective area (A_e), effective length (l_e) and effective volume (V_e) define a hypothetical ring core which would have the same magnetic properties as the non-uniform core.

The reactance of the ideal ring core would be:

$$\frac{l_e}{\mu \cdot A_e}$$

For the non-uniform core shapes, this is usually written as:

$$\frac{1}{\mu_e} \cdot \Sigma \frac{l}{A}$$

the core factor being divided by the permeability. The inductance of the core can now be calculated using this core factor:

$$L = \frac{\mu_o N^2}{\frac{1}{\mu_e} \cdot \Sigma \frac{1}{A}}$$

$$= \frac{1.257 \cdot 10^{-9} N^2}{\frac{1}{\mu_e} \cdot \Sigma \frac{1}{A}} \text{ (in H)}$$

The effective area is used to calculate the flux density in a core,

for sine wave:

$$\hat{B} = \frac{U \sqrt{2} \cdot 10^9}{\omega A_e N} \text{ (in mT)}$$

$$= \frac{2.25U \cdot 10^8}{f N A_e} \text{ (in mT)}$$

for square wave:

$$\hat{B} = \frac{0.25\hat{U} \cdot 10^9}{f N A_e} \text{ (in mT)}$$

where:

A_e is the effective area in mm^2
U is the voltage in V
f is the frequency in Hz
N is the number of turns.

The magnetic field strength (H) is calculated using l_e:

$$\hat{H} = \frac{I \; N \; \sqrt{2}}{l_e} \text{(A/m)}$$

If the cross-sectional area of a core is non-uniform, there will always be a point where the real cross-section is minimal. This value is known as A_{min}, and is used to calculate the maximum flux density in a core. A well designed ferrite core avoids a large difference between A_e and A_{min}. Narrow parts of the core could saturate or cause much higher hysteresis losses.

2.2.10 INDUCTANCE FACTOR (A_L)

To make the calculation of the inductance of a coil easier, the inductance factor, known as the A_L value, is given in each data sheet. The inductance of the core is defined as:

$$L = N^2 \; A_L$$

The value is calculated using the core factor and the effective permeability:

$$A_L = \frac{\mu_o \; \mu_e \cdot 10^6}{\Sigma \frac{1}{A}}$$

$$= \frac{1.257 \, \mu_e}{\Sigma \frac{1}{A}} \text{(nH)}$$

2.2.11 MAGNETIZATION CURVES (H_c, B_r, B_s)

If an alternating field is applied to a soft magnetic material, a hysteresis loop is obtained. For very high field strength, the maximum attainable flux density is reached. This is known as the saturation flux density (B_s) .

If the field is removed, the material returns to a state where, depending on the material grade, a certain flux density remains. This is the remanent flux density (B_r).

This remanent flux returns to zero for a certain negative field strength which is referred to as coercivity (H_c).

These points are clearly shown in Fig.2.4.

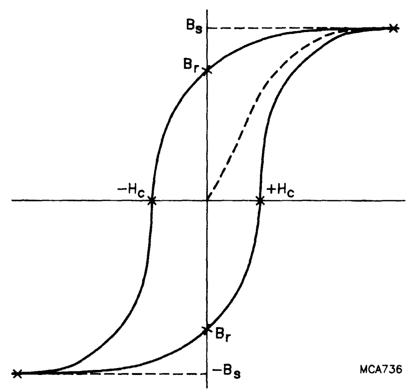


Fig.2.4 Typical BH curve showing points B_s, B_r and H_c.

2.2.12 TEMPERATURE DEPENDENCY OF THE PERMEABILITY (T_c, α_F)

The permeability of a ferrite is a function of temperature. It generally increases with temperature to a maximum value and then drops sharply to a value of 1. The temperature at which this happens is called the Curie temperature (T_c). Typical curves of our grades are given in the material data section.

For filter applications, the temperature dependence of the permeability is a very important parameter. A filter coil should be designed in such a way that the combination it forms with a high quality capacitor results in a LC filter with an excellent temperature stability.

The temperature coefficient (TC) of the permeability is given by:

$$TC = \frac{(\mu_i)_{T2} - (\mu_i)_{T1}}{(\mu_i)_{T1}} \cdot \frac{1}{T_2 - T_1}$$

For a gapped magnetic circuit, the influence of the permeability temperature dependence is reduced by the factor μ_e/μ_i. Hence:

$$TC_{gapped} = \frac{\mu_e}{(\mu_i)_{T1}} \cdot \frac{(\mu_i)_{T2} - (\mu_i)_{T1}}{(\mu_i)^2_{T1}} \cdot \frac{1}{T_2 - T_1}$$

$$= \mu_e \ \alpha_F \text{, so}$$

$$\alpha_F = \frac{(\mu_i)_{T2} - (\mu_i)_{T1}}{(\mu_i)^2_{T1}} \cdot \frac{1}{T_2 - T_1}$$

Or, to be more precise, if the change in permeability over the specified area is rather large:

$$\alpha_F = \frac{(\mu_i)_{T2} - (\mu_i)_{T1}}{(\mu_i)_{T1} \ (\mu_i)_{T2}} \cdot \frac{1}{T_2 - T_1}$$

The temperature factors (α_F) for several temperature trajectories of the grades intended for filter applications are given in the material specifications. They offer a simple means to calculate the temperature coefficient of any coil made with these ferrites.

2.2.13 Time stability

When a soft magnetic material is given a magnetic or thermal disturbance, the permeability rises suddenly and then decreases slowly with time. For a defined time interval, this 'disaccommodation' can be expressed as:

$$D = \frac{\mu_1 - \mu_2}{\mu_1}$$

The decrease of permeability appears to be almost proportional to the logarithm of time. For this reason, IEC has defined a disaccommodation coefficient:

$$d = \frac{\mu_1 - \mu_2}{\mu_1 \log_{10}(t_2/t_1)}$$

As with temperature dependence, the influence of disaccommodation on the inductance drift of a coil will be reduced by μ_e/μ_i.

Therefore, a disaccommodation factor D_F is defined:

$$D_F = \frac{d}{\mu_i} = \frac{\mu_1 - \mu_2}{\mu_1^2 \log_{10}(t_2/t_1)}$$

The variability with time of a coil can now be predicted by:

$$\frac{L_1 - L_2}{L_1} = \mu_e \ D_F$$

2.2.14 Resistivity (ρ)

Ferrite is a semiconductor with a DC resistivity in the crystallites of the order of 10^{-3} Ωm for a MnZn type ferrite, and about 30 Ωm for a NiZn ferrite.

Since there is an isolating layer between the crystals, the bulk resistivity is much higher: 0.1 - 10 Ωm for MnZn ferrites and 10^4 - 10^6 Ωm for NiZn and LiZn ferrites.

This resistivity depends on temperature and measuring frequency, which is clearly demonstrated in Tables 2.1 and 2.2 which show resistivity as a function of temperature for different material grades and types.

Table 2.1 Resistivity as a function of temperature - grade 3C80

TEMPERATURE (°C)	DC RESISTIVITY (Ωm)
-20	≈ 10
0	≈ 7
20	≈ 4
50	≈ 2
100	≈ 1

Table 2.2 Resistivity as a function of temperature - grade 4C6

TEMPERATURE (°C)	DC RESISTIVITY (Ωm)
0	$\approx 5.10^7$
20	$\approx 10^7$
60	$\approx 10^6$
100	$\approx 10^5$

At higher frequencies the crystal boundaries are more or less short circuited by their capacitance and the measured resistivity decreases, as shown in Tables 2.3 and 2.4.

Table 2.3 Resistivity as a function of frequency - MnZn ferrites

FREQUENCY (MHz)	DC RESISTIVITY (Ωm)
0.1	≈ 2
1	≈ 0.5
10	≈ 0.1
100	≈ 0.01

Table 2.4 Resistivity as a function of frequency - NiZn ferrites

FREQUENCY (MHz)	DC RESISTIVITY (Ωm)
0.1	$\approx 10^5$
1	$\approx 5.10^4$
10	$\approx 10^4$
100	$\approx 10^3$

2.2.15 PERMITTIVITY (ε)

The basic permittivity of all ferrites is of the order of 10. This is valid for MnZn and NiZn materials . Also the isolating material on the grain boundaries has a permittivity of approximately 10. However, if the bulk permittivity of a ferrite is measured, very different values of apparent permittivity result. This is caused by the conductivity inside the crystallites. The complicated network of more or less leaky capacitors also shows a strong frequency dependance.

Tables 2.5 and 2.6 show the relationship between permittivity and frequency for both MnZn and NiZn ferrites.

Table 2.5 Permittivity as a function of frequency - MnZn ferrites

FREQUENCY (MHz)	PERMITTIVITY (ε_r)
0.1	$\approx 2.10^5$
1	$\approx 10^5$
10	$\approx 5.10^4$
100	$\approx 10^4$

Table 2.6 Permittivity as a function of frequency - NiZn ferrites

FREQUENCY (MHz)	PERMITTIVITY (ε_r)
0.001	≈100
0.01	50
1	25
10	15
100	12

3.0 QUALITY

Our ferrite cores are produced to meet constantly high quality standards. High quality components in mass production require advanced production techniques as well as background knowledge of the product itself. The quality standard is achieved in our ferrite production centres by implementation of a quality assurance system based on Statistical Process Control (SPC).

To implement SPC, the production is divided in stages which correspond to production steps or groups of steps. The output of each stage is statistically checked in accordance with MIL STD 414 and 105D.

The obtained results are measured against built-in control, warning and reject levels. If an unfavourable trend is observed in the results from a production stage, corrective action is immediately taken. Quality is no longer 'inspected-in', but 'built-in' by continuous improvement.

The system is applicable for the total manufacturing process including,

- raw materials
- production process, and
- finished products.

All our production centres are aiming to comply with the ISO 9000 quality system.

3.1 Aspects of quality

When describing the quality of a product, three aspects must be taken into account:

- Delivery quality
- Fitness for use
- Reliability

3.1.1 Delivery quality

After production, the ferrite components are tested once again for their main characteristics. Tests are conducted in accordance with the guidelines specified by the CENELEC Electronic Components Committee (CECC). A sampling system, in accordance with IEC 410 is used, and the Acceptable Quality Levels (AQL's) are set for different classes of defect, major defects having lower AQL's than minor defects.
Customers may follow the same system to carry out incoming inspections. If the percentage of defects does not exceed the specified level, the probability that the batch will be accepted is high (> 90%), but rejection is still possible.

If the reject level is much lower than specified, quality complaints will disappear. We aim at very low reject levels to eventually allow any customers to dispose with incoming inspection.

3.1.2 Fitness for use

This is a measure of component quality up to the point where the component has been assembled into the equipment and is quoted in parts per million (PPM). After assembly, the component should function fully. The PPM concept covers the possibility of failures that occur during assembly. It includes line rejects that may occur for any reason.

For ferrite cores, co-operation between the component supplier and the customer is a very important aspect. The core is generally a building block for a wound component and many things can go wrong during the assembly process, but the core is not always the problem. A mutual quality control programme can be established to minimize line rejects for a specific application. For some product lines, levels of 50 PPM have already been realized.

3.1.3 Reliability

Ferrite cores are known for their reliability. Once the assembly process has been successfully concluded, no real threats for the life of the ferrite are known.

Reliability is mainly governed by the quality of the total assembly of the wound component. Extreme thermal shocks should be avoided. Some data are available for RM cores assembled with the recommended Philips bobbins and clips.

– Vibration test, IEC 68-2-6 (test Fc)

- no failures
- less than 0.1% drift of inductance value

- Bump test, IEC 68-2-29 (test Eb)

• no failures
• less than 0.03% drift of inductance value

3.2 Classification of defects

If a component does not comply with the specification published in this handbook, it is considered to be defective. Defects are divided into two classes:

• Major defects

These defects lead to a malfunction of the finished wound components.

• Minor defects

These defects do not have a severe influence on the function of the wound component. Often, they have a negative effect on the visual appearance of the end product, or they slightly disturb the assembly process.

Table 3.1 Classification of defects per product line

CORE TYPE	CLASSIFICATION OF FAILURES	
	MAJOR DEFECTS	MINOR DEFECTS
RM P X EP H PH	• A_L • critical dimensions	• power loss • secondary dimensions
E EF ETD EC U I	• A_L • critical dimensions	• power loss • secondary dimensions
ring cores rods tubes beads wideband chokes	• A_L min • critical dimensions • Z min	• A_L max • power loss • dielectric strength of coating • secondary dimensions

Table 3.2 AQL values and inspection levels

CORE TYPE	APPLICATION AREA	FAULT TYPE	CLASSIFICATION OF FAULT			
			MAJOR		MINOR	
			AQL	LEVEL	AQL	LEVEL
P RM X	filter applications	electrical mechanical	1% 0.65%	(I) (I)	2.5% 4%	(S3) (S3)
P RM X EP H	general transformer applications	electrical mechanical	1.5% 0.65%	(S4) (I)	4% 4%	(S3) (S3)
E EF ETD EC U I		electrical mechanical	1% 1%	(I) (I)	4% 4%	(S3) (S3)
ring cores rods, tubes beads chokes		electrical mechanical	0.65% 0.65%	(S3) (S3)	2.5% 2.5%	(S3) (S3)

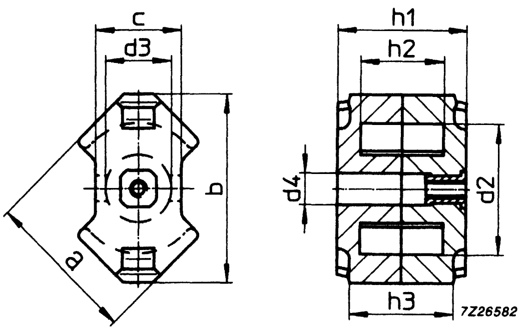


Fig.3.1 RM core.

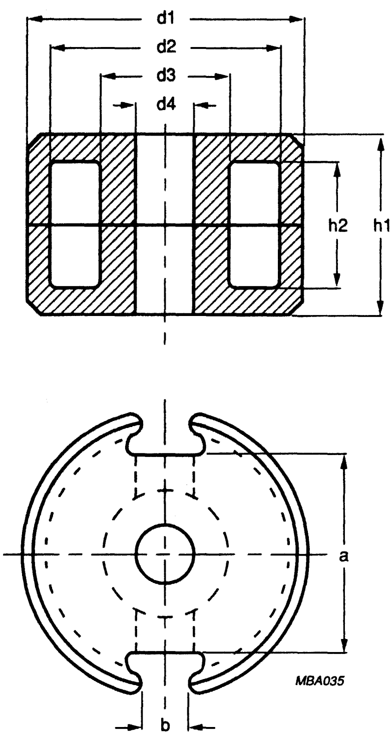


Fig.3.2 P core.

Table 3.3 Classification of mechanical defects

CORE TYPE	FIG. NO	FAULT CLASSIFICATION	
		MAJOR FAULT	MINOR FAULT
RM	3.1	h_2 min.	a
		h_3	b
		d_2 min.	c
		d_3 max.	h_1
		d_4	h_2 max.
			d_2 max.
			d_3 min.

CORE TYPE	FIG. NO	FAULT CLASSIFICATION	
		MAJOR FAULT	MINOR FAULT
P	3.2	h_2 min.	a
		d_2 min.	b
		d_3 max.	h_1
		d_1 max.	h_2 max.
		d_4	d_2 max.
			d_3 min.
			d_1 min.

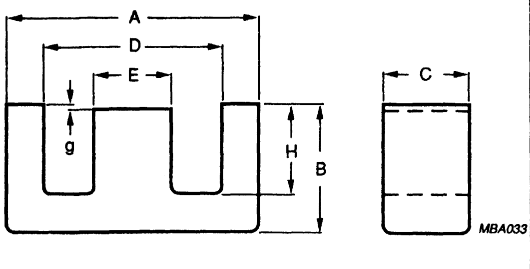


Fig.3.3 E core.

CORE TYPE	FIG. NO	FAULT CLASSIFICATION	
		MAJOR FAULT	MINOR FAULT
E	3.3	A max.	A min.
		B max.	B min.
		C max.	C min.
		D min.	D max.
		E max.	E min.
		H min.	H max.

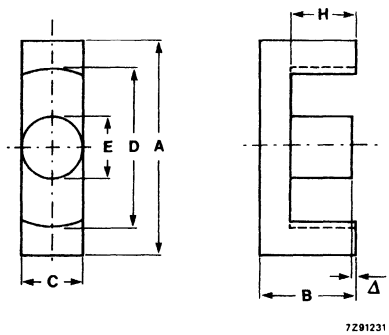


Fig.3.4 ETD core.

CORE TYPE	FIG. NO	FAULT CLASSIFICATION	
		MAJOR FAULT	MINOR FAULT
ETD	3.4	A max.	A min.
		B max.	B min.
		C max.	C min.
		D min.	D max.
		E max.	E min.
		H min.	H max.

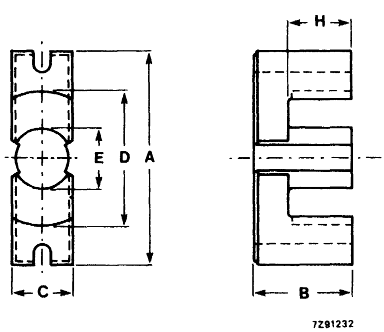


Fig.3.5 EC core.

CORE TYPE	FIG. NO	FAULT CLASSIFICATION	
		MAJOR FAULT	MINOR FAULT
EC	3.5	A max.	A min.
		B max.	B min.
		C max.	C min.
		D min.	D max.
		E max.	E min.
		H min.	H max.

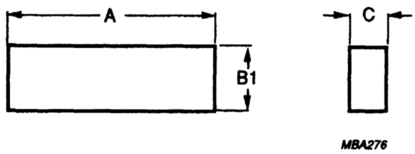


Fig.3.6 I core.

CORE TYPE	FIG. NO	FAULT CLASSIFICATION	
		MAJOR FAULT	MINOR FAULT
I	3.6		A
		B max.	B1 min.
		C max.	C min.

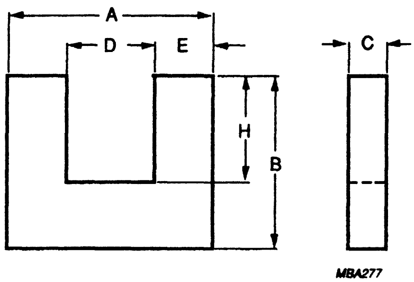


Fig.3.7 U cores.

CORE TYPE	FIG. NO	FAULT CLASSIFICATION	
		MAJOR FAULT	MINOR FAULT
U	3.7		A
			B
		C max.	C min.
		D min.	
		E max.	E min.
		H min.	

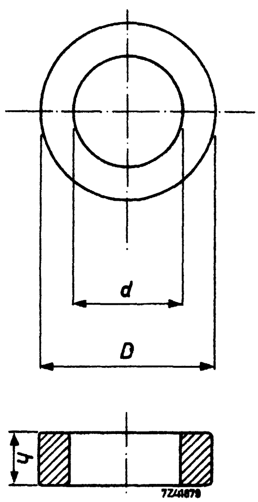


Fig.3.8 Ring cores.

CORE TYPE	FIG. NO	FAULT CLASSIFICATION	
		MAJOR FAULT	MINOR FAULT
ring cores	3.8	h max.	h min.
		D max.	D min.
		d min.	d max.

CORE TYPE	FIG. NO	FAULT CLASSIFICATION	
		MAJOR FAULT	MINOR FAULT
rods,	3.9	D max.	D min.
tubes,		d min.	d max.
beads,			L
multi-hole tubes			H

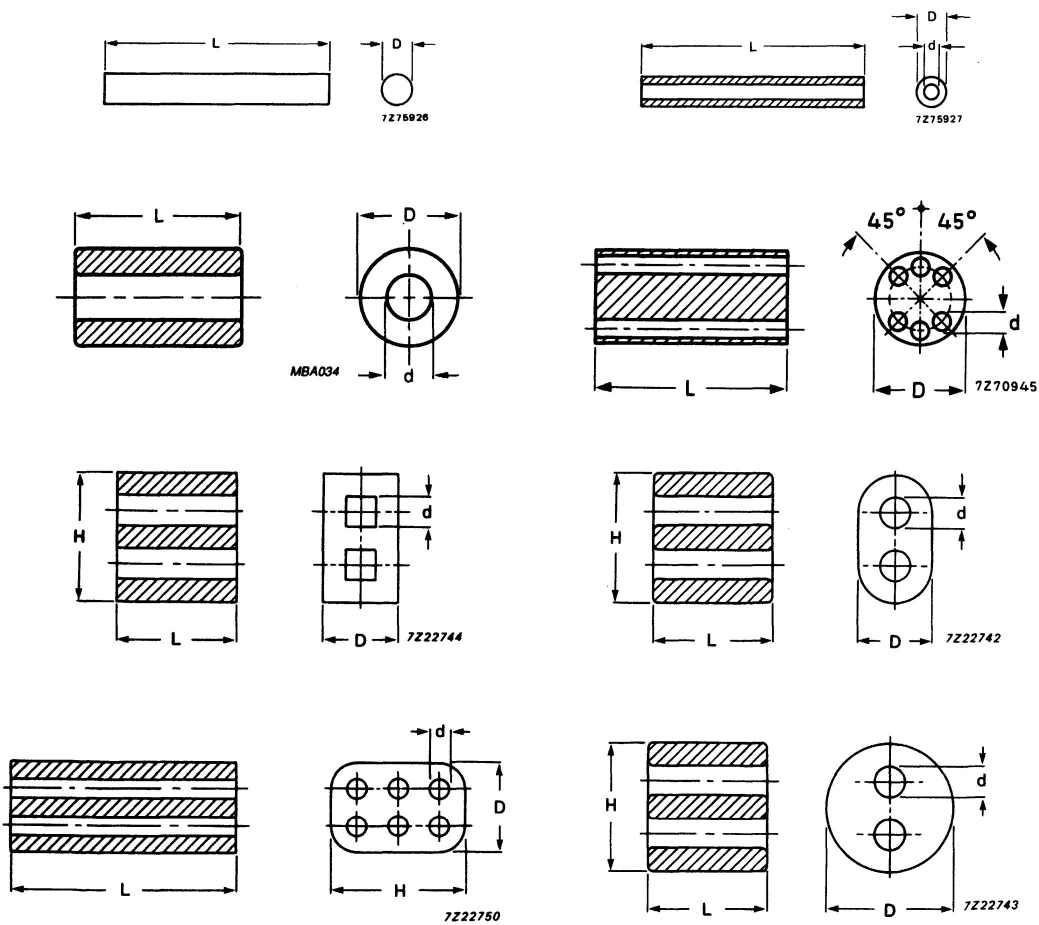


Fig.3.9 Rods, tubes, beads, multi-hole tubes.

4.0 ORDERING INFORMATION

The products in this handbook are identified by an 11 digit code number. All physical and technical properties of the product are described by these 11 digits. It is therefore recommended for use on technical drawings and equipment parts lists.

This 11 digit code may also appear on some packing material inside boxes, e.g. on blister packs for P cores and RM cores.

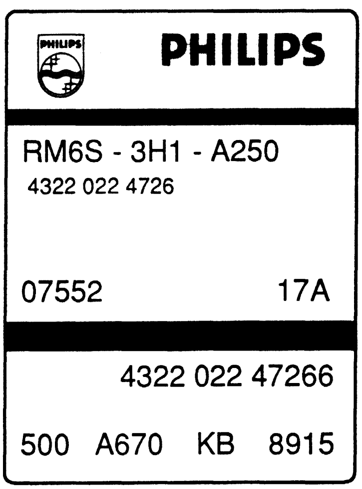
Smallest Packing Quantities (SPQ) are packs which are ready for shipment to our customers. The information on the labels consists of two parts:

– upper half: (technical information)	name of product 11 digit code number delivery and/or production batch numbers.
– lower half: (logistic information)	12 digit code number quantity country of origin production week production centre

The Philips 12 digit code used on the packing labels, provides full logistic information as well.

The 12th digit is used as packing indicator. Products in standard packing quantities have a last digit ranging from 1 to 6. The current number, is a result of developments in the past. For a range of preferred products, smaller packing units are also available for sampling and design-in support. These are identified by a '9' as the 12th digit.

A list at the end of the handbook provides information about the current 12th digits, and the number of products per smallest packing quantity (SPQ).



Example of a label on a standard quantity pack

Designation of product
11 digit catalogue number (as found in the data sheets)

Batch numbers

Full 12 digit code number
Quantity (500 sets)
Country of origin (A670)
Production centre (KB)
Production week (8915)

PHILIPS

RM6S - 3H1 - A250
4322 022 4726

07552 17A

4322 022 47269

100 A670 KB 8915

Example of a label on a small quantity pack

Product designation
11 digit catalogue number (as found in the data sheets)

Batch numbers

Full 12 digit code number
Quantity (100 sets)
Country of origin (A670)
Production centre (KB)
Production week (8915)

MADE IN HOLLAND

4322 022 1703
1 1
BATCH 0000841980
ORIG A670 RPC KB
QTY 500 DATE 9024
TYPE P66/56-3E1-A1800
CODENO 4322 022 17031

In 1990/1991, the yellow label will be replaced by a white bar code identification label. Bar codes recently became an essential tool in achieving effective control of goods and information flow. In addition to the information on the existing label, the new one offers opportunities to add customer specific data.

5.0 APPLICATIONS

Soft ferrites are used wherever effective coupling between an electric current and a magnetic flux is required.

They form an essential part of inductors and transformers used in todays main application areas:

- Telecommunications
- Power conversion
- Interference suppression.

The function that the soft magnetic material performs may be one or more of the following:

Filtering

Filter network with well defined pass-band.
High Q-values for selectivity, good temperature stability.

Material requirements:
- low losses
- defined temperature factor to compensate temperature drift of capacitor
- very stable with time.

(4C6, 3D3, 3H3, 3H1)

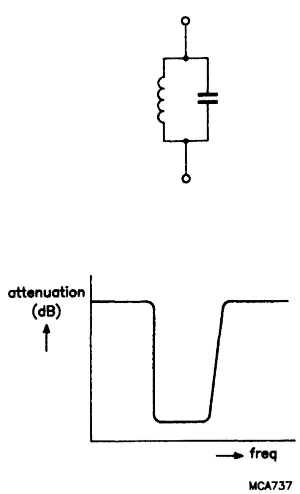


Fig.5.1 Filter application.

Blocking/suppression/decoupling

Unwanted high frequency signals are blocked, wanted signals can pass.
Coupling and decoupling.

Material requirements:
- high impedance in covered frequency range.

(3E25, 3C11, 3C85, 3F3, 4A11, 4C65, 3S1, 4S2)

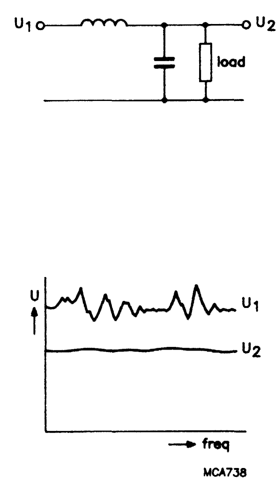


Fig.5.2 Blocking/suppression/decoupling application.

Delaying pulses

The inductor will block current until saturated. Leading edge is delayed depending on design of magnetic circuit.

Material requirements:
• high permeability.

(3E25, 3E5)

Smoothing/storage of energy

Inductor stores energy and delivers it to the load during the off-time of a Switched Mode Power Supply (SMPS).

Material requirements:
• high saturation level.

(3C85, 3C80, 3F3, 2P-iron powder grade)

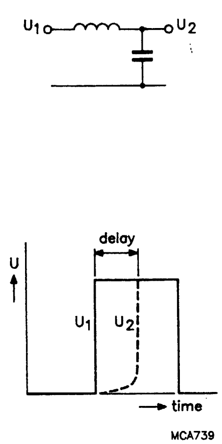


Fig.5.3 Pulse delay application.

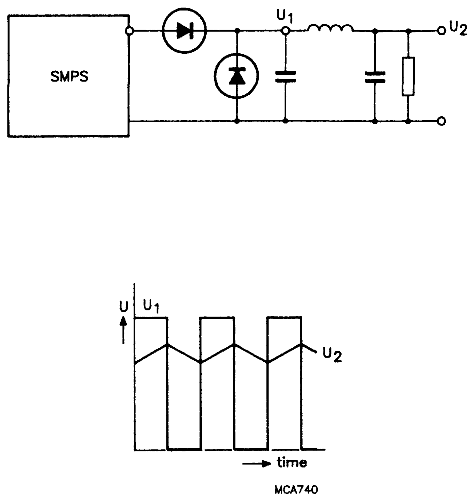


Fig.5.4 Smoothing/storage application.

Pulse transformers/general purpose transformers

Pulse or AC signals are transmitted and if required transformed to a higher or lower voltage level.
Galvanic separation.
Safety requirements.
Impedance matching.

Material requirements:
- high permeability
- low distortion
- low DC sensitivity.

(3B8, 3H1, 3C11, 3E1, 3E4, 3E25, 3E5)

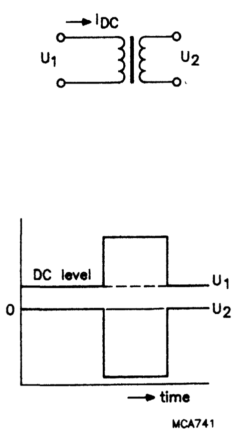


Fig.5.5 Pulse and general purpose transformer application.

Power transformers

Transformer transmits energy, transforms voltage to required level and provides galvanic separation (safety).

Material requirements:
- low power losses
- high saturation.

(3B8, 3C80, 3C10, 3C85, 3F3)

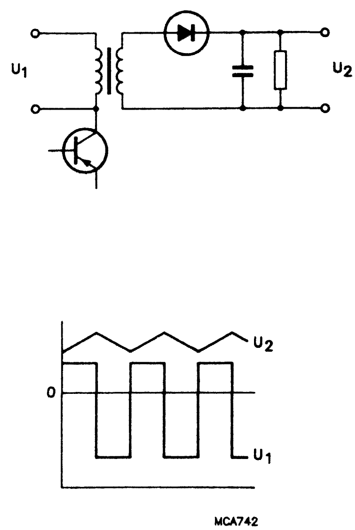


Fig.5.6 Power transformer application.

Tuning

LC filters are often used to tune circuits in audio, video and measuring equipment.
Narrow bandwidth often not wanted.

Material requirements:
- moderate losses up to high frequencies
- reasonable temperature stability.

(3D3, 4A11, 6B1, 4C65, 4D1, 4E1, 1P-iron powder grades)

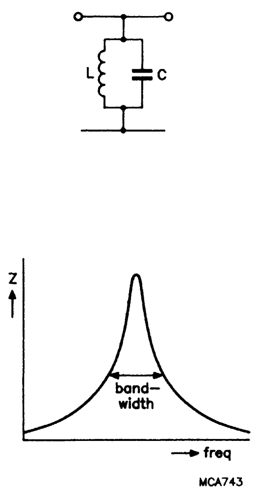


Fig.5.7 Tuning application.

5.1 Ferrites for telecommunications

Telecommunications is the first important branch of technology where ferrites have been used on a large scale. Today, against many predictions, it still is an important, growing market for ferrite cores.

Most important applications are in:
- filter coils, and
- pulse and matching transformers

5.1.1 Filter coils

P cores, RM cores and X cores have been developed specially for this application.

The P core is the oldest design. It is still rather popular because the closed shape provides excellent magnetic screening.

RM cores are a later design, leading to a more economic usage of the surface area on the PCB. X cores also have this advantage plus more room to get the leads out of the coil.

For filter coils, the following design parameters are important:

- low losses, high Q value
- precise inductance value
- high stability over periods of time
- fixed temperature dependence.

5.1.1.1 Q values

The quality factor (Q) of a filter coil should generally be as high as possible. For this reason filter materials such as 3H3, 3D3 and 4C6 have low magnetic losses in their frequency ranges (100 kHz, 2 MHz and 10 MHz respectively).

Losses in a coil can be divided into:

- winding losses, due to:
  the DC resistance of the wire
  eddy-current losses in the wire
  dielectric losses in insulation.
- core losses, due to:
  hysteresis losses in the core material
  eddy-current and residual losses in the core material.

Losses appear as series resistances in the coil.

$$\frac{R_{tot}}{L} = \frac{R_0}{L} + \frac{R_{ec}}{L} + \frac{R_d}{L} + \frac{R_h}{L} + \frac{R_{e+r}}{L} \ (\Omega/H)$$

As a general rule, maximum Q is obtained when the sum of the winding losses is made equal to the sum of the core losses.

DC resistive losses

The DC resistive losses in a winding are given by:

$$\frac{R_0}{L} \ (\Omega/H)$$

Eddy-current losses in the winding

The eddy-current losses in a winding are given by:

$$\frac{R_{ec}}{L} = \frac{C_w C_u V_{Cu} f^2 d^2}{\mu_e} \ (\Omega/H)$$

Where C_{wCu} is the eddy-current loss factor for the winding and depends on the dimensions of the coil former and core, and V_{Cu} is the volume of conductor in mm^3; d is the diameter of a single wire in mm.

Dielectric losses

The capacitances associated with the coil are not loss free. They have a loss factor ($\tan\delta_c$) which also increases the effective coil resistance:

$$\frac{R_d}{L} = \omega^3 LC \left(\frac{2}{Q} + \tan\delta_c\right) \ (\Omega/H)$$

Hysteresis losses

The effective series resistance due to hysteresis losses is calculated from the core hysteresis constant, the peak flux density, the effective permeability and the operating frequency:

$$\frac{R_h}{L} = \omega\eta_B\hat{B}\mu_e \ (\Omega/H)$$

Eddy-current and residual losses

The effective series resistance due to eddy-current and residual losses is calculated from the loss factor ($\tan\delta/\mu_i$).

$$\frac{R_{e+r}}{L} = \omega\mu_e \ (\tan\delta/\mu_i) \ (\Omega/H)$$

5.1.1.2 Coil design

The specification of an inductor usually includes:

- the inductance
- minimum Q at the operating frequency
- applied alternating voltage
- maximum size
- maximum and minimum temperature coefficient
- range of adjustment
- variability.

To satisfy these requirements, the designer has the choice of:

- core size
- material grade
- A_L value
- type of conductor (solid or bunched)
- type of adjuster.

5.1.1.3 Frequency, core type and material grade

The operating frequency is a useful guide to the choice of core type and material.

- Frequencies below 20 kHz: the highest Q will be obtained with large, high inductance-factor cores in Ferroxcube 3H1 or 3H3 material. Winding wire should be solid, with minimum-thickness insulation.

Note: high inductance factors are associated with high temperature coefficients of inductance.

- Frequencies between 20 kHz and 200 kHz; high Q will generally be obtained with a core also in Ferroxcube 3H1 or 3H3. Maximum Q will not necessarily be obtained from the largest-size core, particularly at higher frequencies, so the choice of inductance factor is less important. Bunched, stranded conductors should be used to reduce eddy-current losses in the copper. Above 50 kHz, the strands should not be thicker than 0.07 mm.

- Frequencies between 200 kHz and 2 MHz; use a core of Ferroxcube 3D3 material. Bunched conductors of maximum strand diameter 0.04 mm are recommended.

- Frequencies between 2 MHz and 12 MHz; use a core of Ferroxcube 4C6. Bunched conductors of maximum strand diameter 0.04 mm are recommended for frequencies up to 5 MHz. Solid conductors should be used at frequencies between 5 MHz and 12 MHz.

5.1.1.4 Signal level

In most applications, the alternating signal voltage is low. It is good practice wherever possible, to keep the operating flux density of the core below 1 mT, at which level the effect of hysteresis is usually negligible. At higher flux densities, it may be necessary to allow for some hysteresis loss and inductance change.

The expression for third harmonic voltage U_3 ($U_3/U_1 \approx 0.6\tan\delta_h$) may be used as a guide to the amount of distortion. For low distortion, RM cores with small hysteresis loss factors should be used.

5.1.1.5 DC polarization

The effect of a steady, superimposed magnetic field, whether due to an external field or a DC component of winding current on a cored inductor, reduces the inductance obtained with a given number of turns. As with other characteristics, the amount of the decrease depends on the value of the effective permeability, becoming less at lower permeabilities. However, for most applications the effect is not serious. Ferroxcube material grade 3B8 has been developed specially for applications involving DC polarization.

5.1.1.6 Design procedure

(i) On the basis of the operating characteristics and design limitations, select the core size, material grade, inductance factor and conductor type using the information given in the data sheets.

(ii) Check that the range of adjustment is sufficient to cover the tolerance on A_L or μ_e and that of the resonating capacitor. Make an allowance of about 1% for circuit strays.

(iii) Calculate the number of turns required from the A_L or α value for the core.

(iv) Select a conductor size to fill the coilformer.

(v) From the voltage across the inductor (E_{RMS}), determine the peak flux density (B). If this is in excess of 1 mT, check that the hysteresis loss and distortion are acceptable.

The ISO-Q curve shown in Fig.5.8 is an example of what can be achieved using a RM6-s core in material grade 3H1.

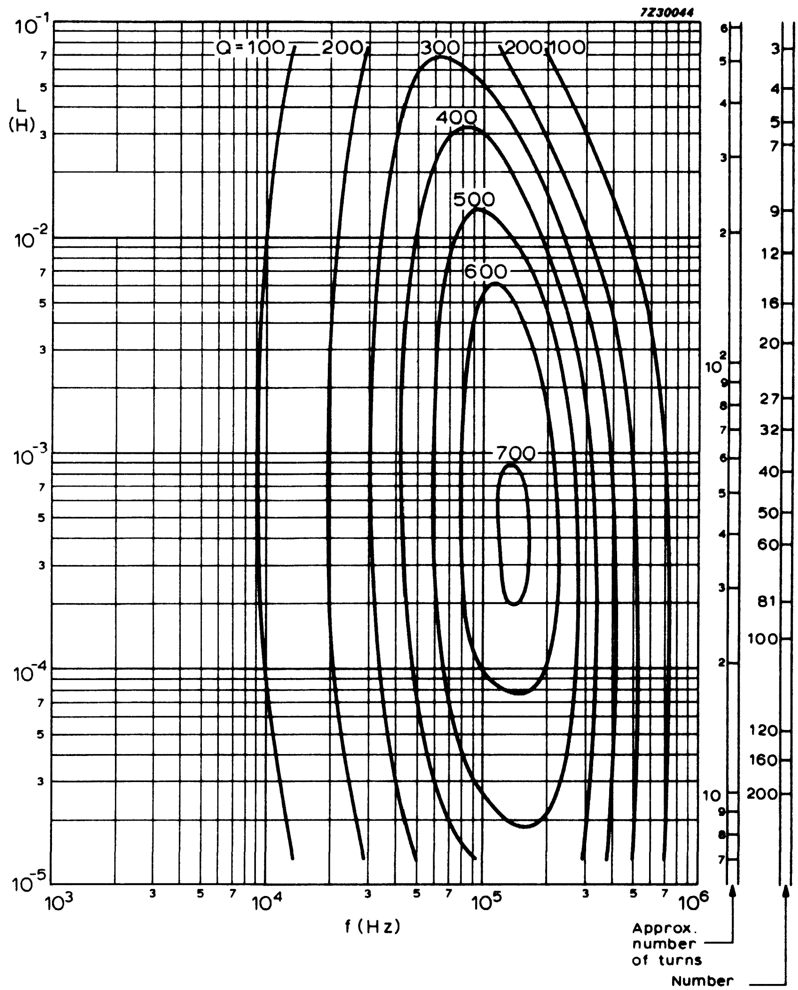


Fig.5.8 ISO Q curve.

5.1.1.7 A_L value

Since the airgap in pot cores, square cores and cross cores can be ground to any length, any value of A_L can be provided within the limits set by the core size. In practice, the range of A_L values has been standardized with values chosen to cover the majority of application requirements.

If a core set is provided with an asymmetrical airgap, this airgap is ground in the upper half. This half is marked with the FXC grade and A_L value.

Most pre-adjusted cores are provided with an injection-moulded nut for the adjuster.

Continuously variable adjusters can be supplied for pre-adjusted cores of most A_L values. These are specially recommended for filter coils; maximum adjustment range is 10% to 30%, depending on core type.

5.1.1.8 α and A_L factors

The α factor for a given core is the number of turns required for an inductance of 1 mH. For other values of inductance, $N = \alpha\sqrt{L}$, where L is the inductance in mH (10^{-3} H).

The A_L factor is the inductance per turn squared (in nH) for a given core.

$L = N^2 A_L$, L in nH (10^{-9} H).

The measured A_L value of a core will depend slightly on the coil used for this measurement.

For very low A_L values (e.g. 16 or 25) the contribution of the stray inductance will be quite high, resulting in a marked influence of the position of the coil in the core and its number of turns.

5.1.1.9 Conversion from μ_e to α and A_L values

Figs 5.9 to 5.11 provide a quick reference to convert μ_e values into α and A_L values (or vice versa).

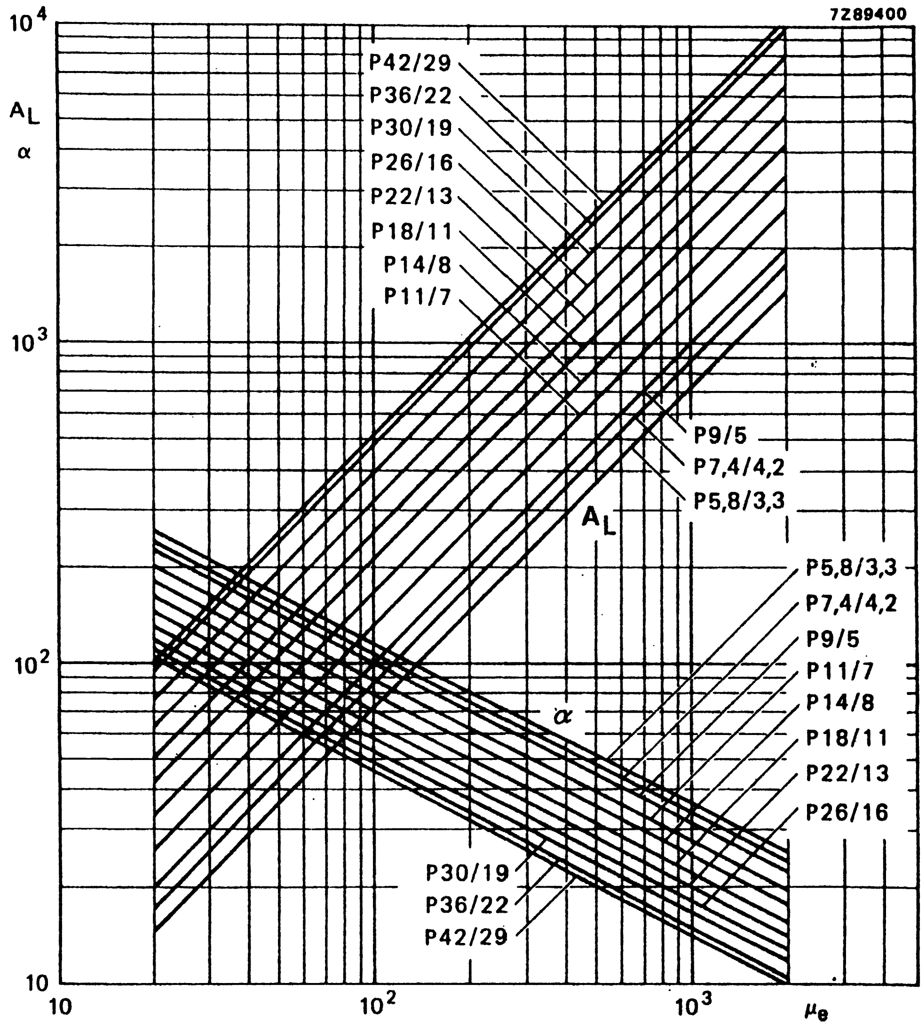


Fig.5.9 Conversion graph for P cores.

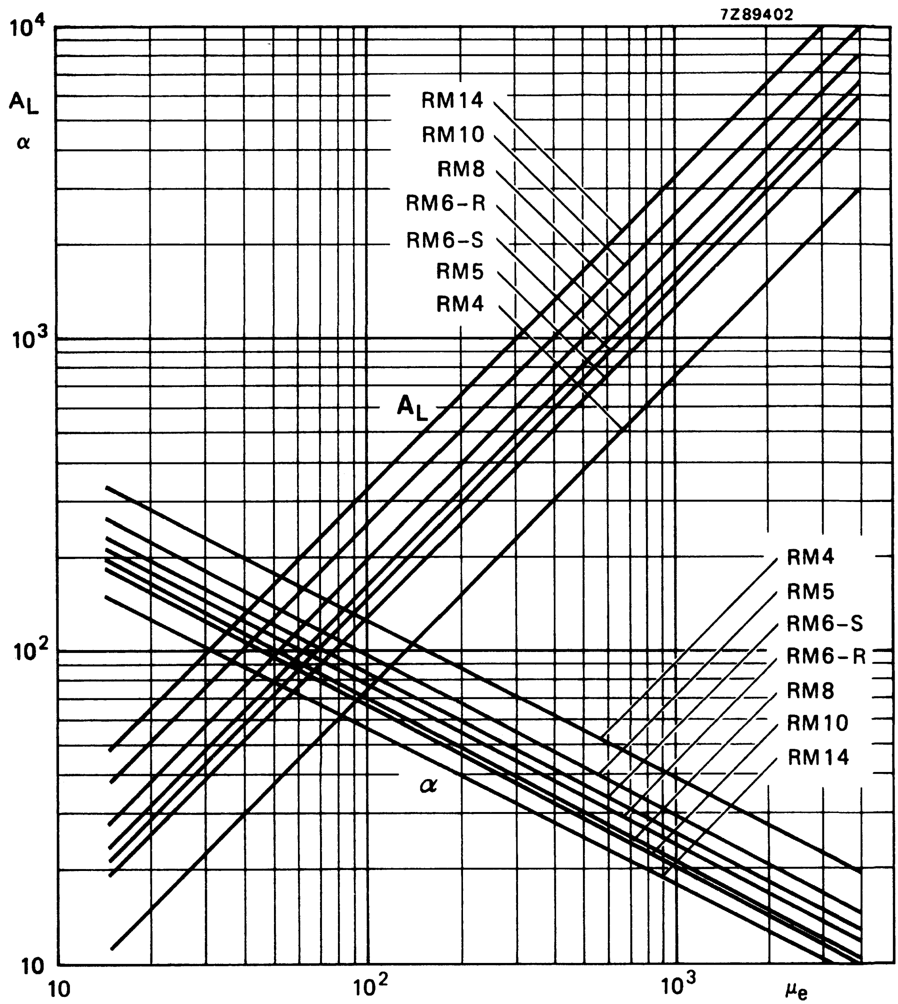


Fig.5.10 Conversion graph for RM cores.

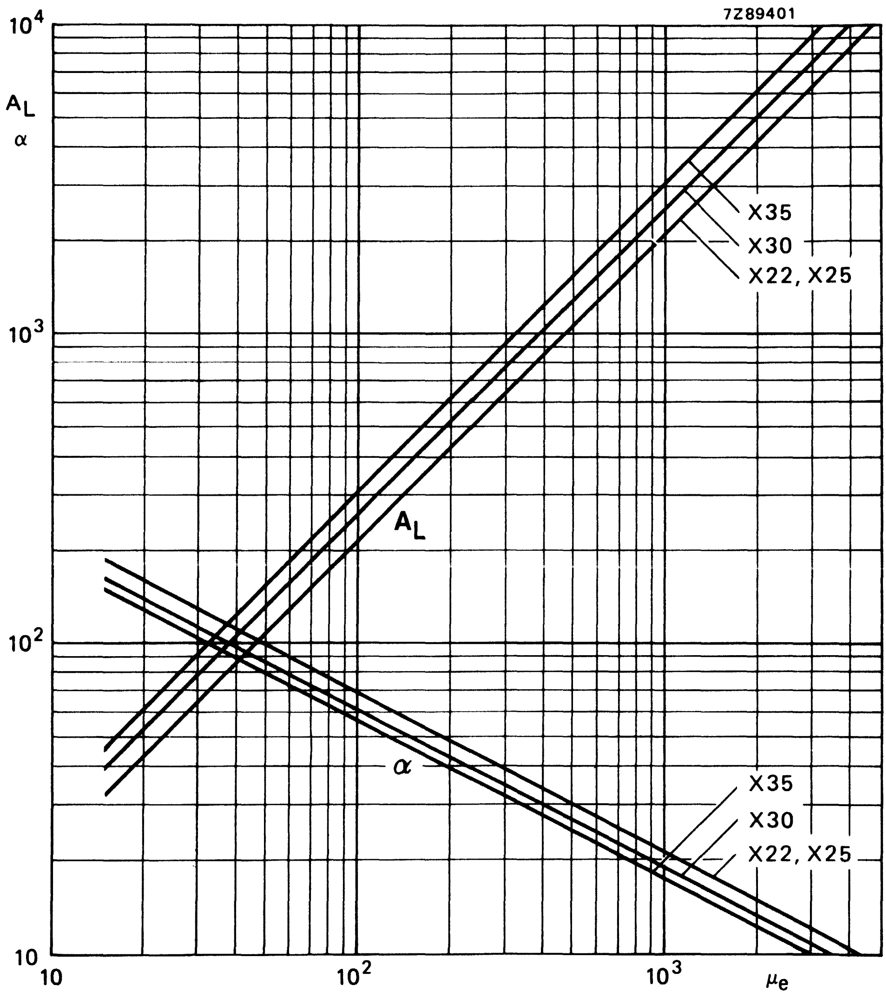


Fig.5.11 Conversion graph for X cores.

5.1.1.10 Inductance adjusters

A major feature of a FXC core assembly is its adjustment mechanism. It allows the cores to be set to a very accurate value (± 0.1%).

The inductance adjustment is achieved by inserting a tube or cylinder, manufactured from Ferroxcube or carbonyl-iron powder into the central hole of the core. This acts as a partial magnetic shunt across the airgap. The adjuster consists of this tube moulded into a thermoplastic carrier which has been threaded at one end. This screws into a nut which is injection moulded or cemented into the lower half of the core. The magnetic tubes are centreless ground to give very close diameter tolerances.

Inductance stability

The stability of a correctly assembled pot, square or cross core depends mainly on the stability of the ferrite's permeability.

The permeability of a ferrite may change with temperature, time, mechanical pressure, magnetic polarization and other factors. The most important changes affecting the inductance stability of the assembly are:

- variation of permeability with temperature (temperature coefficient)
- variation of permeability with time (disaccommodation).

Changes in inductance may also occur due to:

- movement of the adjuster after final setting
- movement of the coil former
- relative movement of the core halves
- movement of the mechanical components of the assembly.

Small movements of this kind are usually caused by changes in temperature, mechanical vibration or shock.

The achievement of acceptable long-term inductance stability is mainly a matter of careful assembly and suitable stabilizing treatment before final adjustment.
If the inductor is to be used in a critical circuit, it should be artificially aged by temperature cycling. The long-term change in inductance of an assembly so treated should not be greater than $500 \cdot 10^{-6}$, assuming an ambient temperature between 25 °C and 40 °C that does not vary by more than 15 K.

The change in inductance of an RM core assembly using clips with earthing spikes when subjected to IEC 68-2-6, test Fc, (vibration conditions) is less than $1000 \cdot 10^{-6}$. Such severe conditions are unlikely to be encountered in practice.

Bump tests of RM-core assemblies with earthing spikes (IEC 68-2-29, test Eb), have also been carried out. The observed change in the inductance of RM6-R cores of 3H1 material was less than $300 \cdot 10^{-6}$.

Inductance adjusters are available in several versions. Figure 5.12 shows the principle outline.

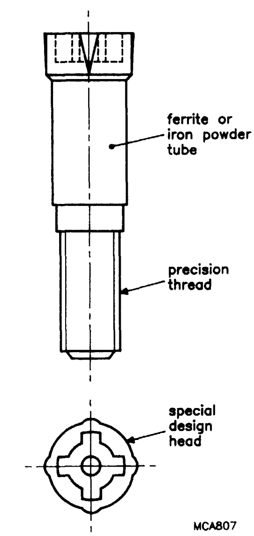


Fig.5.12 Inductance adjuster outline.

A survey of adjusters is given in Table 5.2; this includes the catalogue number of the adjuster, its colour code, and the material of the core, FXC (Ferrite) or cip (carbonyl-iron powder).

The data sheets include lists of recommended adjusters for the A_L values in various grades. The table also lists the maximum inductance variation ($\Delta L/L$ in %). In some cases, the choice of adjuster is optional and depends on the application. For that reason, a suggestion is given for minimum, average and maximum inductance variation where applicable.

Figure 5.13 shows a typical curve of a specified adjuster in a core set, pre-adjusted on A_L.

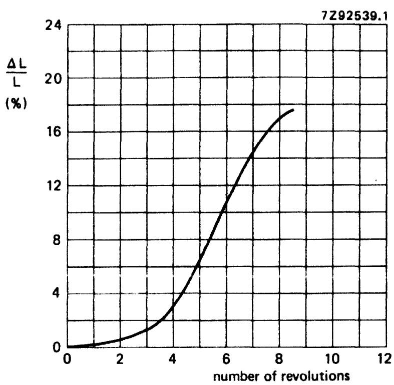


Fig.5.13 Typical curve of a specified adjuster in a core set, pre-adjusted on A_L.

Dependent on size, the screw-head of the adjuster is suited for tools of M1.4, M1.7, and M2.6. An adjusting tool, combining M1.4 and M1.7 is available (catalogue number 4322 058 0326) as well as a tool combining M2 and M2.6 (catalogue number 4322 058 0327). For customers who wish to make the adjuster tool themselves, the four outlines are depicted in Fig.5.14.

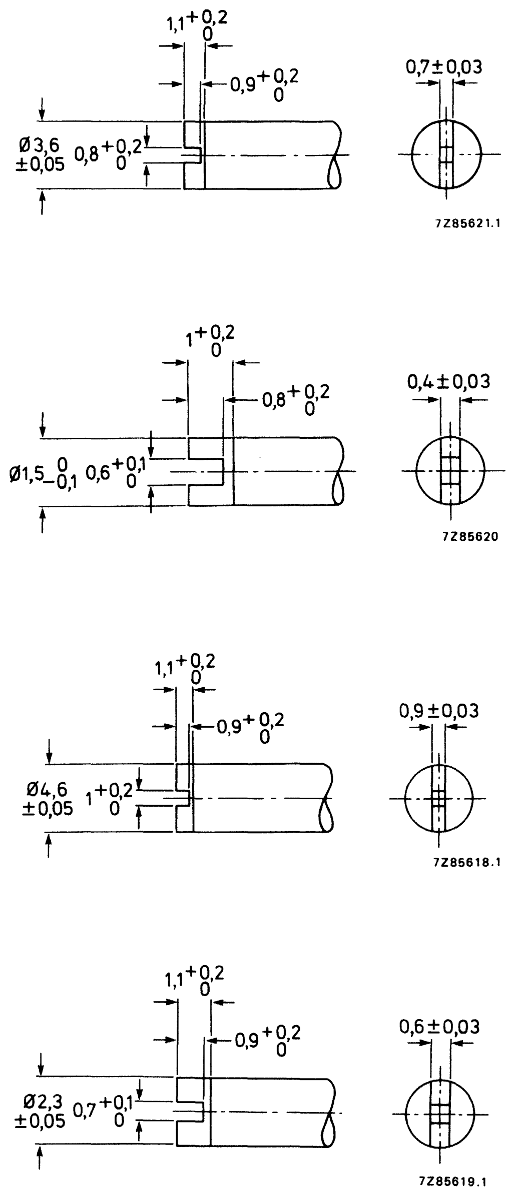


Fig.5.14 Dimensions of tools for adjusters.

Table 5.2 Survey of adjusters

CORE TYPE	CATALOGUE NUMBER	COLOUR CODE	MATERIAL*
P9/5, P11/7	4322 021 3981	brown	FXC
	4322 021 3984	yellow	cip
	4322 021 3985	green	cip
	4322 021 3989	grey	FXC
P14/8	4322 021 3970	black	FXC
	4322 021 3971	brown	FXC
	4322 021 3972	red	cip
	4322 021 3973	orange	cip
	4322 021 3974	yellow	FXC
	4322 021 3975	green	cip
	4322 021 3978	white	FXC
	4322 021 3979	grey	FXC
P18/11	4322 021 3960	black	FXC
	4322 021 3961	brown	FXC
	4322 021 3962	red	FXC
	4322 021 3963	orange	cip
	4322 021 3964	yellow	cip
	4322 021 3965	green	cip
	4322 021 3967	violet	FXC
	4322 021 3968	white	FXC
P22/13, RM8, X30	4322 021 3840	black	FXC
	4322 021 3841	brown	FXC
	4322 021 3842	red	cip
	4322 021 3843	orange	cip
	4322 021 3844	yellow	FXC
	4322 021 3845	green	cip
	4322 021 3848	white	FXC
	4322 021 3849	grey	FXC
P26/16	4322 021 3941	brown	FXC
	4322 021 3942	red	cip
	4322 021 3945	green	cip
	4322 021 3948	white	FXC
	4322 021 3949	grey	FXC
P30/19, RM10	4322 021 3832	red	cip
	4322 021 3834	yellow	cip
	4322 021 3838	white	FXC
	4322 021 3839	grey	FXC

* FXC = Ferrite; cip = carbonyl-iron powder.

Table 5.2 Survey of adjusters (continued)

CORE TYPE	CATALOGUE NUMBER	COLOUR CODE	MATERIAL*
P36/22, P42/29, X35	4322 021 3924	yellow	cip
	4322 021 3928	white	cip
	4322 021 3929	grey	FXC
RM4, RM5	4322 021 3870	black	FXC
	4322 021 3871	brown	FXC
	4322 021 3872	red	cip
	4322 021 3875	green	cip
	4322 021 3878	white	FXC
	4322 021 3879	grey	FXC
RM6-R, RM6-S, X22	4322 021 3860	black	FXC
	4322 021 3861	brown	FXC
	4322 021 3862	red	cip
	4322 021 3864	yellow	cip
	4322 021 3865	green	cip
	4322 021 3867	violet	FXC
	4322 021 3868	white	FXC
	4322 021 3869	grey	FXC

* FXC = Ferrite; cip = carbonyl-iron powder.

The thread of both the nut and the adjuster are closely toleranced (4H) to allow smooth rotation without backlash or friction. The gauge-measured maximum torque of the threaded part for the adjusters is:

M1.4 types ≤ 2 mNm
M1.7 types ≤ 3 mNm
M2 types ≤ 6 mNm
M2.6 types ≤10 mNm

5.1.2 PULSE AND SIGNAL TRANSFORMERS

Pulse and signal transformers, also known as wideband transformers, are frequently used in communications systems, and modern digital networks such as, for example, ISDN.

They provide impedance matching and transform signal amplitudes to provide DC isolation or a combination of these. Signal power levels are usually low. In order to transmit analogue signals or digital pulses without much distortion, good wideband characteristics are needed.

The principal function of the transformer core is to provide optimum coupling between the windings.
The general equivalent circuit of a signal transformer is shown in Fig.5.15.

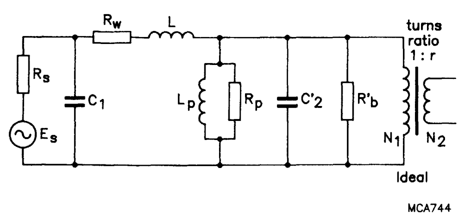


Fig.5.15 Simplified equivalent circuit of a transformer.

The elements of the circuit depicted in Fig.5.15 may be defined as follows.

E_s = source voltage
R_s = source resistance
R_w = total winding resistance = $R_1 + R_2'$ where R_1 is the primary winding resistance and R_2' is the secondary winding resistance referred to the primary
L = total leakage inductance ≈ the primary inductance with the secondary shorted
L_p = open circuit inductance
R_p = the shunt loss resistance representing the core loss
N_1, N_2' = the primary and referred secondary self or stray capacitances respectively
R_b' = load resistance referred to the primary
r = turns ratio

A high permeability core with polished pole faces results in a large flux contribution, improving the coupling. Open circuit inductance will be high, leakage inductance is kept low.

Ring cores are also suitable since they have no airgap and full use is made of the high permeability of the ferrite.

The frequency response of a practical transformer is shown in Fig.5.16.

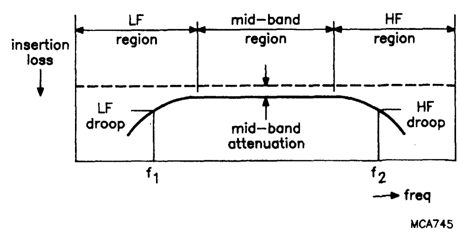


Fig.5.16 Transmission characteristic of a wideband transformer.

The corresponding distortion of a rectangular pulse by the same circuit is shown in Fig.5.17.

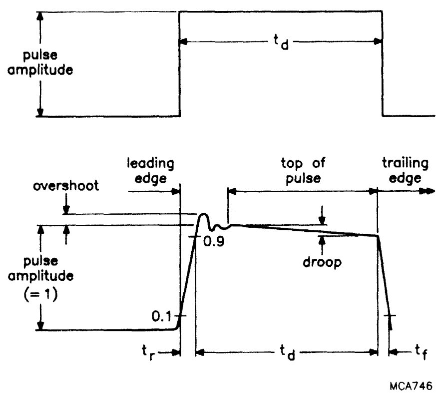


Fig.5.17 An ideal rectangular pulse (a) and the main pulse distortions (b) that may be introduced by a transformer.

The shunt inductance (L_p) is responsible for the low frequency droop in the analogue transformer since its reactance progressively shunts the circuit as the frequency decreases. In the case of the pulse transformer, the shunt inductance causes the top of the pulse to droop because, during the pulse, the magnetizing current in L_p rises approximately linearly with time causing an increasing voltage drop across the source resistance.

The winding resistance is the main cause of the mid-band attenuation in low frequency analogue transformers. In a pulse transformer, it attenuates the output pulse but usually has little effect on the pulse distortion.

The high frequency droop of an analogue transformer may be due to either the increasing series reactance of the leakage inductor or the decreasing shunt reactance of the self-capacitances, or a combination of both as the frequency increases. In a pulse transformer, the leakage inductance, self-capacitances and the source or load resistance combines to slow down, or otherwise distort the leading and trailing edge responses.

Suitable core types for this application are:

- P cores
- RM cores
- EP cores
- ring cores

in the material grades 3E25, 3E1, 3E4 and 3E5.

If the signal is superimposed on a DC current, core saturation may become a problem. In that case, a lower permeability material grade such as 3B8 or 3C85 is recommended.

5.2 Ferrites for power conversion

Power conversion is a major application area for modern ferrites. Originally designed for use as line output transformers in television receivers, power cores are now being used in a wide range of applications. The introduction of Switched Mode Power Supplies (SMPS) has stimulated the development of a number of new ferrite grades and core shapes to be used in the manufacture of power transformers, output chokes and input filters.

Power transformers and inductors generally operate under loss or saturation limited conditions which require special power ferrites with high saturation levels and low losses.

Output chokes must tolerate high DC currents; this means a gapped magnetic circuit or a special material with a very high saturation level such as iron powder.

Input chokes prevent mains pollution generated by the SMPS. Therefore grades are generally used which provide maximum blocking impedances at the switching frequencies.

5.2.1 Switched Mode Power Supply circuits

The basic arrangement of a Switched Mode Power Supply (SMPS) is shown in Fig.5.18.

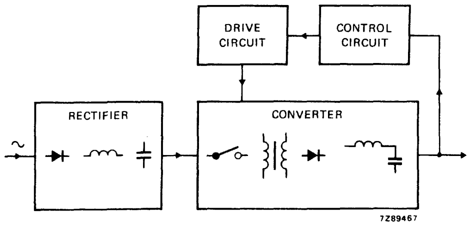


Fig.5.18 Block diagram of a Switched Mode Power Supply.

In this configuration, the power input is rectified and filtered, and the resulting DC voltage is chopped by a switch at a high frequency. The chopped waveform is applied to the primary of a transformer and the secondary output is rectified and filtered to give the required DC output. The output voltage is sensed by a control circuit which supplies a correction signal to the drive circuit to vary the ON-OFF time of the switched waveform and compensate for any change at the output. This system can operate from a battery or any other DC input.

Numerous circuit designs can be used to convert DC input voltage to the required DC output voltage. However, some preliminary design selection has to be made to determine the type of converter circuit to use. Since the emphasis is on the design of SMPS using magnetic components the different designs are considered with this in mind.

If the circuits are analysed in this way, three broad basic converter designs can be distinguished, based upon the magnetic converting device.

These are:

- flyback converters
- forward converters, and
- push-pull converters.

5.2.1.1 Flyback converter

Figure 5.19 shows the basic circuit of a flyback converter and its associated waveforms.

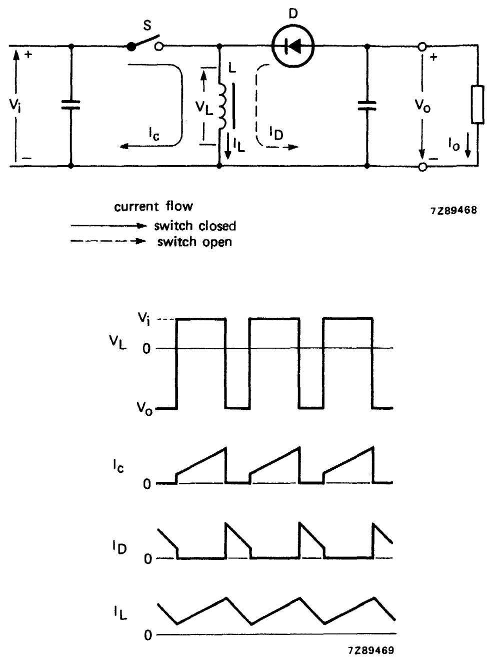


Fig.5.19 Basic circuit of a DC to DC flyback converter with associated waveforms.

When the switch is closed (transistor conducts), the supply voltage is connected across the inductor and the output diode is non-conducting. The current rises linearly, storing energy, until the switch is opened. When this happens, the voltage across the inductor reverses and the stored energy is transferred into the output capacitor and load. By varying the conduction time of the transistor at a given frequency, the amount of energy stored in the inductor during each ON cycle can be controlled. This allows the output of the SMPS to be controlled and changed.

This basic circuit can be developed into a practical circuit using an inductor with two windings (see Fig.5.20).

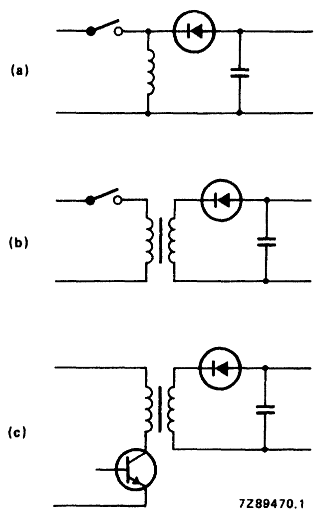


Fig.5.20 Practical flyback converter circuit.

In a flyback converter, all the energy to be transferred to the output capacitor and load is, at first, stored in the inductor. It is therefore possible to obtain line isolation by adding a secondary winding to the inductor (although an inductor with more than one winding appears in schematic diagrams as a transformer, it is referred to as an inductor in accordance with its function).

Another advantage of the flyback converter is that no smoothing choke is required in the output circuit. This is important in high-voltage supplies and in power supplies with a number of output circuits (see Fig.5.21).

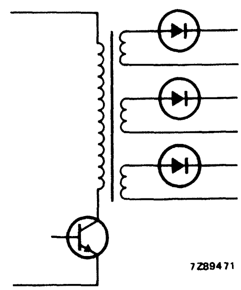


Fig.5.21 Multiple output flyback converter circuit.

A disadvantage of this type of converter is that the output capacitor is charged only during the transistor's OFF cycle. Hence the output capacitor ripple current is high when compared with the other types of converters. Another disadvantage of the flyback converter concerns the energy stored in the inductor. The inductor is driven in one direction only; this requires a larger core in a flyback design than for an equivalent design using a forward or push-pull converter.

5.2.1.2 Forward converter

The basic circuit of the forward converter, together with its associated voltage and current waveforms is shown in Fig.5.22.

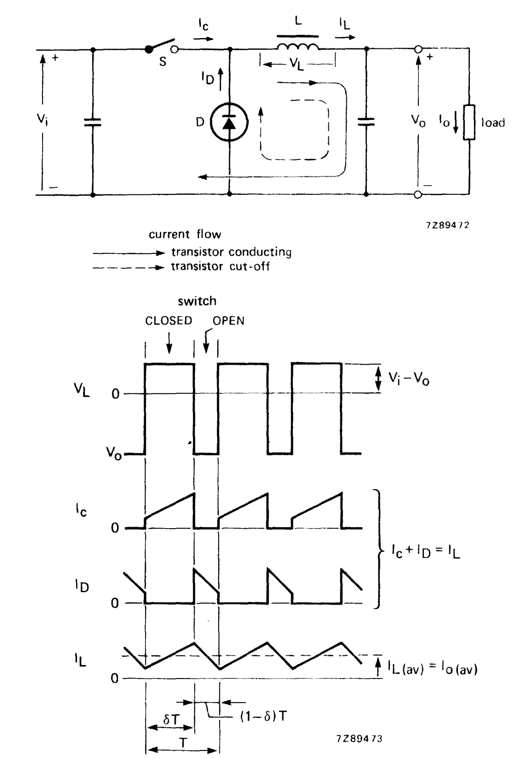


Fig.5.22 Basic circuit of a DC to DC forward converter with associated waveforms.

When the switch is closed (transistor conducts), the current rises linearly and flows through the inductor into the capacitor and the load. During this ON cycle, energy is transferred to the output and stored in the inductor 'L'. When the switch is opened, the energy stored in the inductor causes the current to continue to flow to the output via the diode.

As with the flyback converter, the amount of energy stored in the inductor can be varied by controlling the ON-OFF cycles. This provides control of the output of the forward converter.

A more practical forward converter circuit with a line-isolation transformer is shown in Fig.5.23.

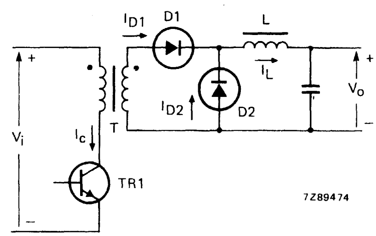


Fig.5.23 Forward converter with line isolation transformer.

The need for a separate transformer for line isolation is an obvious disadvantage of this converter circuit when compared with the flyback converter.

A major advantage of the forward converter in comparison with the flyback converter is the lower ripple voltage at the output. The high-frequency ripple current feeding into the smoothing capacitor is limited by the inductor. This makes this type of design suitable for low-voltage supplies.

Multiple outputs in a forward converter can be obtained by using more secondary windings on the transformer. However, each of these windings requires two diodes, an inductor and a capacitor which can cause regulation difficulties and is expensive.

Under certain conditions, a better approach is the combination of forward and flyback converters. A dual-output converter where this principle is demonstrated is shown in Fig.5.24.

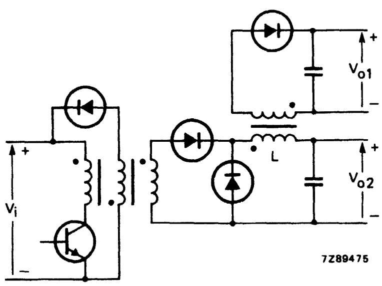


Fig.5.24 Dual-output forward converter.

Here the energy is stored in the inductor, to provide power to another output. At the end of the transistor's conduction cycle, the voltage across the inductor is equal to the output voltage V_{01}. Therefore, if V_{01} is stabilized, V_{02} will also be stabilized. The amount of energy that can be stored in the inductor is clearly limited. However, this circuit is a practical alternative in cases where a constant-load second output is required which is 30% or less of the value of the main output voltage.

In Fig.5.24, the transformer has a tertiary winding and a series diode. The purpose of the additional winding and diode is as follows: during the conduction cycle of the transistor, the magnetizing current increases linearly to some final value. As soon as the transistor is turned off, the magnetizing current is transferred via the additional winding and diode to the DC supply. The demagnetizing winding should be tightly coupled with the primary winding to avoid voltage spikes during the switching of the transistors. The demagnetizing winding and diode ensure a return of the transformer's magnetic energy back to the DC supply and also limits the transistor collector voltage to twice the value of the DC input voltage.

5.2.1.3 Push-pull converter

The basic circuit of the push-pull converter, with voltage and current waveforms is shown in Fig.5.25.

The push-pull converter is an arrangement of two forward converters operating in antiphase (push-pull action). With switch S1 closed (Fig.5.25.a) diode D2 conducts and energy is simultaneously stored in the inductor and supplied to the load. With S1 and S2 open (Fig.5.25.b),the energy stored in the inductor continues to support the load current via the parallel diodes D1 and D2, which are now acting as flywheel diodes. When switch S2 closes (Fig.5.25.c), diode D1 continues to conduct, diode D2 stops conducting and the process repeats itself.

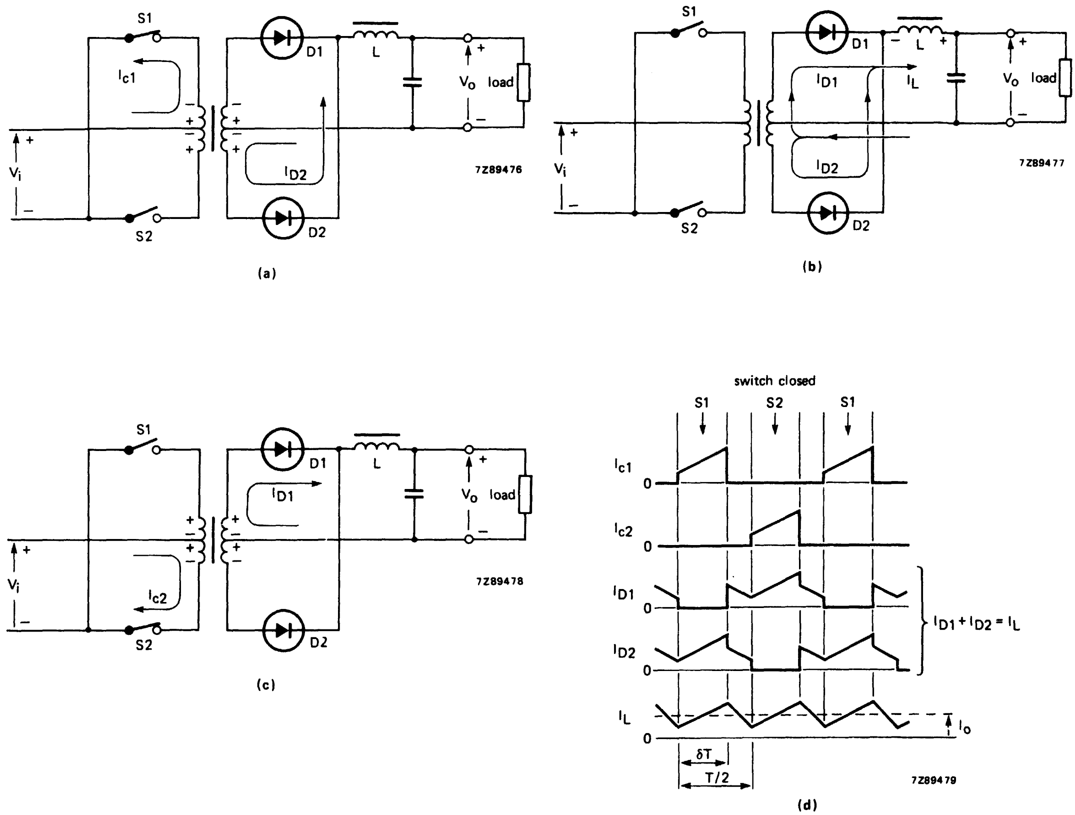


Fig.5.25 Basic circuit of a DC to DC push-pull converter with associated waveforms.

A practical push-pull converter circuit is shown in Fig.5.26.

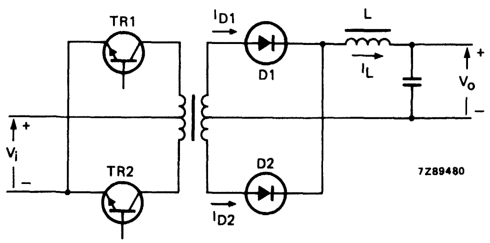


Fig.5.26 Conventional push-pull converter circuit.

A push-pull converter circuit doubles the frequency of the ripple current in the output filter and, therefore, reduces the output ripple voltage. A further advantage of the push-pull operation is that the transformer core is excited alternately in both directions in contrast to both the forward and flyback converters. Therefore, for the same operating conditions and power throughput, a push-pull converter design can use a smaller transformer core.

Multiple outputs can be constructed by using several secondary windings, each with its own output diodes, inductor and smoothing capacitor. The method of storing energy in the output choke can also be used in this example (see Fig.5.24 and associated description, section 5.2.1.2, Forward converter).

5.2.1.4 Converter selection

In each of the three basic converter designs there are several different circuit possibilities. In the flyback and forward converters, single and two-transistor designs can be used. If two transistors are used, they will switch simultaneously. This type of circuit preference is determined by the allowable collector-emitter voltage and collector current of the transistor. In push-pull converter designs, the primary of the transformer can be connected in several ways (see Fig.5.27).

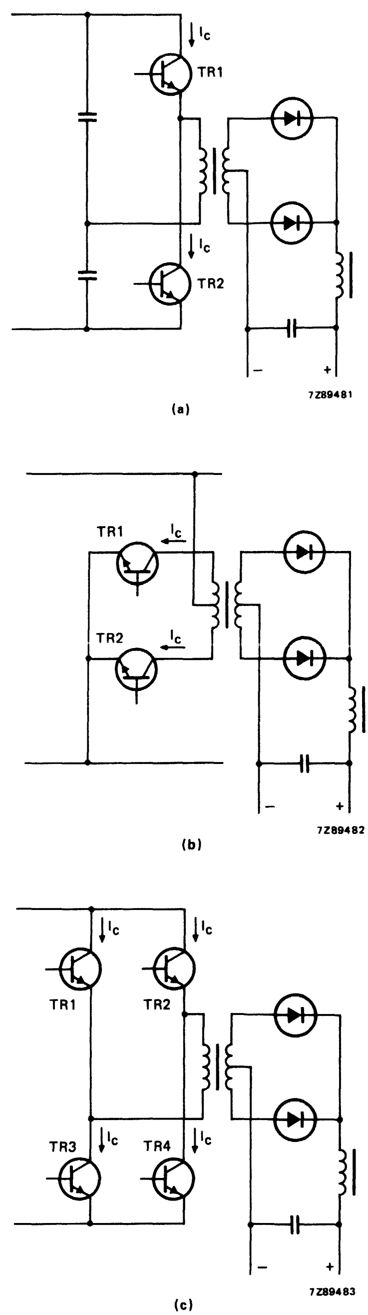


Fig.5.27 Several push-pull converter circuits.

Depending upon how the transformer primary is driven, it is possible to differentiate between single-ended (Fig.5.27.a), push-pull (Fig.5.27.b) and full-bridge circuits (Fig.5.27.c). Decisions on circuit details are determined by the transistor capabilities.

For a particular converter design, the first selection that should be considered is the type of converter circuit to use. To aid in this initial converter circuit selection, Fig.5.28 offers a rough guide to the type of converter, its output voltage and power capability. This selection has to be considered along with other requirements, including line isolation, ripple content, overall efficiency, multiple outputs, etc.

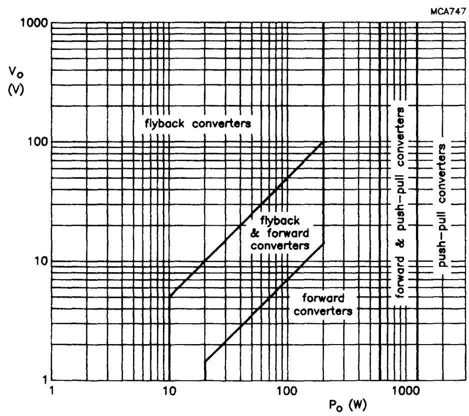


Fig.5.28 Converter circuit selection as a function of output voltage and throughput power.

Table 5.3 summarizes the most significant properties of a converter design. It shows the relative strengths and weaknesses of the three types of converters with regard to these characteristics.

Table 5.3 Converter design selection chart

FUNCTION	TYPE OF CONVERTER CIRCUIT		
	FLYBACK	FORWARD	PUSH-PULL
Circuit simplicity	+	0	-
Number of components	+	0	-
Drive circuitry	+	0	-
Output ripple	-	0	+
Choke volume	not required	0	+
Transformer volume	-	0	+
Mains isolation	+	-	+
High power	-	0	+
High voltage	+	0	0
Multiple outputs	+	0	0

+ Favourable
0 Average
- Unfavourable

For a high performance, high power, single output supply, where ripple is well below 1%, the push-pull design is the obvious choice. For smaller power versions of this type of supply, the forward, or double-forward converter provides a useful alternative to the push-pull converter.

In high-voltage supplies, the flyback converter is the most suitable circuit and should be considered as a preference. In multiple-output supplies, the flyback converter is again normally the first choice because it avoids the necessity of providing a number of output windings on the inductor, together with a single diode and capacitor for each.

5.2.1.5 Core selection

Table 5.4 shows which core type could be considered suitable for the different types of converter design.

Table 5.4 Converter design by selection of core type

CORE TYPE	TYPE OF CONVERTER CIRCUIT		
	FLYBACK	FORWARD	PUSH-PULL
E cores	+	+	0
ETD cores	0	+	+
EC cores	-	0	+
U cores	+	0	0
RM cores	0	+	0
EP cores	-	+	0
P cores	-	+	0
Ring cores	-	+	+

+ Favourable
0 Average
- Unfavourable

The power-handling capability of a given core is determined by frequency, its geometry and available winding area, and by other factors which depend on the specific application.

Operating frequency

The preferred operating frequency of a Switched Mode Power Supply is greater than 20 kHz to avoid audible noise from the transformer. With modern ferrites the practical upper limit has shifted to at least 1 MHz.

Ambient temperature

Ambient temperature, together with the maximum core temperature, determines the maximum temperature rise, which in turn fixes the permissible total power dissipation in the transformer. Normally, a maximum ambient temperature of 60 °C has been assumed. This allows a 40 °C temperature rise from the ambient to the centre of the transformer for a maximum core temperature of 100 °C. There is a tendency however towards higher temperatures to increase power throughput.

Flux density

To avoid saturation in the cores the flux density in the minimum cross-section must not exceed the saturation flux density of the material at 100 °C. The allowable total flux is the product of this flux density and the minimum core area and must not be exceeded even under transient conditions, that is, when a load is suddenly applied at the power supply output, and maximum duty factor occurs together with maximum supply voltage. Under steady-state conditions, where maximum duty factor occurs with minimum supply voltage, the flux is reduced from its absolute maximum permissible value by the ratio of the minimum to maximum supply voltage (at all higher supply voltages the voltage control loop reduces the duty factor and keeps the steady-state flux constant).

The minimum to maximum supply voltage ratio is normally taken as 1:1.72, this being typical for most applications.

Winding-window utilization

The gaps of 4 mm on each side of the windings (see Figs 5.29 and 5.30) ensure compliance with IEC435 mains isolation requirements. If these gaps are omitted, the maximum throughput power is increased to P' where:

$$P' = P\sqrt{\frac{\text{winding area}}{\text{winding area} - 8}} \text{ (mm)}$$

that is, by about 25% for small cores and about 10% for large cores.

The maximum percentage of copper in the available winding area is generally about 50%, corresponding to windings of circular cross-section and insulation equal to 25% of the wire diameter.

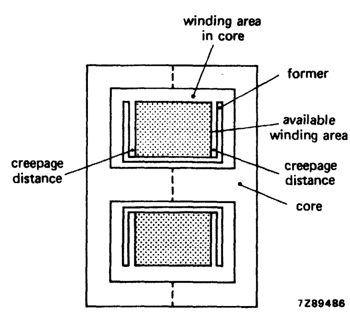


Fig.5.29 Section through core showing airgap; to allow for creepage distance for 230 V mains isolation, a gap of 4 mm is left at each side of the winding.

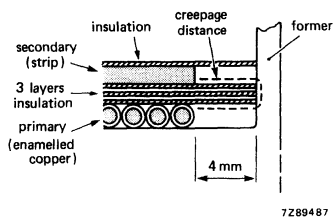


Fig.5.30 Detailed section of winding showing how creepage distance is measured.

F_W and F_R ratios

The term F_W is the winding copper factor and is defined as:

$$F_W = \frac{A_{Cu}}{A_W}$$

where:
A_{Cu} is the total cross-sectional area of the copper in the windings, and A_W is the available winding area.

F_R is defined as:

$$F_R = \frac{\text{AC winding resistance}}{\text{DC winding resistance}}$$

Both F_W and F_R ratios depend on conductor sizes and winding configuration employed in any particular transformer design, and these will depend on the required input and output voltages, etc. Achievable F_W and F_R ratios for normal solid wire and strip conductors depend on the particular transformer specification and can only be assessed for particular cases.

5.2.1.6 Selecting the correct core type

The choice of a core type for a specific design depends on the design considerations detailed in para. 5.2.1.5 and also on the personal preference of the designer. Table 5.5 gives an overview of core types as a function of power throughput, and this may be useful to the designer for an initial selection.

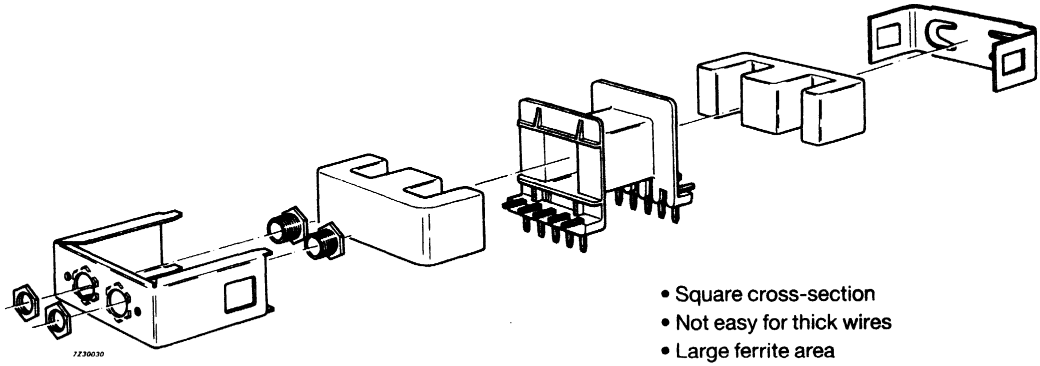
Table 5.5 Power throughput for different core types (at 100 kHz switching frequency)

POWER RANGE (W)	CORE TYPE
< 5	RM4, P11/7, R14, EF12.6, U10
5 - 10	RM5, P14/8
10 - 20	RM6, E20, P18/11, R23, U15
20 - 50	RM8, P22/13, U20, RM10, ETD29, E25, R26/10
50 - 100	ETD29, ETD34, EC35, EC41, RM12, P30/19, R26/20
100 - 200	ETD34, ETD39, ETD44, EC41, EC52, RM14, P36/22, E30, R56, U25, U30, E42
200 - 500	ETD44, ETD49, E55, EC52, E42, P42/29, U37
> 500	E65, EC70, U93, U100

Each of the core types has been developed for a specific application, therefore they all have advantages and drawbacks depending on, for example, converter type and winding technique.

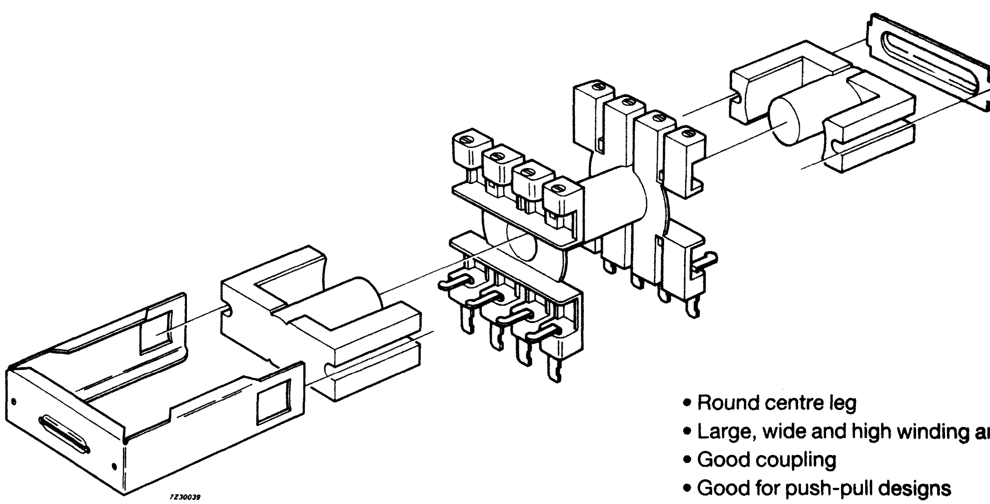
The choice will also often be governed by available production equipment. For instance, a factory with a long history of winding RM cores for telecom filter applications will tend to also choose RM cores if they launch into the SMPS business.

Figs 5.31 to 5.38 provide an overview of the core types available.



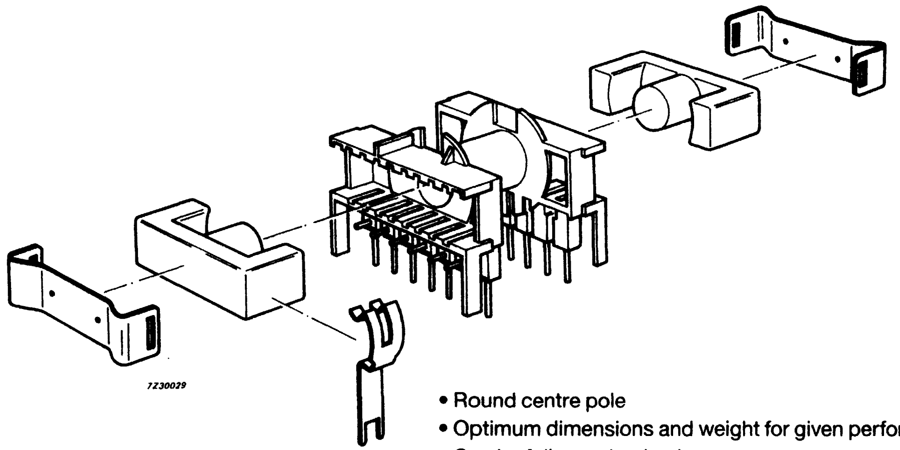
- Square cross-section
- Not easy for thick wires
- Large ferrite area
- Smaller winding area
- Simple shape, easy to manufacture

Fig.5.31 E core exploded view.



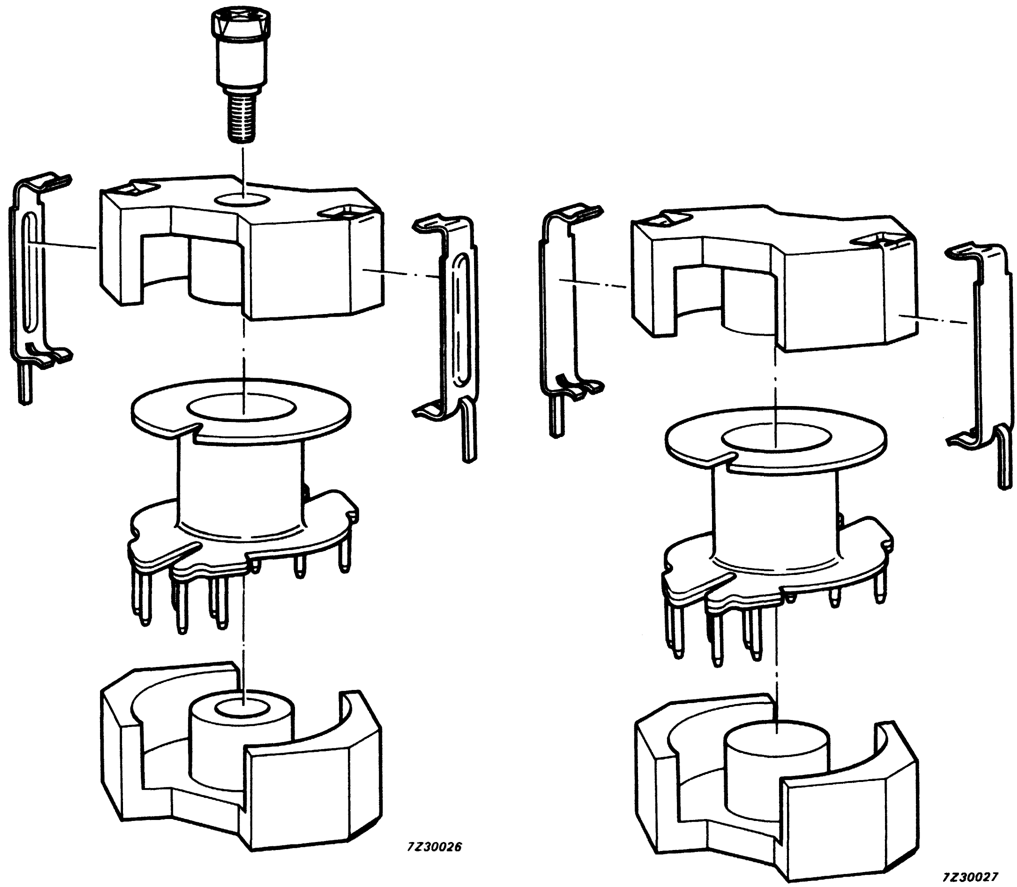
- Round centre leg
- Large, wide and high winding area
- Good coupling
- Good for push-pull designs

Fig.5.32 EC core exploded view.



- Round centre pole
- Optimum dimensions and weight for given performance
- Can be fully mechanized
- Efficient mounting parts

Fig.5.33 ETD core exploded view.

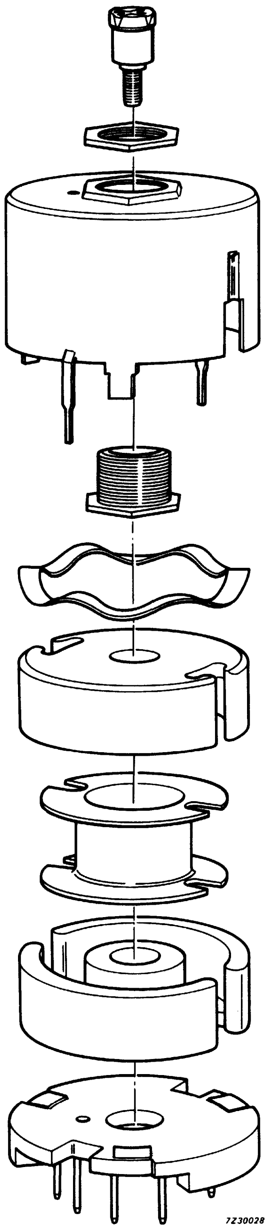


7Z30026

7Z30027

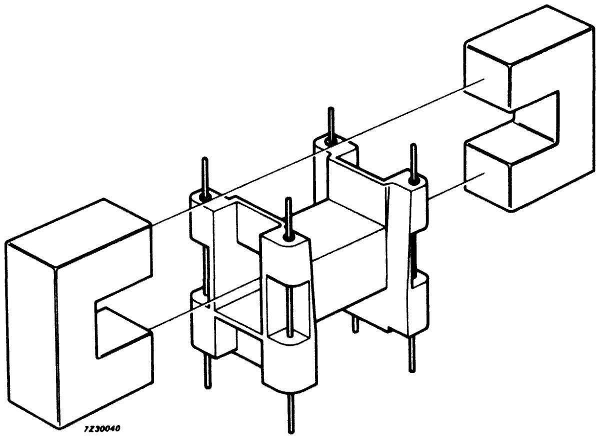
- Good screening
- Wider slots to get leads out
- Simple mounting system
- Easy for automatic winding
- Small surface area on PCB
- Good for high frequency low power

Fig.5.34 RM core exploded view.



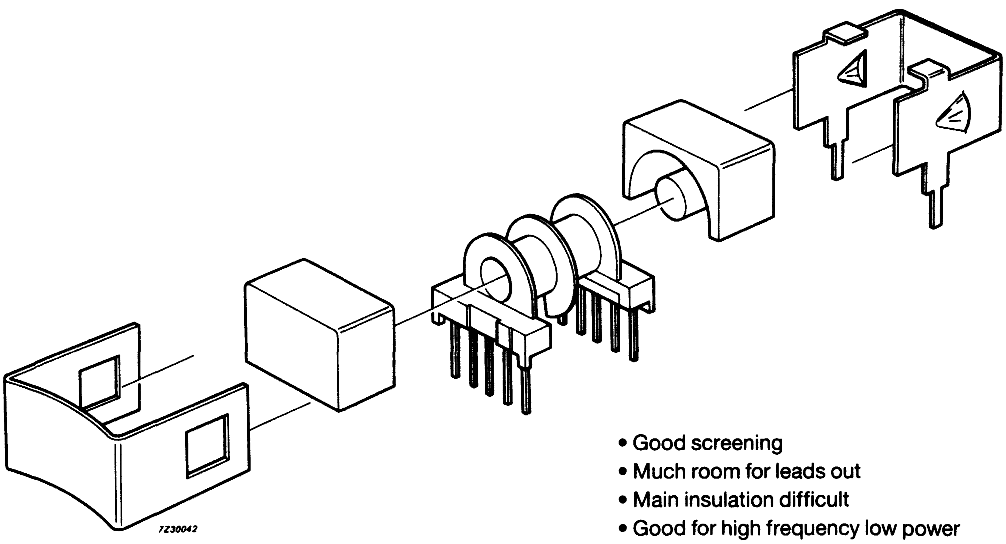
- Excellent screening
- Short winding length
- Difficult to get leads out
- Mains insulation very difficult
- Good for high frequency low power

Fig.5.35 P core exploded view.



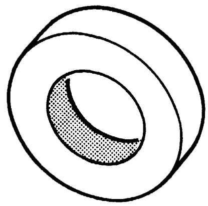
- Simple shape
- Can be stacked for very high power
- TV - U cores have round leg and are excellent for high voltage power

Fig.5.36 U core exploded view.



- Good screening
- Much room for leads out
- Main insulation difficult
- Good for high frequency low power

Fig.5.37 EP core exploded view.



• Simple shape
• Very low stray flux
• Low leakage inductance
• Not easy to wind

Fig.5.38 Ring core.

5.2.1.7 Choice of ferrite grade for power transformers

A full range of power ferrites is available for any application (see Table 5.6)

Table 5.6 Core availability

CORE TYPE	MATERIAL GRADE				
	3B8	3C80	3C10	3C85	3F3
E - CORES		•		•	•
EF - CORES		•		•	•
ETD - CORES		•		•	•
EC - CORES		•		•	
U - CORES		•	•		
RM - CORES	•			•	•
P - CORES	•			•	•
EP - CORES				•	•
RING CORES				•	•

The main characteristics of the grades are:

3B8 Medium frequency grade (< 200 kHz) for small power transformers or general purpose transformers.
Minimum loss at room temperature, so not really suitable for loss-limited transformers.

3C80 Low frequency grade (< 100 kHz) for "real" power transformers. Main use in TV applications.

3C10 Low frequency grade with improved saturation level. Suitable for flyback converters e.g. (Line Output Transformers)

3C85 Medium frequency (< 200 kHz) grade for industrial use. Loss levels much lower than for 3C80 for all frequencies.

3F3 High frequency grade (up to 1 MHz). Top material for modern high frequency designs. Specially recommended for resonant supplies.

Figures 5.39 and 5.40 show loss information for the material grades measured at a frequency of 100 kHz and magnetic flux density (B) of 100 mT, and at a frequency of 500 kHz and magnetic flux density of 50 mT respectively. What can be gained by the use of a better ferrite grade is clearly demonstrated in Figs 5.41 and 5.42.

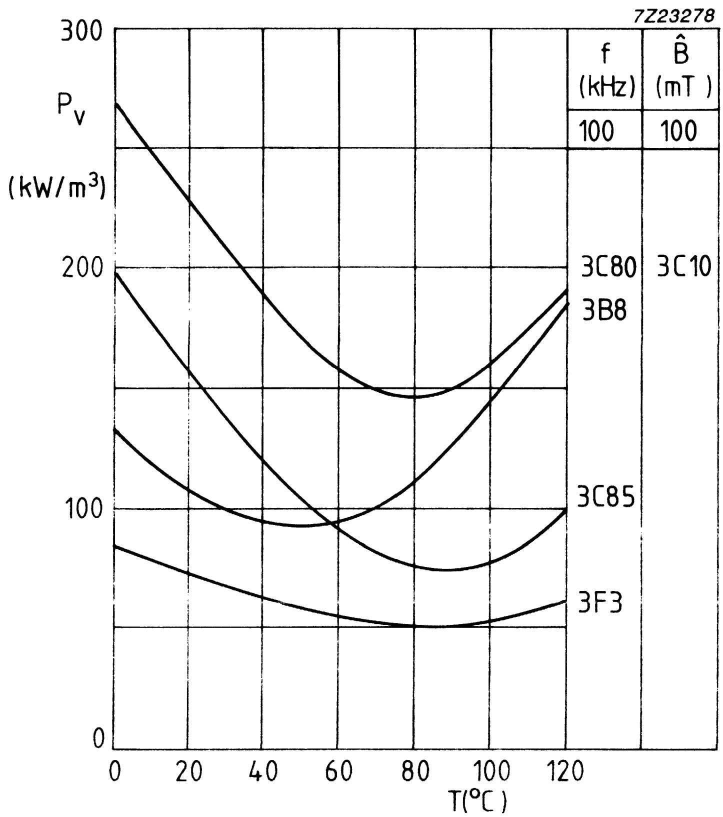


Fig.5.39 Specific power loss (P_V) as a function of temperature; f = 100 kHz, B = 100 mT.

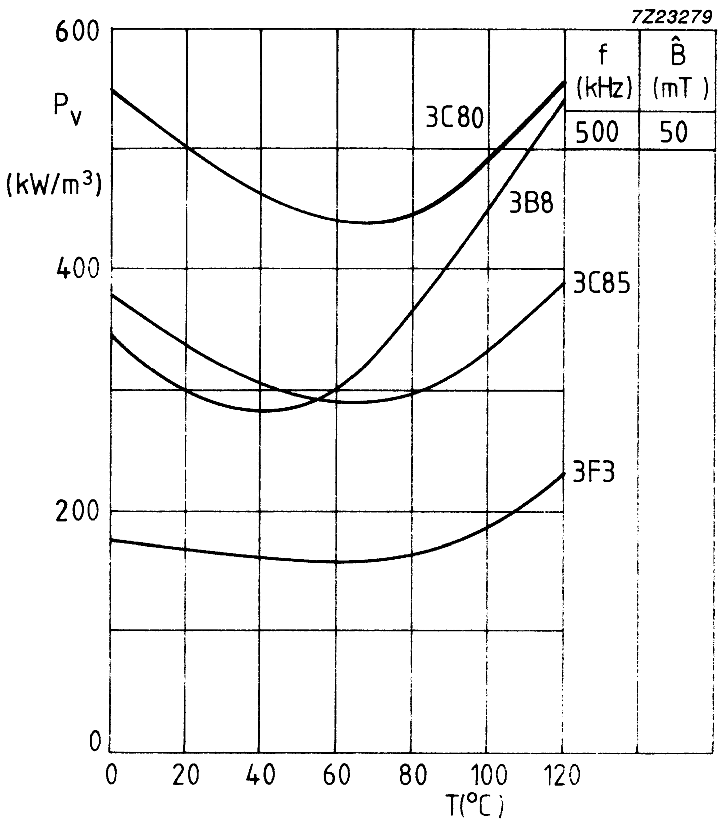


Fig.5.40 Specific power loss (P_V) as a function of temperature; f = 500 kHz, B = 50 mT.

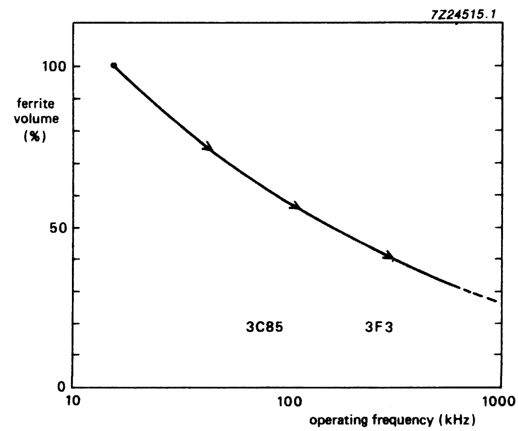


Fig.5.41 Decrease of ferrite volume in power supplies with increasing switching frequency.

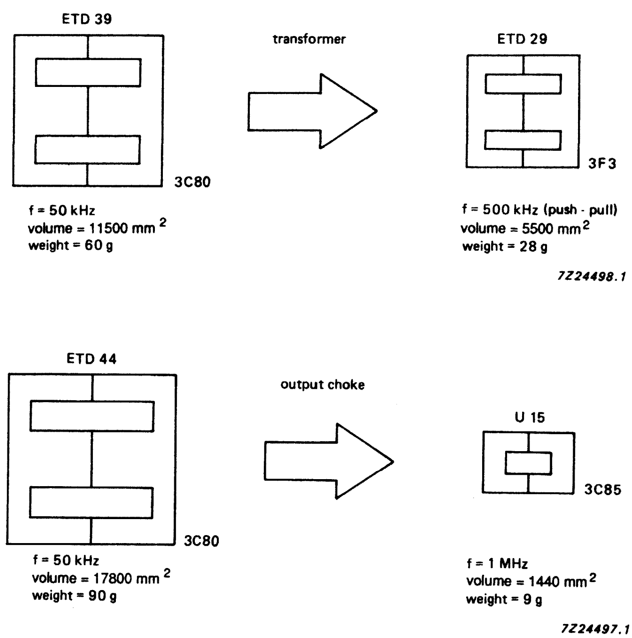


Fig.5.42 Decrease of ferrite component size for increasing frequency.

The performance factor (f · B_{max}) is a measure of the power throughput that a ferrite core can handle at a loss level of 200 mW/cm^3. This level is considered to be acceptable for a good medium size transformer design. From the graph it is clear that for low frequencies there is not much difference between the grades, because the cores are saturation limited. At higher frequencies, the differences between the grades increase. There is an optimum operating frequency for each material grade. It is evident that in order to increase power throughput or power density a higher operating frequency and a better ferrite should be chosen.

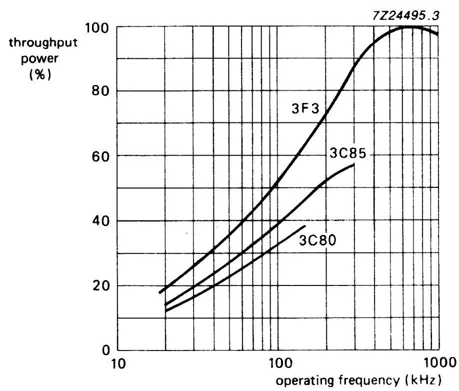


Fig.5.43 Performance factor (f ·B_{max}) as a function of frequency for material grades 3C80, 3C85 and 3F3.

Output chokes

Output chokes for Switched Mode Power Supplies have to operate with a DC load causing a bias magnetic field H_{DC}.

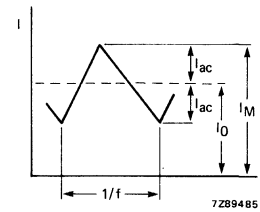


Fig.5.44 Choke waveform.

In a closed ferrite circuit, this can easily lead to saturation. Power ferrites such as 3C80, 3C85 or 3F3 start saturating at field strengths of about 50 A/m. Permeability drops sharply, as can be seen in the graphs (μ_Δ) of the material data section. The choke loses its effectivity.

There are two remedies against this effect:

- use gapped ferrite cores
- use a material with a low permeability and high saturation.

Gapped core sets

The effect of an airgap in the circuit is that a much higher field strength is needed to saturate a core.

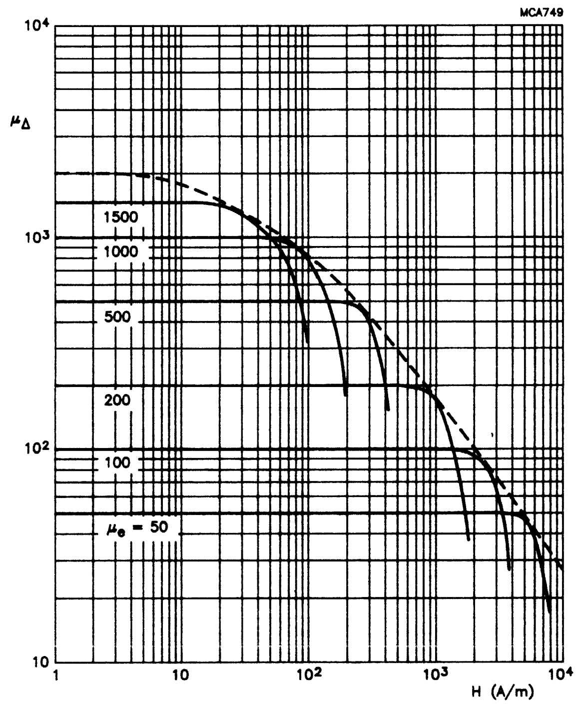


Fig.5.45 Effect of increased gap length.

For each operating condition an optimum airgap length can be found. In a design, the maximum output current (I) and the value of inductance (L) necessary to smoothen the ripple to the required level are known. The product I^2L is a measure of the energy which is stored in the core during one half cycle.

Using this I^2L value and the graphs given for a number of core types, the proper airgap can be selected.

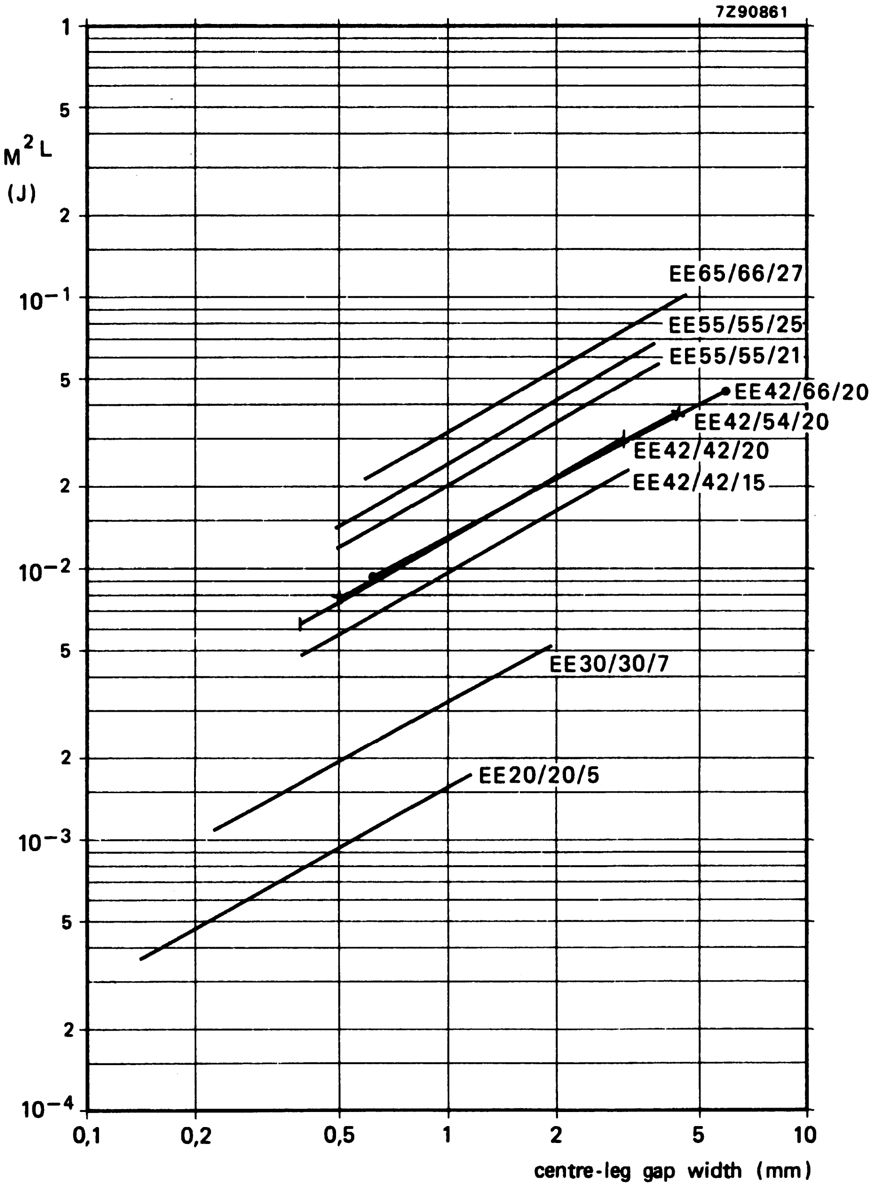


Fig.5.46 I^2L graph for E cores.

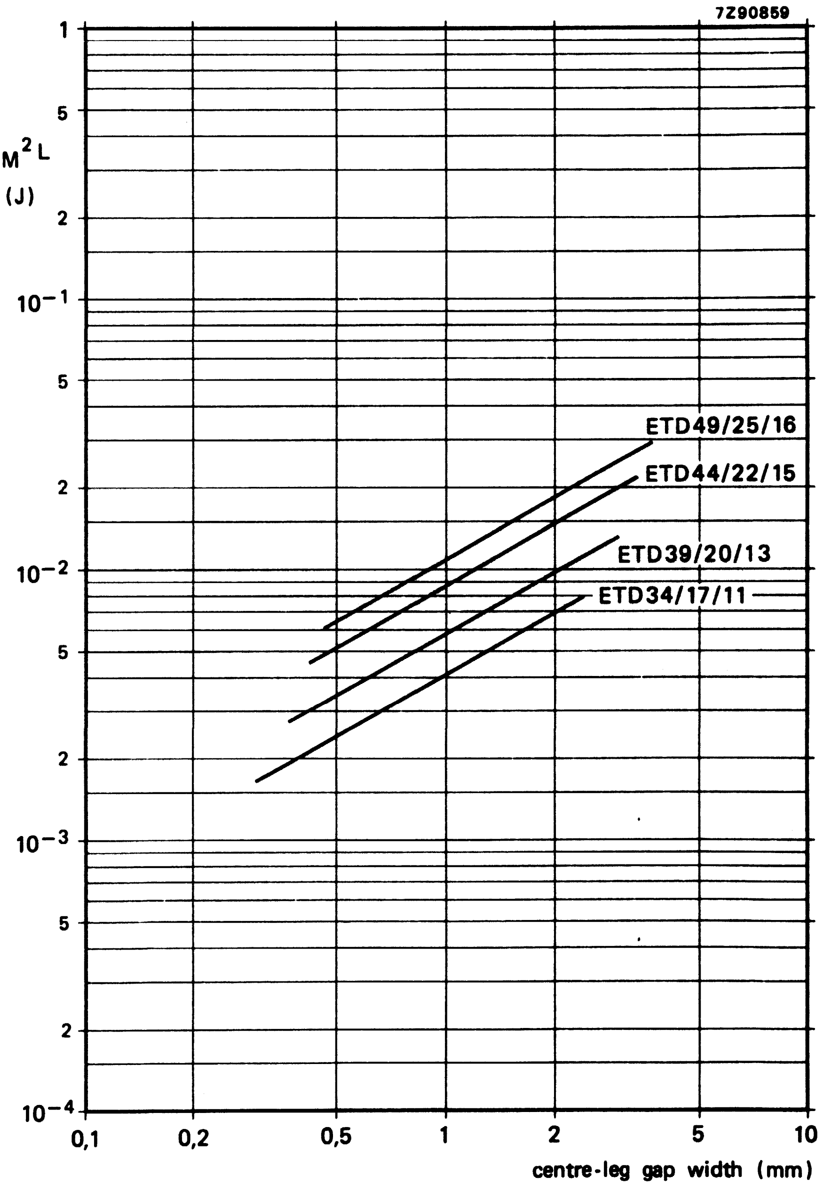


Fig.5.47 I^2L graph for ETD cores.

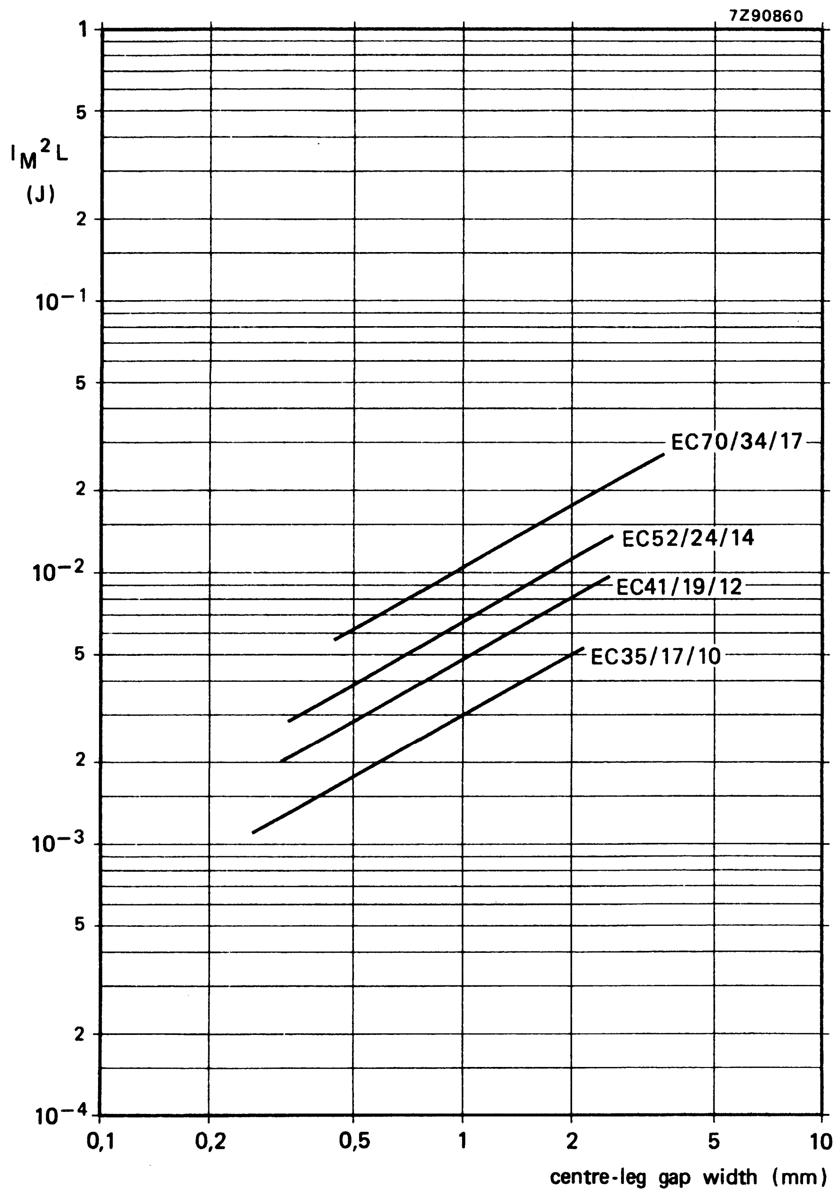


Fig.5.48 I^2L graph for EC cores.

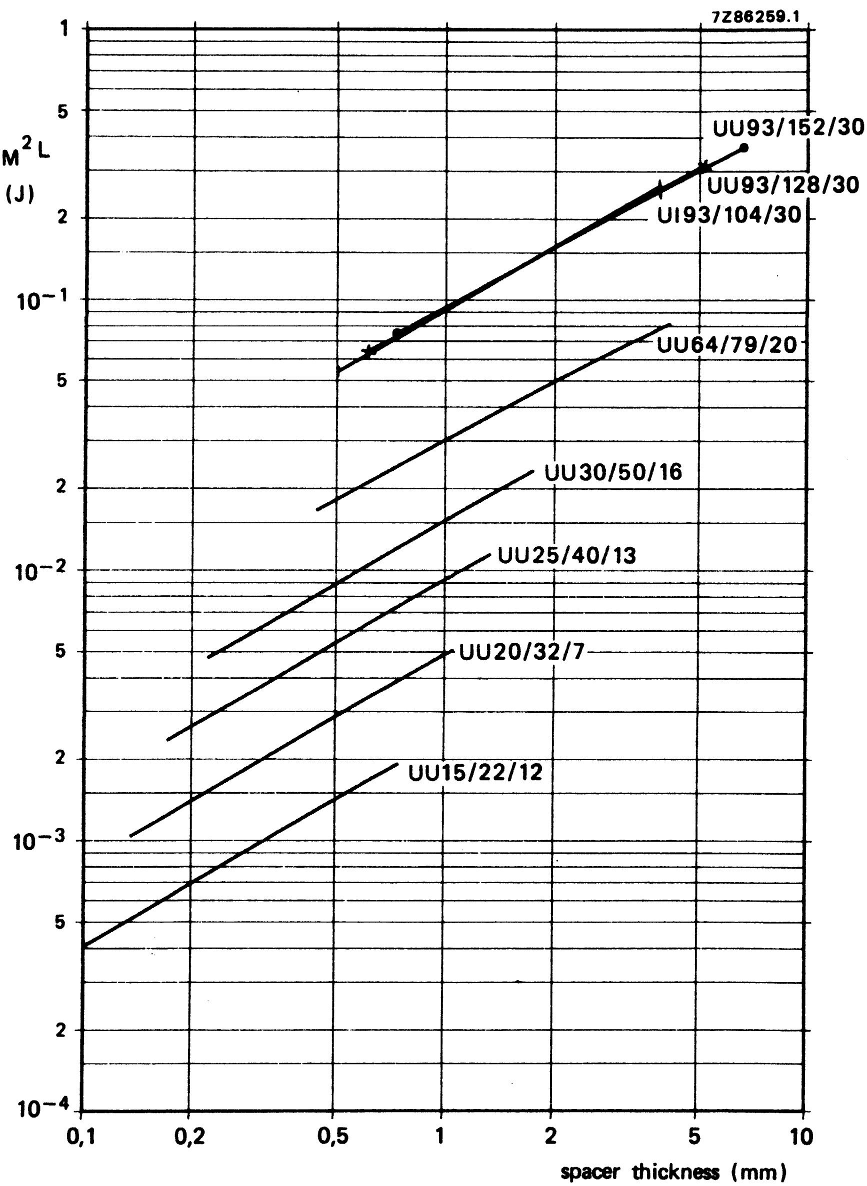


Fig.5.49 I^2L graph for U cores.

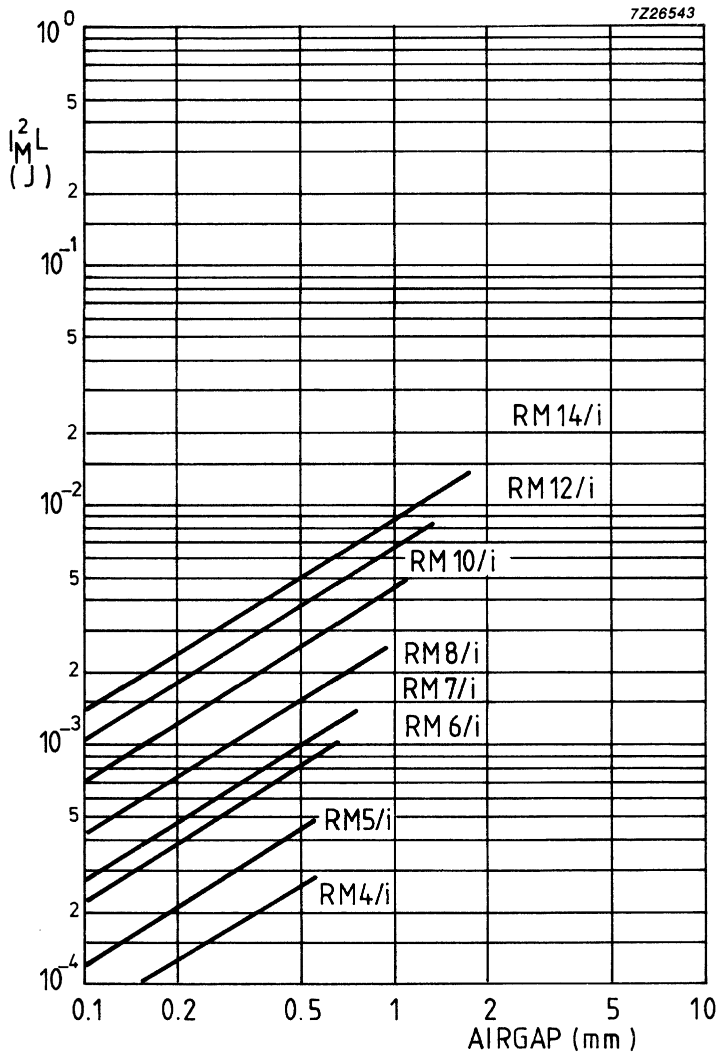


Fig.5.50 I^2L graph for RM cores.

Iron powder ring cores

Ring cores made from compressed iron powder have a rather low permeability (max. 90) combined with a very high saturation level (up to 1500 mT). The permeability is so low because the isolating coating on the iron particles act as a so called distributed airgap. Therefore, our 2P ring core range can operate under bias fields of up to 2000 A/m.

Input filters (current compensated chokes)

To avoid the conduction of switching noise from a SMPS into the mains, an input filter is generally necessary. The magnetic circuit in these filters is usually a pair of U cores or a ring core.

Since the noise signal is mainly common mode, current compensation can be used to avoid saturation.

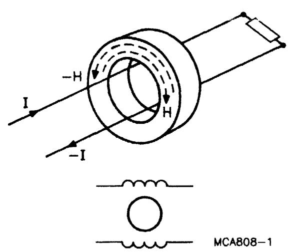


Fig.5.51 Current compensated choke.

Two separate windings on the core cause opposing magnetic fields when the load current passes through them (current compensation). The common mode noise signal however, is blocked by the full inductance caused by the high permeability ferrite.

If, for some reason, current compensation is not complete or impossible, high permeability grades will saturate. In that case one of the power grades may be a better compromise. Another important factor in the design process is the frequency range of the interference signal. High permeability ferrites have a limited bandwidth as can be seen from Fig.5.52.

These grades only perform well as an inductance below the frequency where ferromagnetic resonance occurs. Above this cut-off frequency, a coil will have a highly resistive character and the Q-factor of the LC filter circuit will be limited and thus, also the impedance. A better result could have been obtained with a grade having a lower permeability.

Figure 5.53 provides a quick method of choosing the right ferrite grade for the job.

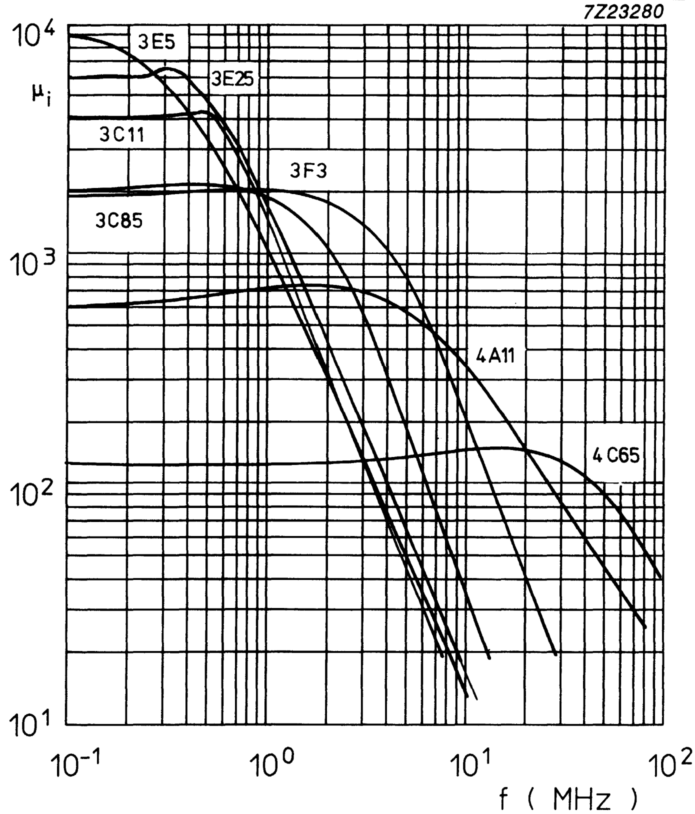


Fig.5.52 Permeability as a function of frequency of different material grades.

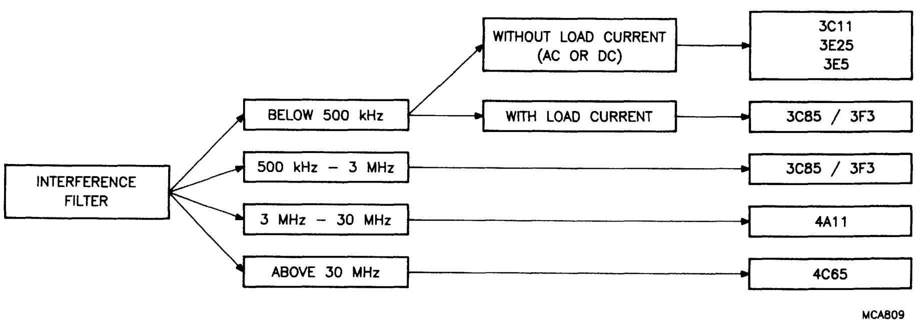


Fig.5.53 Selection chart for materials used in input filters.

Magnetic regulators

Saturable inductors provide a means of efficiently regulating several independent outputs in an SMPS by blocking varying amounts of energy from the secondary of the transformer. This eliminates the need for feedback between secondary and primary and allows improved isolation of input and output. The circuits required are both simple and economic and can be easily integrated.

A schematic of a saturable inductor circuit (without regulation) together with associated waveforms is shown in Fig.5.54.

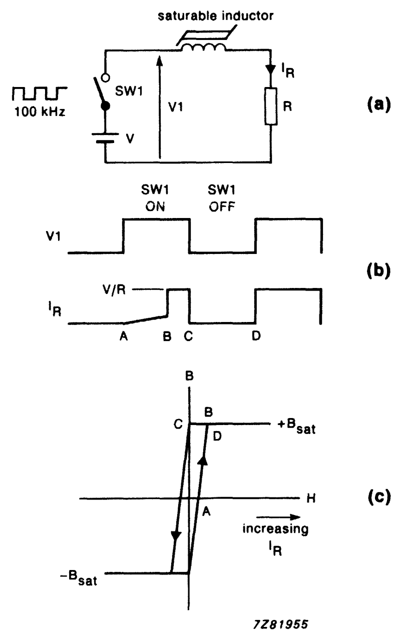


Fig.5.54 Schematic of a saturable inductor and associated waveforms (without regulation).

During a typical cycle:

- switch SW1 is closed (point A on timing diagram), the inductance of the saturable inductor limits the rate of current rise until the core becomes saturated
- with the core saturated (point B), the only impedance to current flow is the very small resistance of the inductor, which can be regarded as a short circuit with power being transferred unimpeded to the load resistor
- switch SW1 is opened (C). Because the saturable inductor has a rectangular B-H loop, the flux remains unchanged even when H has fallen to zero. Since there has been no change in flux, there is no inductance and the current can fall instantaneously
- switch SW1 is reclosed. As the flux in the core is still saturated and remains unchanged, there is no resistance to the current flow to the load.

A schematic of a regulated circuit and its associated waveforms is shown in Fig.5.55.

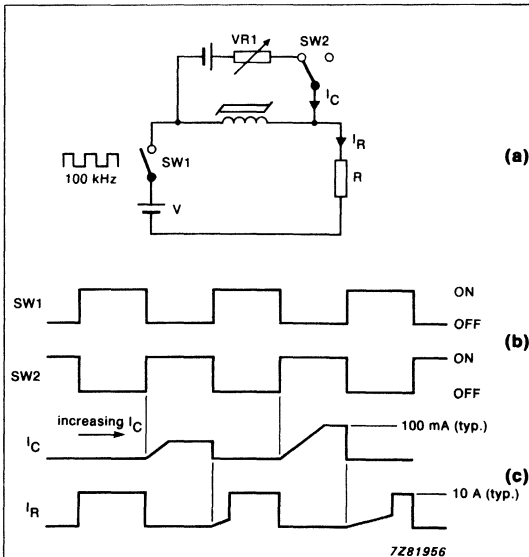


Fig.5.55 Schematic of a saturable inductor and associated waveforms (with regulation).

In this circuit, the inductor is saturated while switch SW1 is closed, thus reducing the period during which energy is conducted from the transformer to the load. Varying the level of this control current, in effect, pulse width modulates the main output voltage waveform (see Fig.5.56), thus regulating the output voltage across the load.

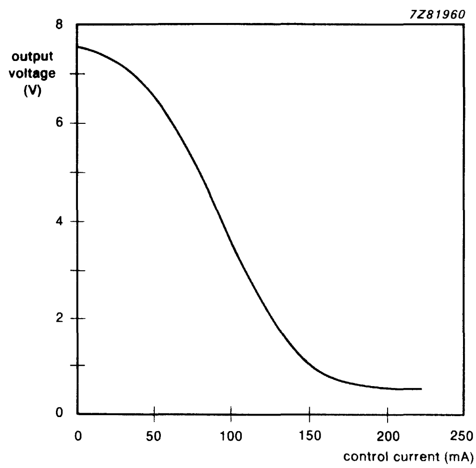


Fig.5.56 Typical control curve for a 3R1 ring core (size 14 x 9 x 5 mm, with 15 turns).

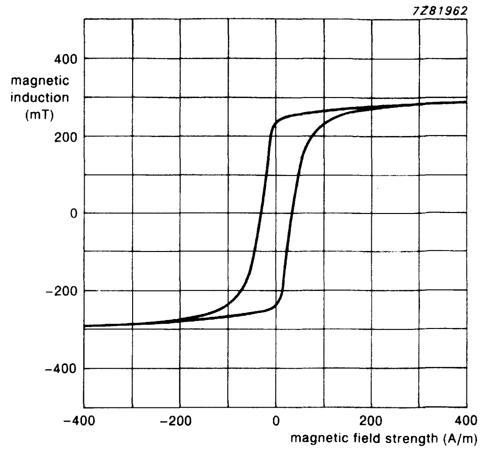


Fig.5.57 Properties of 3R1 ferrite material; f = 100 kHz, T = 25 °C

The new 3R1 ferrite material is an excellent alternative to the amorphous metal for the cores of saturable inductors of SMPS. The suitability of 3R1 for these cores derives from:

- a rectangular B-H loop
- high saturation flux level
- low coercive force.

The performance of 3R1 is comparable to that of amorphous metal making it an excellent material for applications such as output regulation and spike suppression.

5.3 Ferrites for Interference Suppression and Electromagnetic Compatability (EMC)

With the ever increasing intensive use of electronic equipment Electromagnetic Compatibility (EMC) has become an important item. Laws specify limits of the level of interference caused by equipment (EMR) and also the sensitivity of equipment to incoming interference (EMS).

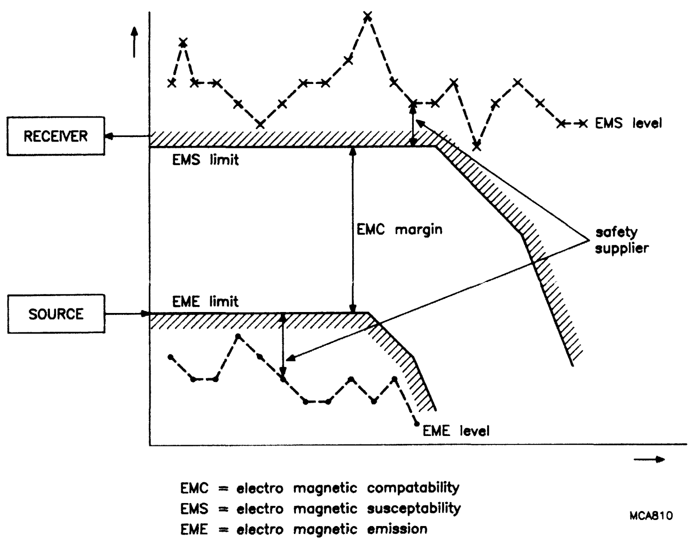


Fig.5.58 Principles of Electromagnetic Compatability (EMC).

Limiting curves are defined by organizations such as CISPR and FCC. Since the density of equipment increases, laws will become more stringent in the near future.

During the design phase, problems with interference can be avoided to some extent. Often additional suppression components such as capacitors and coils will be necessary to meet the required levels. Inductive components are very effective in blocking interfering signals, especially at high frequencies. The principles of suppression are shown in Fig.5.59.

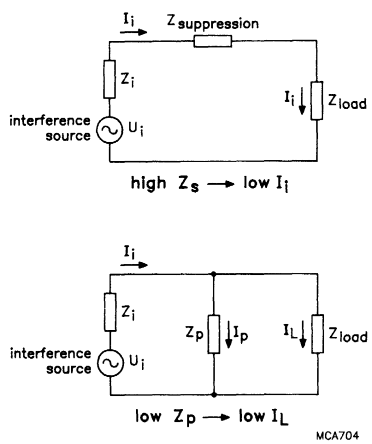


Fig.5.59 Basic suppression circuits.

Capacitors are used as a shunt impedance for the unwanted signal.
Unfortunately for high frequencies, most capacitors do not have the low impedance one might expect because of parasitic inductance or resistance.

Inductors are used in series with the load impedance. They provide a low impedance for the wanted signal, but a high impedance for the interfering, unwanted, signal.

Philips have a full range of beads, beads on wire and wideband chokes to suit every application. Rods and tubes are also often used for this application after they have been coiled by the user.

5.3.1 INTERFERENCE SUPPRESSION BEADS

A range of beads is available in two material grades, especially developed for suppression purposes.

They can easily be shifted on existing wires in the equipment.

- 3S1 for frequencies up to 30 MHz
- 4S2 for frequencies from 10 to 1000 MHz.

The material grades and beads are fully guaranteed for their main feature, impedance as a function of frequency.

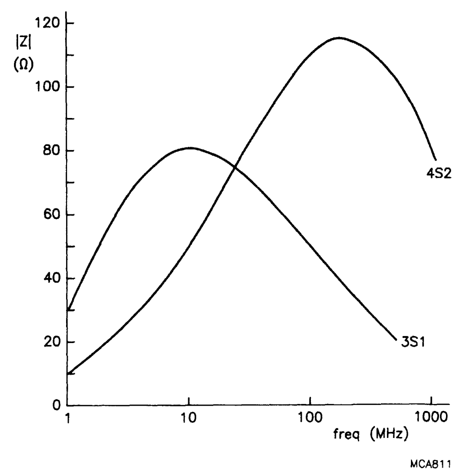


Fig.5.60 Impedance as a function of frequency for material grades 3S1 and 4S2; bead size 5 x 2 x 10 mm.

The grade 3S1 has a high permeability and is therefore rather sensitive for DC load. In applications where a high DC current is flowing,4S2 can be a better choice (see graphs 5.61 and 5.62).

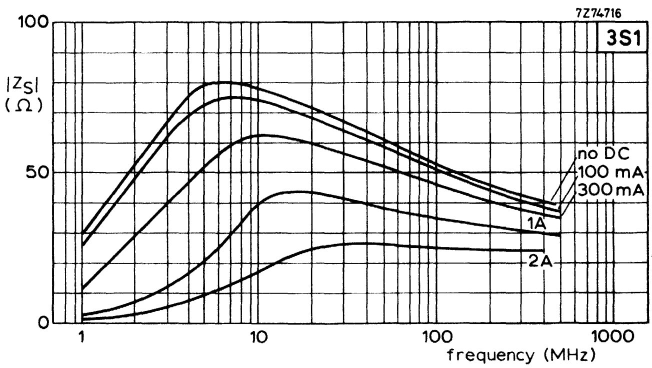


Fig.5.61 Impedance as a function of frequency at different DC levels for material grade 3S1.

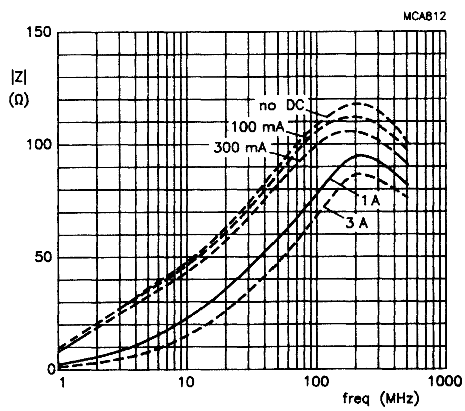


Fig.5.62 Impedance as a function of frequency at different DC levels for material grade 4S2.

5.3.2 BEADS ON WIRE

This product range consists of suppression beads, already mounted on presoldered 0.6 mm wire and taped on standard reels. These can be handled by automatic placement machines.

5.3.3 WIDEBAND CHOKES

Wideband chokes are wired multihole beads. Since they have up to 2 1/2 turns of wire their impedance values are rather high over a broad frequency range,hence their name.

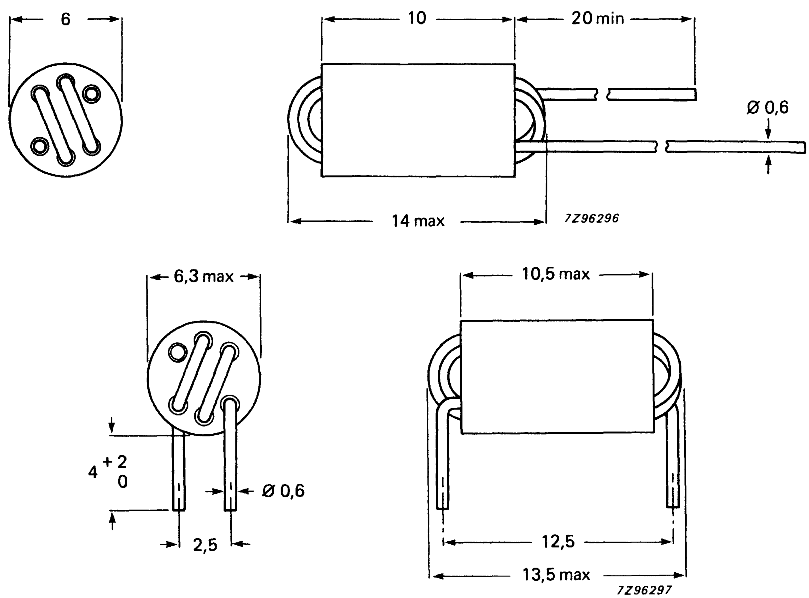


Fig.5.63 Outline of wide band chokes.

The magnetic circuit is closed, so there is little stray field. The DC resistance is very low since only a short length of 0.6 mm copper wire is used.

5.3.4 Rods and tubes

Rods and tubes are generally used to increase the inductance of a coil. The magnetic circuit is very open and therefore the mechanical dimensions have more influence on the inductance than the ferrite's permeability (see Fig.5.65) unless the rod is very slender.

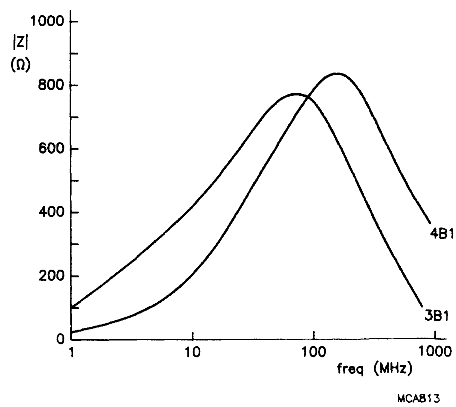


Fig.5.64 Impedance as a function of frequency for a wideband choke.

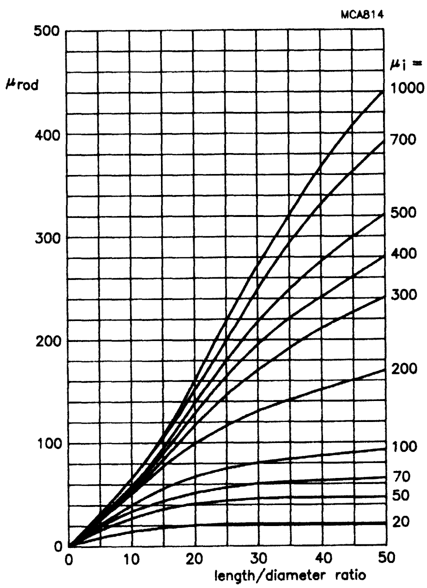


Fig.5.65 Rod permeability (μ_{rod}) as a function of length to diameter ratio with material permeability as a parameter.

In order to establish the effect of a rod on the inductance of a coil, the following procedure should be carried out.

- calculate the length to diameter ratio of the rod (l/d).
- find this value on the horizontal axis and draw a vertical line.
- the intersection of this line with the curve of the material permeability gives the effective rod permeability (μ_{Rod}).

The inductance of the coil, provided the winding covers the whole length of the rod is given by:

$$L = \mu_0 \mu_{rod} \frac{N^2 A}{l} \text{ (H)}$$

where N = number of turns
where A = cross sectional area of rod
where l = length of coil.

Material grade specification

Material grade specifications

Survey

Properties specified in this section are related to room temperature (25 °C) unless otherwise stated. They have been measured on sintered, non ground ring cores of dimension ∅ 25 x ∅ 15 x 10 mm which are not subjected to external stresses.

Products generally do not fully comply with the material specification. Deviations may occur due to shape, size and grinding operations etc.

Specific product properties are given in the data sheets or product drawings.

For further details of material specifications, please refer to the page numbers quoted in the type survey.

Survey of material grades

FERRITE GRADE	μ_i at 25 °C	B_{sat} (mT) at 25 °C	T_c (°C)	ρ (Ωm)	FERRITE TYPE	MAIN APPLICATION AREA	AVAILABLE CORE SHAPES (SEE DATA SHEETS)	PAGE
4C6	100	≈ 380	≥ 350	≈ 10^5	NiZn	• telecom	RM, P, X	79
3D3	750	≈ 400	≥ 200	≈ 2	MnZn	filters	EP	80
3H1	2300	≈ 400	≥ 130	≈ 1	MnZn	• low signal		81
3H3	2000	≈ 450	≥ 160	≈ 2	MnZn	transformers		82
3E1	3800	≈ 400	≥ 125	≈ 1	MnZn	• pulse		83
3E4	4700	≈ 400	≥ 125	≈ 1	MnZn	transformers		85
3E5	10000	≈ 350	≥ 120	≈ 0.5	MnZn		ring cores	87
3B8	2300	≈ 500	≥ 200	≈ 1	MnZn	• power	RM, P,	89
3C10	1800	≈ 500	≥ 190	≈ 1	MnZn	conversion	E, EF, ETD, EFD	91
3C80	2000	≈ 500	≥ 200	≈ 1	MnZn	• general	EC, U, I, EP	93
3C85	2000	≈ 500	≥ 200	≈ 2	MnZn	purpose	ring cores	95
3F3	1800	≈ 500	≥ 200	≈ 2	MnZn	transformers		97
3S1	4000	≈ 400	≥ 125	≈ 1	MnZn	• suppression	beads	99
4S2	700	≈ 350	≥ 125	≈ 10^5	NiZn		beads on wire	100
4C65	125	≈ 350	≥ 350	≈ 10^5	NiZn	• suppression	ring cores	101
4A11	700	≈ 350	≥ 125	≈ 10^5	NiZn	• pulse	H	102
3C11	4300	≈ 400	≥ 125	≈ 1	MnZn	transformers		103
3E25	6000	≈ 400	≥ 125	≈ 0.5	MnZn			105
3C2	900	≈ 400	≥ 150	≈ 0.1	MnZn	• deflection	yoke rings	107
2A2	350	≈ 250	≥ 135	≈ 10^6	MgZn	coils		109
2B1	350	≈ 250	≥ 125	≈ 10^6	MgZn			111
4E1	15	≈ 200	≥ 500	≈ 10^5	NiZn	• tuning	ring cores	113
4D2	60	≈ 240	≥ 400	≈ 10^5	NiZn	• suppression	rods, tubes	114
4B1	250	≈ 350	≥ 250	≈ 10^5	NiZn	• miscellaneous	wide band	115
6B1	250	≈ 350	≥ 250	≈ 10^5	LiZn		chokes	116
3B1	900	≈ 400	≥ 150	≈ 0.2	MnZn			117
3R1	800	≈ 450	≥ 230	≈ 1	MnZn	• magnetic regulators	ring cores	118

Material grade specifications

Survey

Survey of material grades (continued)

IRON POWDER GRADE	μ_i at 25 °C	B_{sat} (mT) at 25 °C	MAXIMUM OPERATING TEMPERATURE (° C)	MAIN APPLICATION AREA	AVAILABLE CORE SHAPES (SEE DATA SHEETS)	PAGE
1P04	4	-	130	• tuning	rods, pins	119
1P11	11	-	130			119
1P30	30	-	140			119
2P40	40	950	140	• suppression	ring cores	121
2P50	50	1000	140			121
2P65	65	1150	140			121
2P80	80	1400	140			121
2P90	90	1600	140			121

Typical mechanical and thermal properties

PROPERTY	UNIT	MnZnFERRITE	NiZn FERRITE	LiZn FERRITE
Young's modulus	N/mm^2	$(90\text{-}150).10^3$	$(80\text{-}150).10^3$	140.10^3
Ultimate compressive strength	N/mm^2	200-600	200-700	-
Ultimate tensile strength	N/mm^2	20-65	30-60	25
Vickers hardness	N/mm^2	600-700	800-900	800
Linear expansion coefficient	K^{-1}	$(10\text{-}12).10^{-6}$	$(7\text{-}8).10^{-6}$	$(7.5\text{-}9.0).10^{-6}$
Specific heat	$J.kg^{-1}.K^{-1}$	700-800	750	-
Heat conductivity	$J.mm^{-1}.s^{-1}.K^{-1}$	$(3.5\text{-}5.0).10^{-3}$	$(3.5\text{-}5.0).10^{-3}$	-

Material grade specification 4C6

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	100 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 300 ≈ 250	mT mT
$\tan\delta/\mu_i$	3 MHz, 0.1 mT, 25 °C 10 MHz, 0.1 mT, 25 °C	≤ 60.10^{-6} ≤ 100.10^{-6}	
η_B	100 kHz, 1.5 - 3 mT, 25 °C	≤ 20.10^{-3}	T^{-1}
D_F	100 kHz, 0.1 mT, 25 °C	≤ 10.10^{-6}	
α_F	≤ 10 kHz, 0.1 mT, 5 - 25 °C ≤ 10 kHz, 0.1 mT, 25 - 55 °C	$(3 \pm 3).10^{-6}$ $(3 \pm 3).10^{-6}$	K^{-1} K^{-1}
ρ	DC, 25 °C	≈ 10^5	Ωm
T_c		≥ 350	°C
density		≈ 4500	kg/m^3

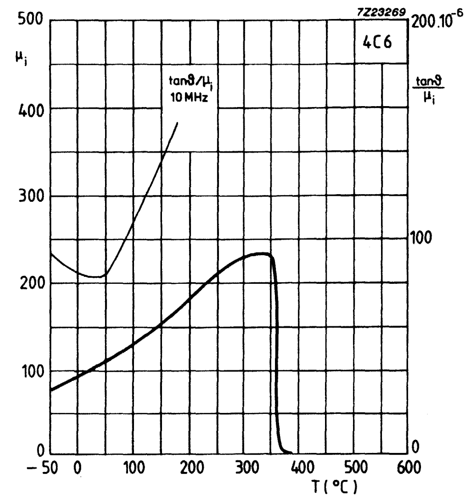


Fig.2 Initial permeability and loss factor as a function of temperature.

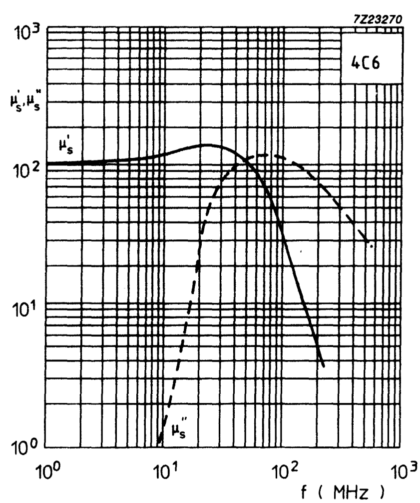


Fig.1 Complex permeability as a function of frequency.

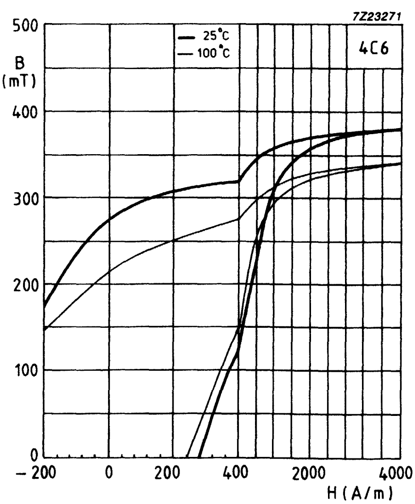


Fig.3 Typical B-H loops.

Material grade specification 3D3

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	750 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 320 ≈ 260	mT mT
$\tan\delta/\mu_i$	300 kHz, 0.1 mT, 25 °C 1 MHz, 0.1 mT, 25 °C	$\leq 10.10^{-6}$ $\leq 30.10^{-6}$	
η_B	100 kHz, 1.5 - 3 mT, 25 °C	$\leq 1.8.10^{-3}$	T^{-1}
D_F	10 kHz, 0.1 mT, 25 °C	$\leq 12.10^{-6}$	
α_F	≤ 10 kHz, 0.1 mT, 25 - 70 °C	$(1.5 \pm 1).10^{-6}$	K^{-1}
ρ	DC, 25 °C	≈ 2	Ωm
T_C		≥ 200	°C
density		≈ 4700	kg/m^3

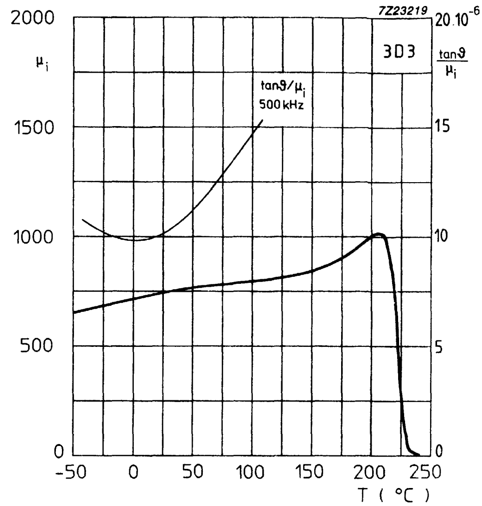


Fig.2 Initial permeability and loss factor as a function of temperature.

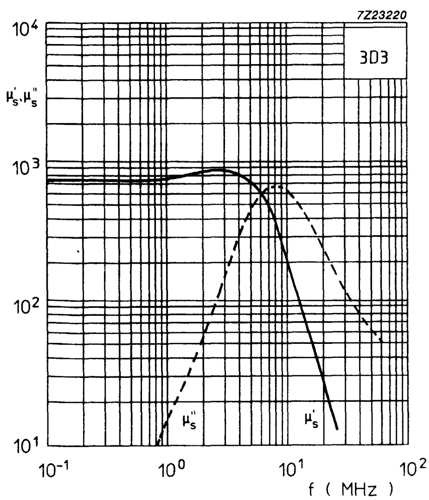


Fig.1 Complex permeability as a function of frequency.

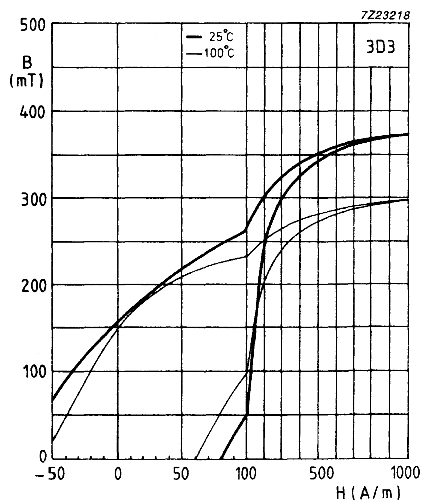


Fig.3 Typical B-H loops.

Material grade specification

3H1

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	2300 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 350 ≈ 210	mT mT
$\tan\delta/\mu_i$	10 kHz, 0.1 mT, 25 °C 100 kHz, 0.1 mT, 25 °C	≤ $1.5.10^{-6}$ ≤ 5.10^{-6}	
η_B	10 kHz, 1.5 - 3 mT, 25 °C	≤ 1.10^{-3}	T^{-1}
D_F	10 kHz, 0.1 mT, 25 °C	≤ $4.5.10^{-6}$	
α_F	≤ 10 kHz, 0.1 mT, 5 - 25 °C ≤ 10 kHz, 0.1 mT, 25 - 55 °C ≤ 10 kHz, 0.1 mT, 25 - 70 °C	$(1 \pm 0.5).10^{-6}$ $(1 \pm 0.5).10^{-6}$ $(1 \pm 0.5).10^{-6}$	K^{-1} K^{-1} K^{-1}
ρ	DC, 25 °C	≈ 1	Ωm
T_C		≥ 130	°C
density		≈ 4800	kg/m³

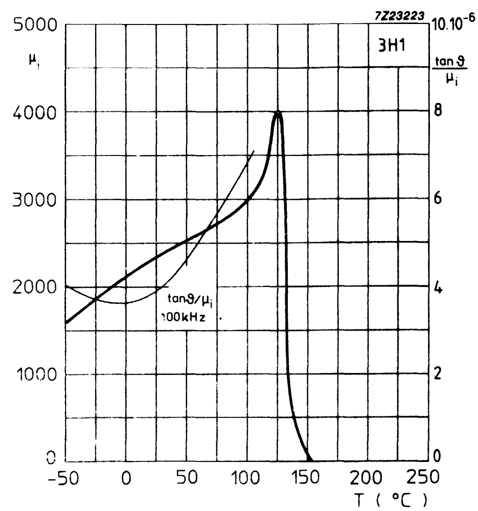


Fig.2 Initial permeability and loss factor as a function of temperature.

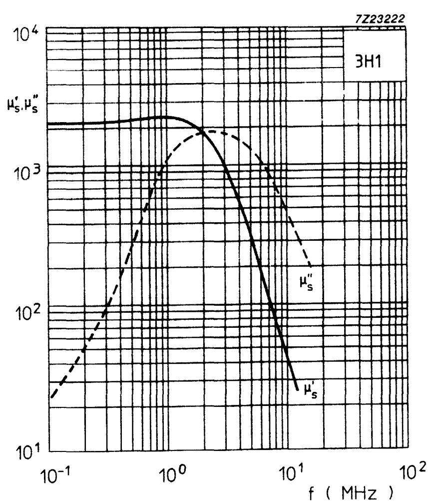


Fig.1 Complex permeability as a function of frequency.

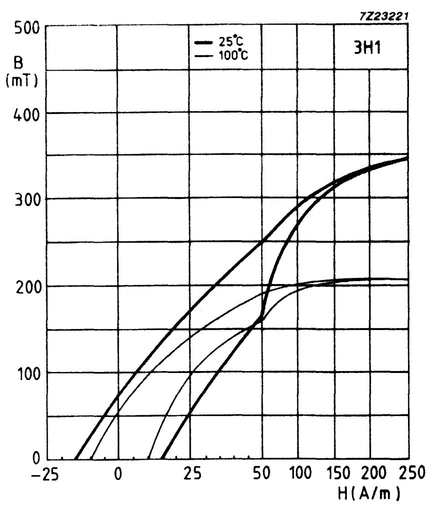


Fig.3 Typical B-H loops.

Material grade specification 3H3

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	2000 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 330 ≈ 250	mT mT
$\tan\delta/\mu_i$	30 kHz, 0.1 mT, 25 °C 100 kHz, 0.1 mT, 25 °C	≤ $1.6.10^{-6}$ ≤ $2.5.10^{-6}$	
η_B	100 kHz, 1.5 - 3 mT, 25 °C	≤ $0.6.10^{-3}$	T^{-1}
D_F	10 kHz, 0.1 mT, 25 °C 10 kHz, 0.1 mT, 40 °C	≤ 3.10^{-6} ≤ 3.10^{-6}	
α_F	≤ 10 kHz, 0.1 mT, 5 - 25 °C ≤ 10 kHz, 0.1 mT, 25 - 55 °C ≤ 10 kHz, 0.1 mT, 25 - 70 °C	$(0.7 \pm 0.3).10^{-6}$ $(0.7 \pm 0.3).10^{-6}$ $(0.7 \pm 0.3).10^{-6}$	K^{-1} K^{-1} K^{-1}
ρ	DC, 25 °C	≈ 2	Ωm
T_C		≥ 160	°C
density		≈ 4700	kg/m^3

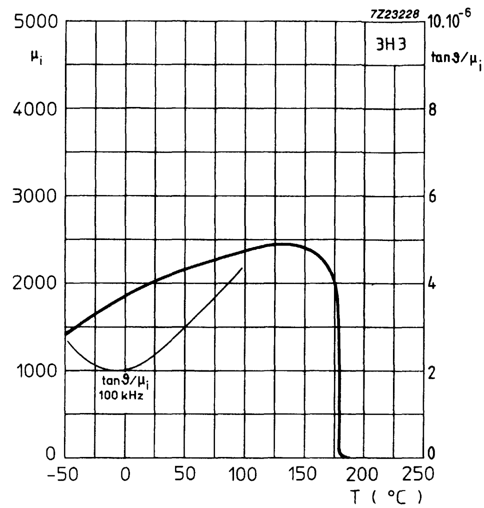


Fig.2 Initial permeability and loss factor as a function of temperature.

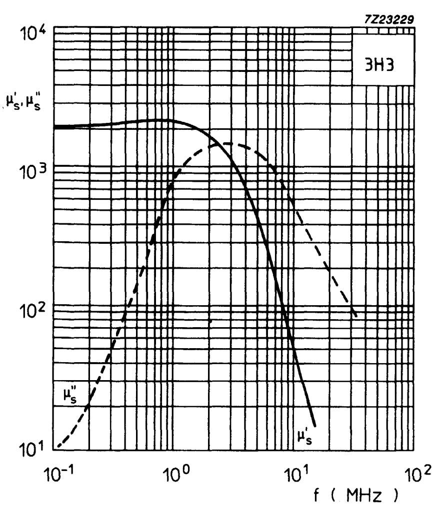


Fig.1 Complex permeability as a function of frequency.

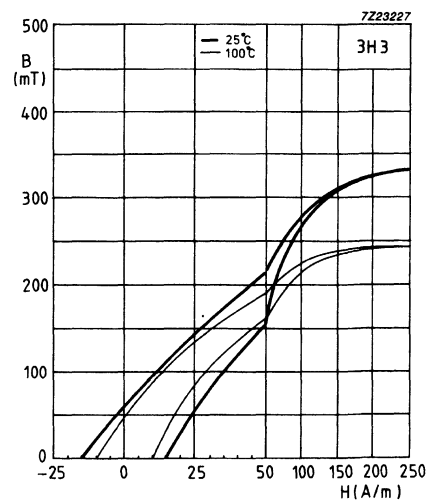


Fig.3 Typical B-H loops.

Material grade specification 3E1

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	3800 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 350 ≈ 200	mT mT
$\tan\delta/\mu_i$	100 kHz, 0.1 mT, 25 °C 300 kHz, 0.1 mT, 25 °C	$\leq 20.10^{-6}$ $\leq 150.10^{-6}$	
η_B	10 kHz, 1.5 - 3 mT, 25 °C	$\leq 1.2.10^{-3}$	T^{-1}
D_F	10 kHz, 0.1 mT, 25 °C	$\leq 5.10^{-6}$	
ρ	DC, 25 °C	≈ 1	Ωm
T_C		≥ 125	°C
density		≈ 4800	kg/m^3

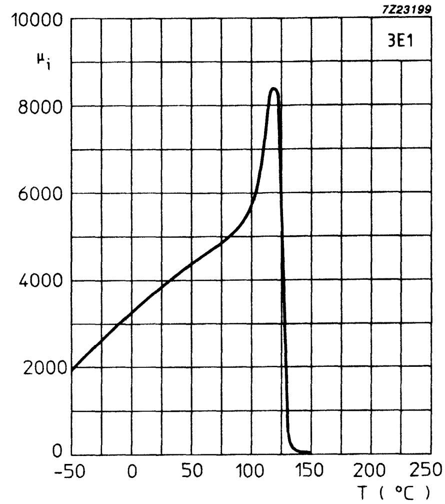


Fig.2 Initial permeability as a function of temperature.

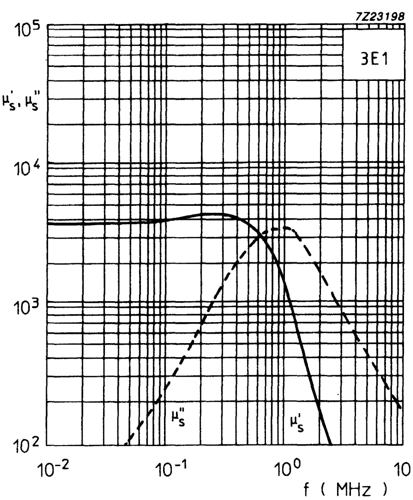


Fig.1 Complex permeability as a function of frequency.

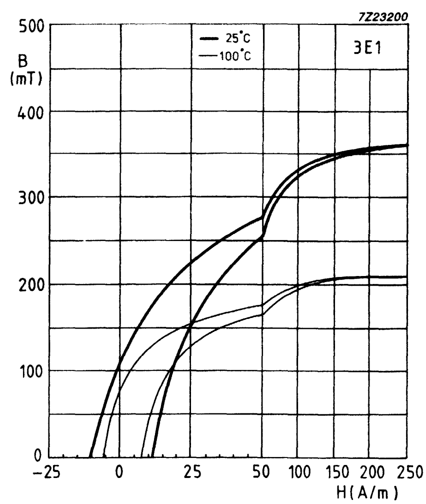


Fig.3 Typical B-H loops.

Material grade specification 3E1

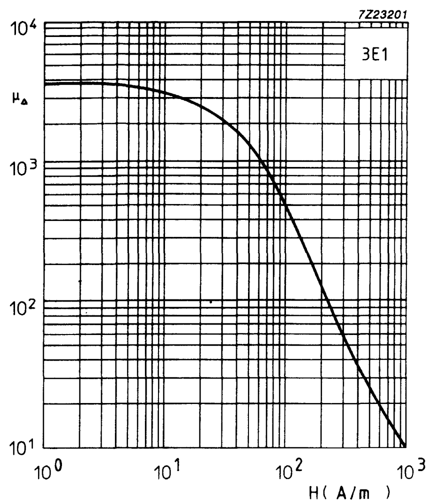


Fig.4 Incremental permeability as a function of magnetic field strength.

Material grade specification 3E4

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	4700 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 360 ≈ 210	mT mT
$\tan\delta/\mu_i$	100 kHz, 0.1 mT, 25 °C 300 kHz, 0.1 mT, 25 °C	$\leq 20.10^{-6}$ $\leq 150.10^{-6}$	
η_B	10 kHz, 1.5 - 3 mT, 25 °C	$\leq 1.10^{-3}$	T^{-1}
D_F	10 kHz, 0.1 mT, 25 °C	$\leq 5.10^{-6}$	
ρ	DC, 25 °C	≈ 1	Ωm
T_c		≥ 125	°C
density		≈ 4800	kg/m^3

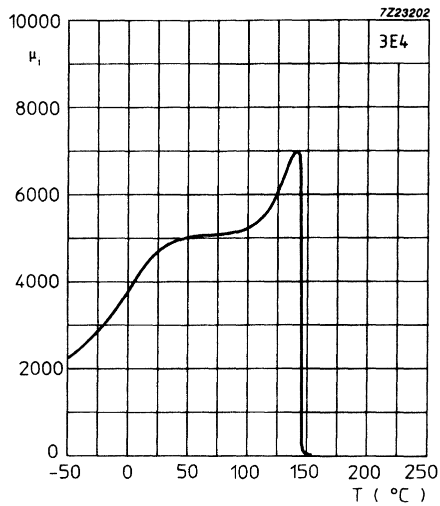


Fig.2 Initial permeability as a function of temperature.

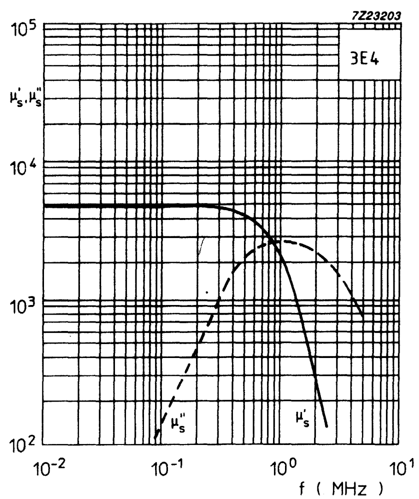


Fig.1 Complex permeability as a function of frequency.

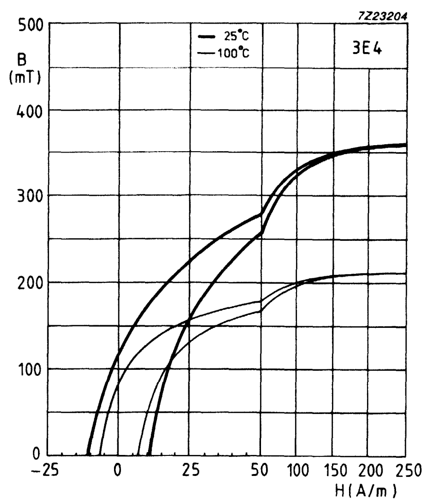


Fig.3 Typical B-H loops.

Material grade specification 3E4

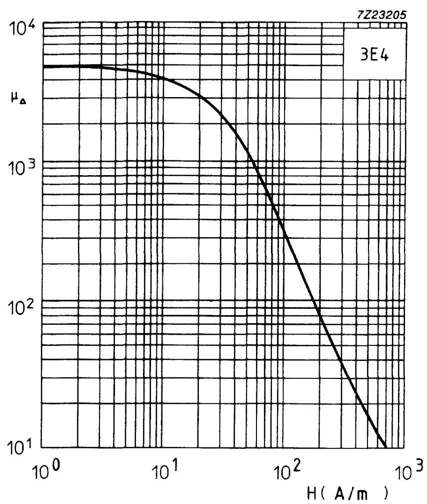


Fig.4 Incremental permeability as a function of magnetic field strength.

Material grade specification

3E5

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	10000 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 380 ≈ 210	mT mT
$\tan\delta/\mu_i$	30 kHz, 0.1 mT, 25 °C 100 kHz, 0.1 mT, 25 °C	$\leq 25.10^{-6}$ $\leq 75.10^{-6}$	
η_B	10 kHz, 1.5 - 3 mT, 25 °C	$\leq 1.10^{-3}$	T^{-1}
ρ	DC, 25 °C	≈ 0.5	Ωm
T_c		≥ 120	°C
density		≈ 4900	kg/m^3

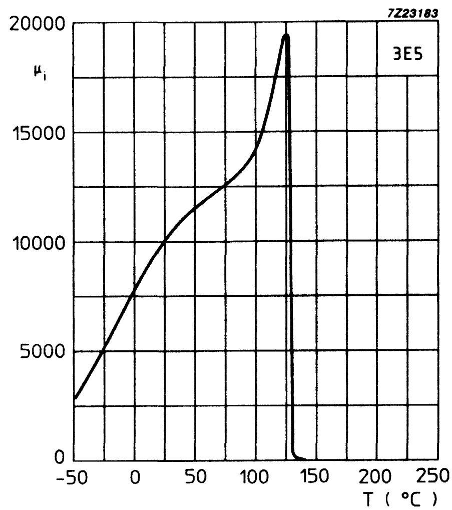


Fig.2 Initial permeability as a function of temperature.

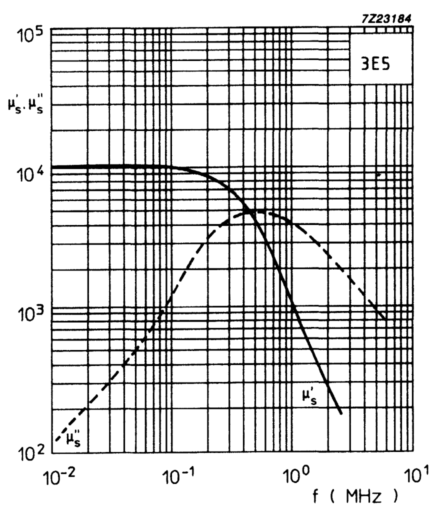


Fig.1 Complex permeability as a function of frequency.

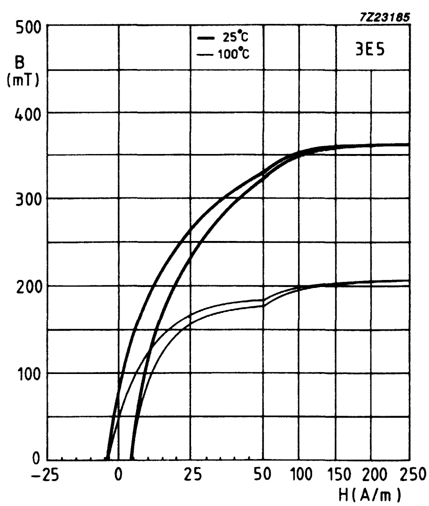


Fig.3 Typical B-H loops.

Material grade specification 3E5

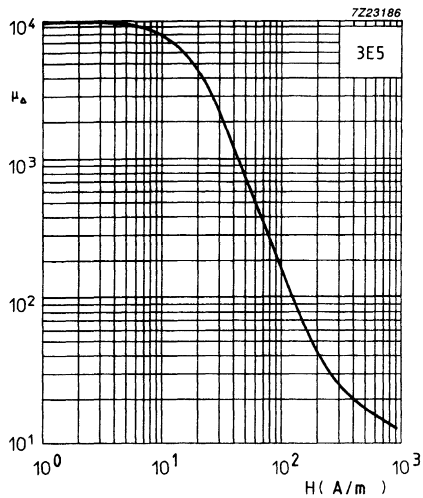


Fig.4 Incremental permeability as a function of magnetic field strength.

Material grade specification 3B8

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	2300 ± 20%	
B	10 kHz, 250 A/m, 25 °C	≈ 420	mT
	10 kHz, 250 A/m, 100 °C	≈ 330	mT
$\tan\delta/\mu_i$	100 kHz, 0.1 mT, 25 °C	$\leq 5.10^{-6}$	
P_V	25 kHz, 200 mT, 25 °C	≤ 140	kW/m^3
	100 kHz, 100 mT, 25 °C	≤ 155	kW/m^3
ρ	DC, 25 °C	≈ 2	Ωm
T_c		≥ 200	°C
density		≈ 4800	kg/m^3

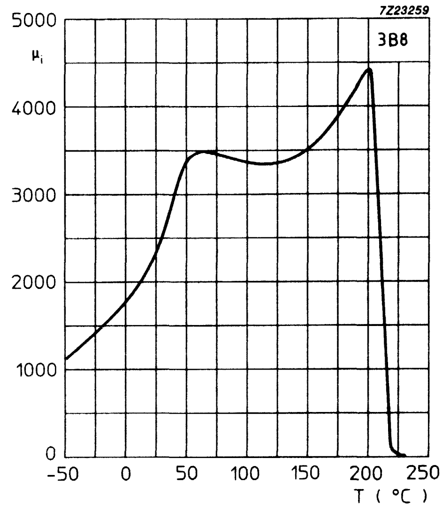


Fig.2 Initial permeability as a function of temperature.

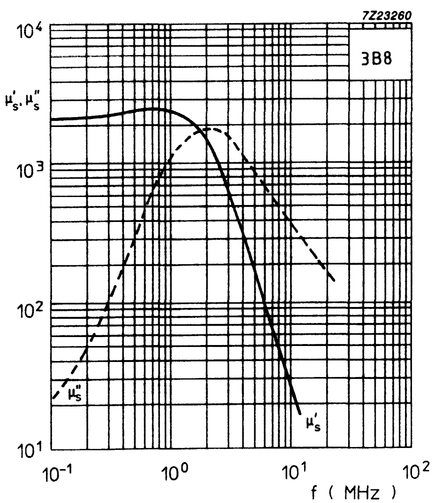


Fig.1 Complex permeability as a function of frequency.

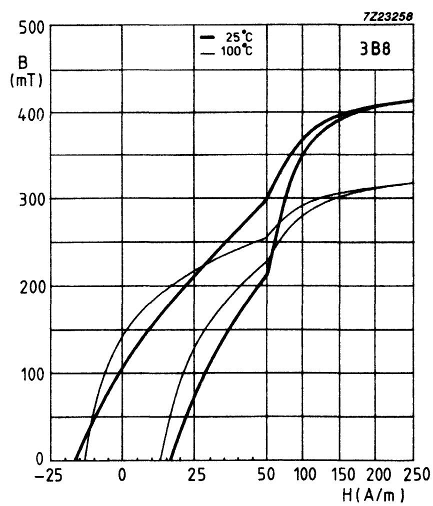


Fig.3 Typical B-H loops.

Material grade specification 3B8

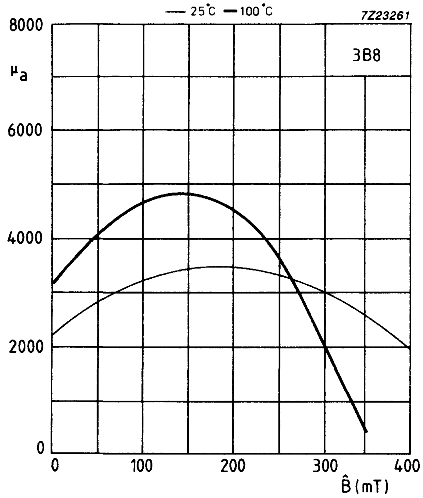


Fig.4 Amplitude permeability as a function of peak flux density.

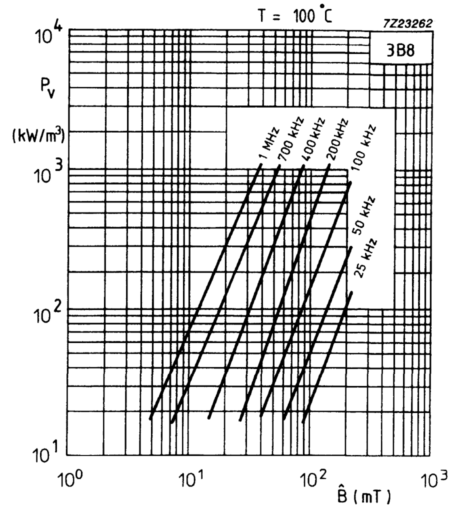


Fig.6 Specific power loss as a function of peak flux density with frequency as parameter.

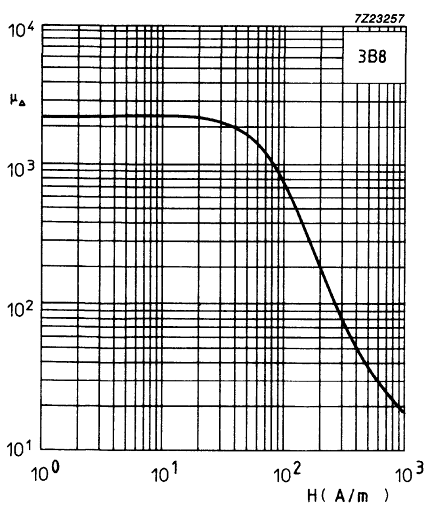


Fig.5 Incremental permeability as a function of magnetic field strength.

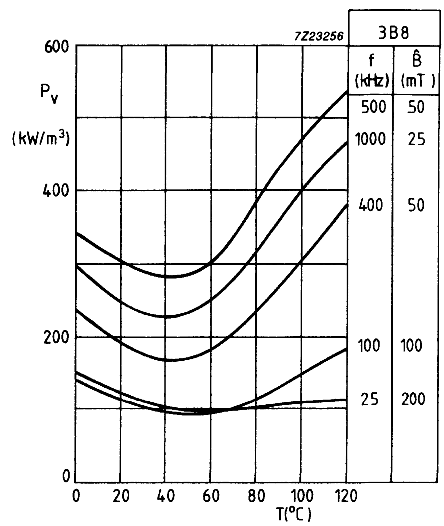


Fig.7 Specific power loss for several frequency/flux density combinations as a function of temperature.

Material grade specification 3C10

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	1800 ± 20%	
μ_a	25 kHz, 200 mT, 25 °C 25 kHz, 200 mT, 100 °C	5000 ± 25% 6000 ± 25%	
B	10 kHz, 250 A/m, 100 °C	≥ 350	mT
P_V	16 kHz, 200 mT, 25 °C 16 kHz, 200 mT, 100 °C	≈ 140 ≈ 85	kW/m^3 kW/m^3
ρ	DC, 25 °C	≈ 1	Ωm
T_c		≥ 190	°C
density		≈ 4800	kg/m^3

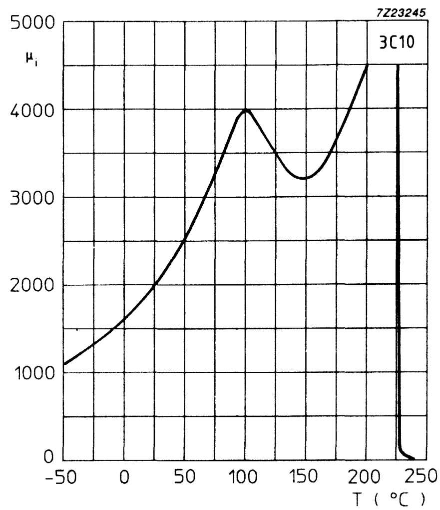


Fig.2 Initial permeability as a function of temperature.

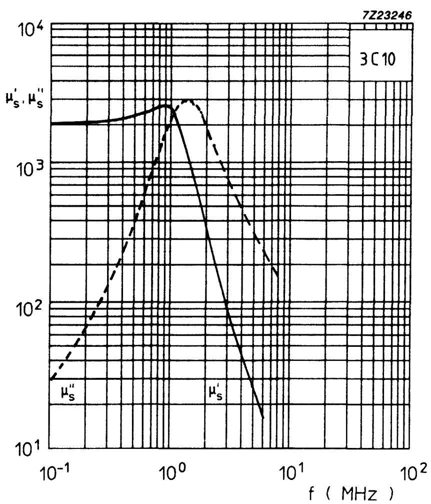


Fig.1 Complex permeability as a function of frequency.

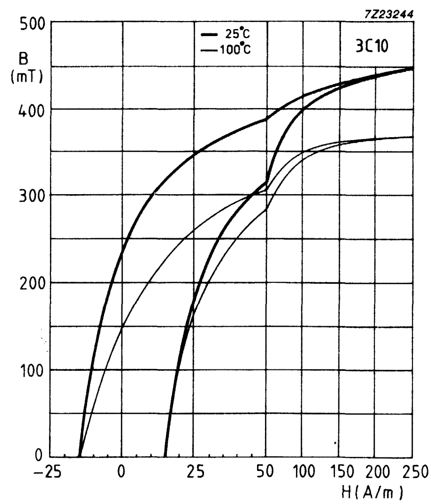


Fig.3 Typical B-H loops.

Material grade specification 3C10

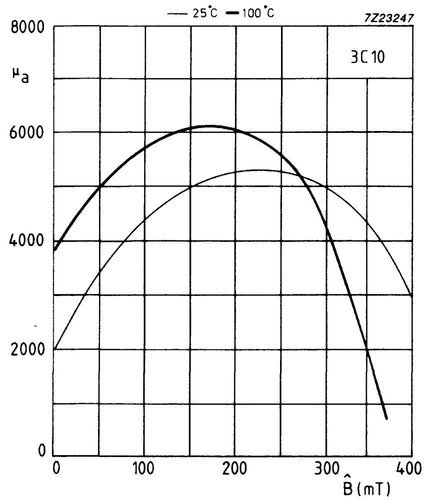


Fig.4 Amplitude permeability as a function of peak flux density.

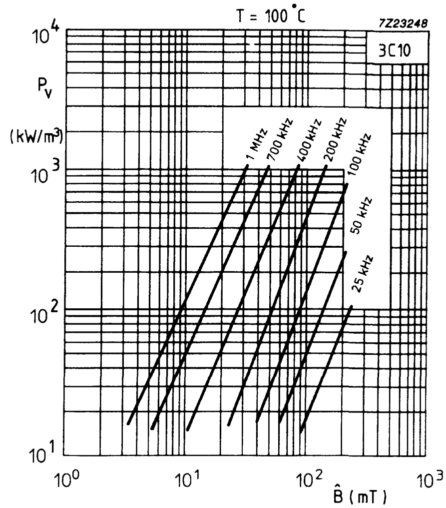


Fig.6 Specific power loss as a function of peak flux density with frequency as parameter.

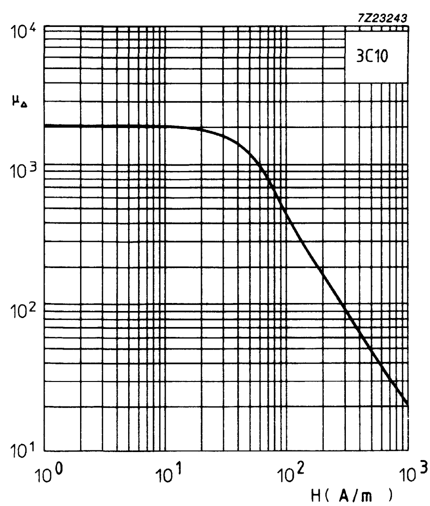


Fig.5 Incremental permeability as a function of magnetic field strength.

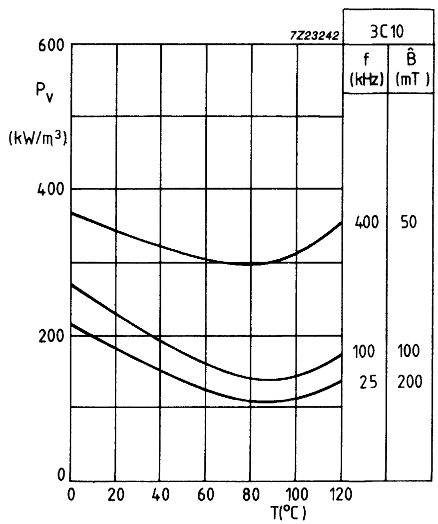


Fig.7 Specific power loss for several frequency/flux density combinations as a function of temperature.

Material grade specification 3C80

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	2000 ± 20%	
μ_a	25 kHz, 200 mT, 25 °C	4500 ± 25%	mT
	25 kHz, 200 mT, 100 °C	5500 ± 25%	mT
B	10 kHz, 250 A/m, 25 °C	≈ 420	mT
	10 kHz, 250 A/m, 100 °C	≈ 330	mT
P_V	25 kHz, 200 mT, 25 °C	≈ 250	kW/m³
	25 kHz, 200 mT, 100 °C	≈ 200	kW/m³
ρ	DC, 25 °C	≈ 1	Ωm
T_c		≥ 200	°C
density		≈ 4800	kg/m³

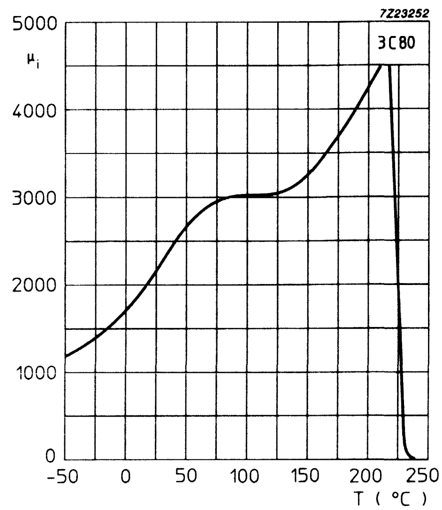


Fig.2 Initial permeability as a function of temperature.

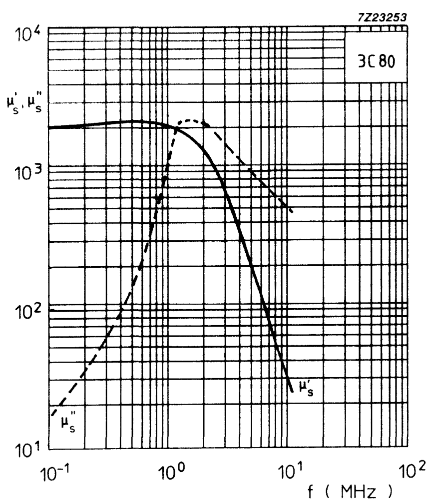


Fig.1 Complex permeability as a function of frequency.

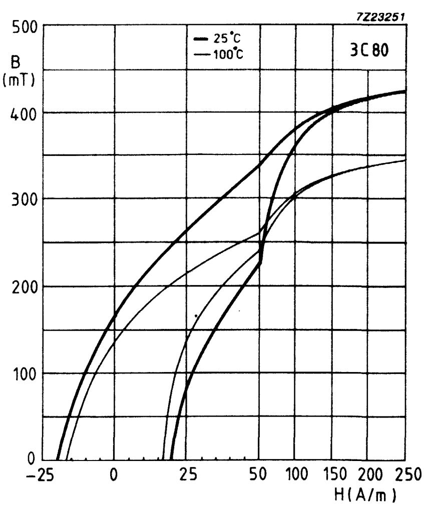


Fig.3 Typical B-H loops.

Material grade specification 3C80

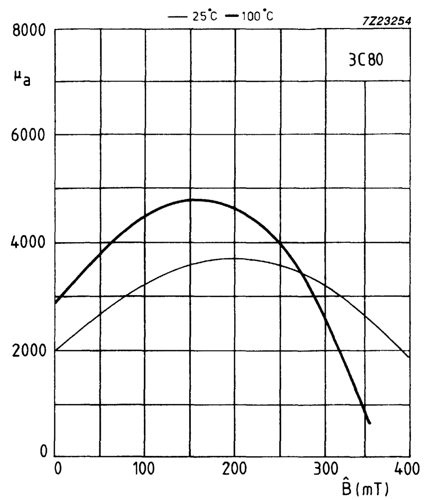


Fig.4 Amplitude permeability as a function of peak flux density.

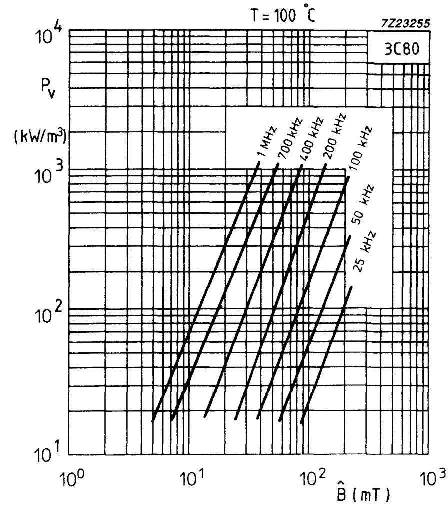


Fig.6 Specific power loss as a function of peak flux density with frequency as parameter.

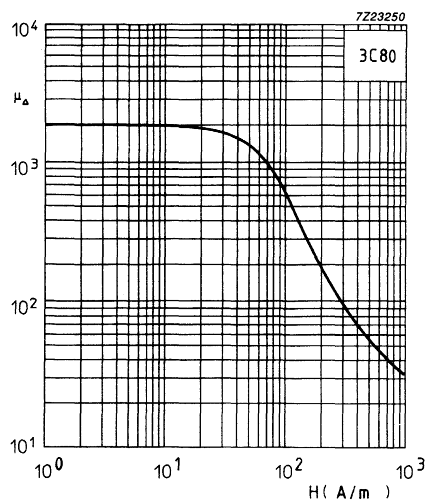


Fig.5 Incremental permeability as a function of magnetic field strength.

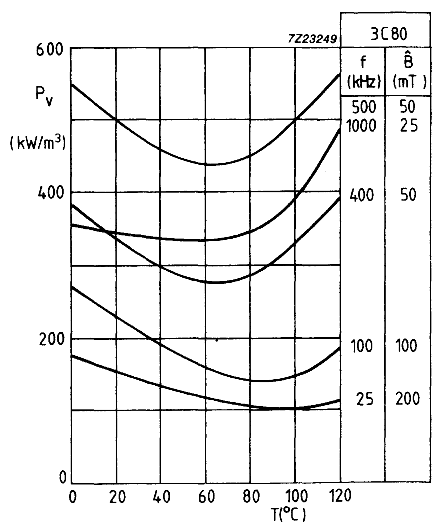


Fig.7 Specific power loss for several frequency/flux density combinations as a function of temperature.

Material grade specification 3C85

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	2000 ± 20%	
μ_a	25 kHz, 200 mT, 25 °C	4500 ± 25%	
	25 kHz, 200 mT, 100 °C	5500 ± 25%	
B	10 kHz, 250 A/m, 25 °C	≥ 400	mT
	10 kHz, 250 A/m, 100 °C	≥ 330	mT
P_V	25 kHz, 200 mT, 25 °C	≤ 190	kW/m³
	25 kHz, 200 mT, 100 °C	≤ 140	kW/m³
	100 kHz, 100 mT, 25 °C	≤ 230	kW/m³
	100 kHz, 100 mT, 100 °C	≤ 165	kW/m³
ρ	DC, 25 °C	≈ 2	Ωm
T_c		≥ 200	°C
density		≈ 4800	kg/m³

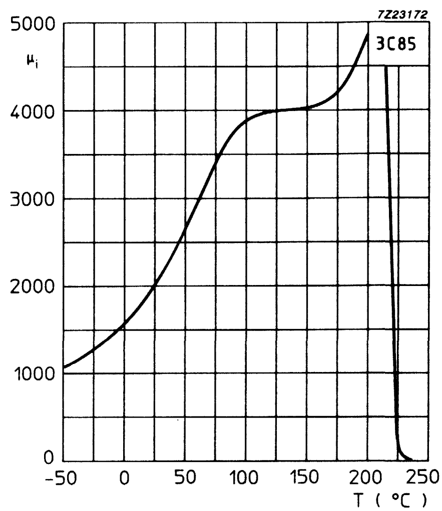


Fig.2 Initial permeability as a function of temperature.

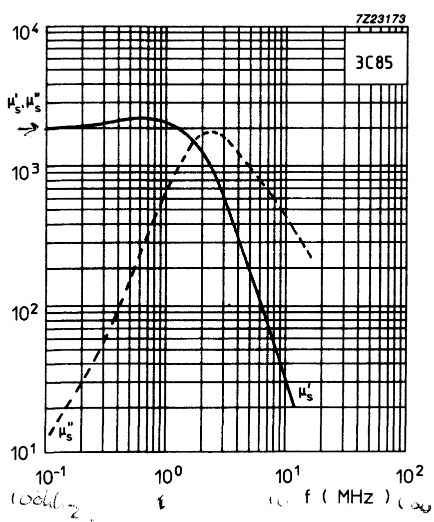


Fig.1 Complex permeability as a function of frequency.

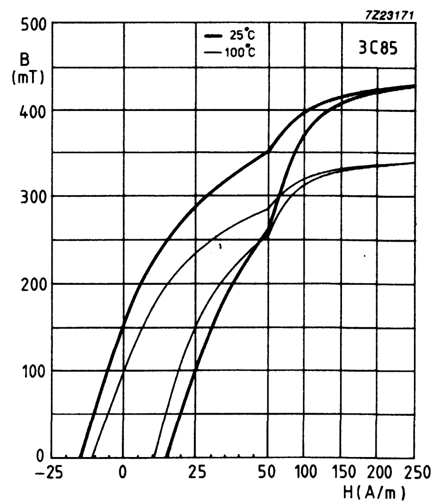


Fig.3 Typical B-H loops.

Material grade specification 3C85

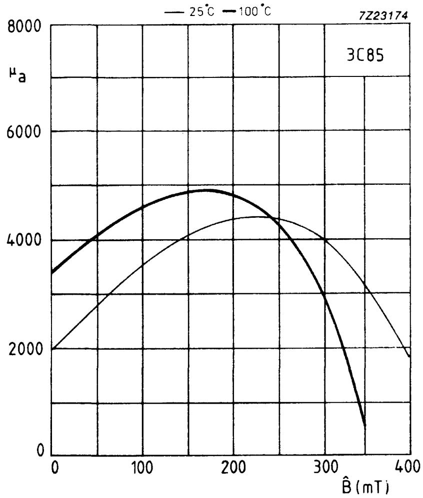


Fig.4 Amplitude permeability as a function of peak flux density.

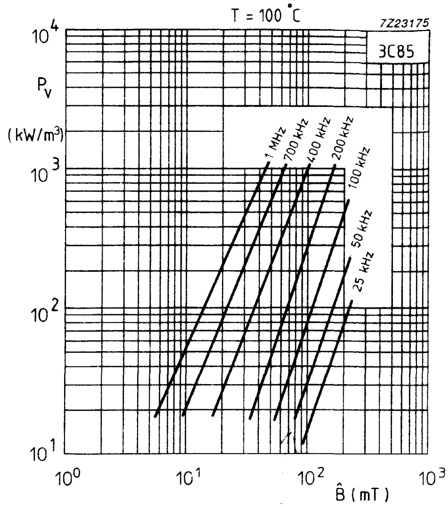


Fig.6 Specific power loss as a function of peak flux density with frequency as parameter.

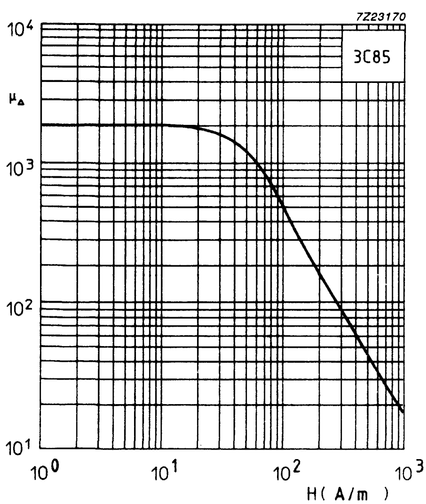


Fig.5 Incremental permeability as a function of magnetic field strength.

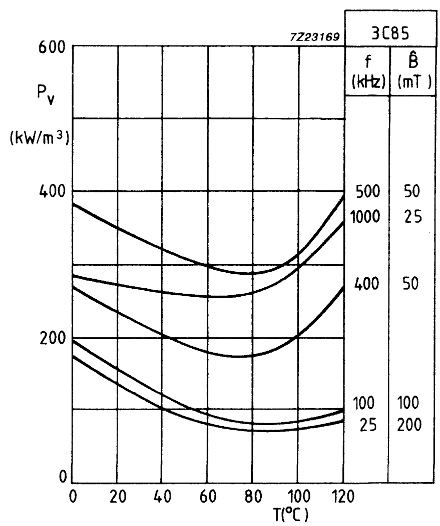


Fig.7 Specific power loss for several frequency/flux density combinations as a function of temperature.

Material grade specification 3F3

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	1800 ± 20%	
μ_a	25 kHz, 200 mT, 25 °C 25 kHz, 200 mT, 100 °C	≈ 4000 ≈ 4000	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≥ 400 ≥ 330	mT mT
P_V	25 kHz, 200 mT, 100 °C 100 kHz, 100 mT, 100 °C 400 kHz, 50 mT, 100 °C	≤ 90 ≤ 80 ≤ 150	kW/m³ kW/m³ kW/m³
ρ	DC, 25 °C	≈ 2	Ωm
T_c		≥ 200	°C
density		≈ 4750	kg/m³

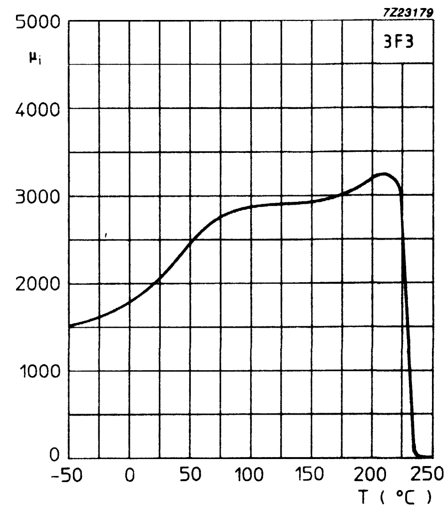


Fig.2 Initial permeability as a function of temperature.

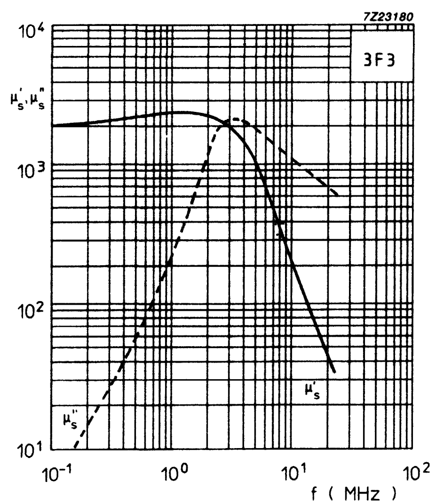


Fig.1 Complex permeability as a function of frequency.

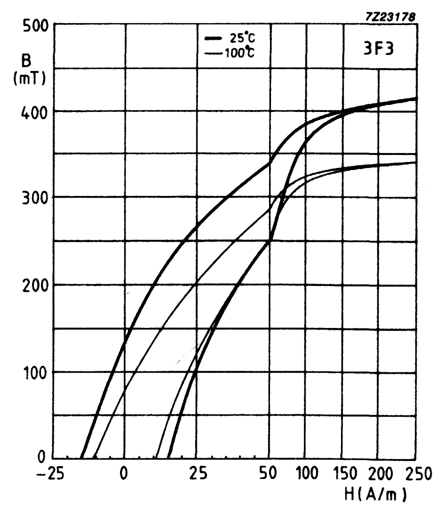


Fig.3 Typical B-H loops.

Material grade specification 3F3

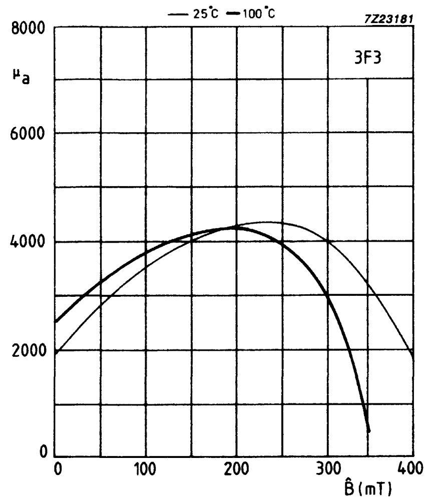


Fig.4 Amplitude permeability as a function of peak flux density.

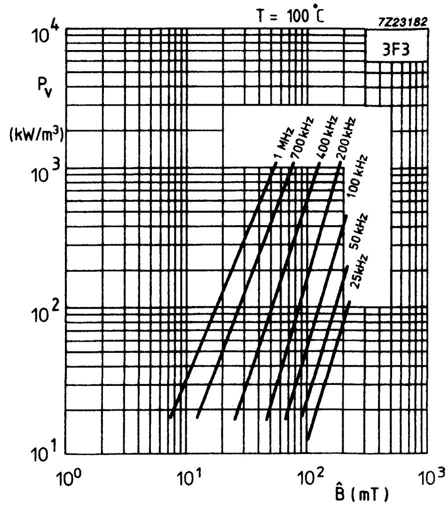


Fig.6 Specific power loss as a function of peak flux density with frequency as parameter.

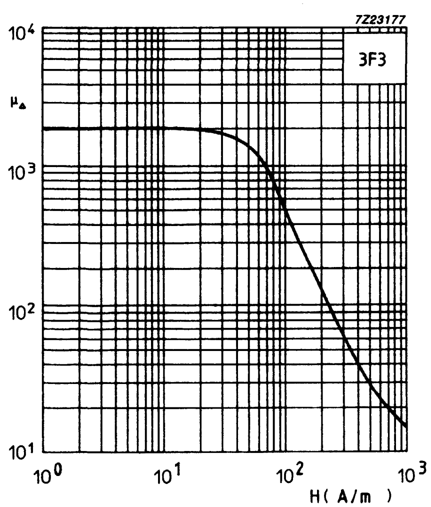


Fig.5 Incremental permeability as a function of magnetic field strength.

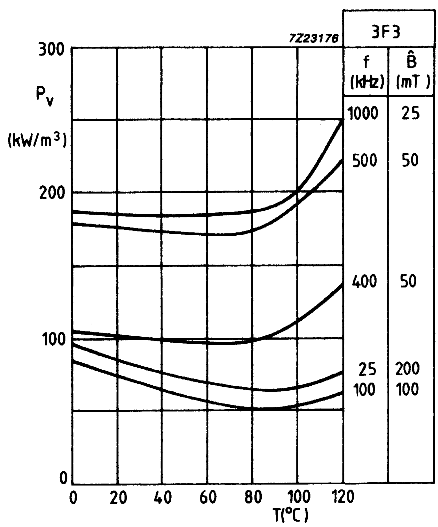


Fig.7 Specific power loss for several frequency/flux density combinations as a function of temperature.

Material grade specification 3S1

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	≈ 4000	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 350 ≈ 180	mT mT
|Z|*	1 MHz, 25 °C 10 MHz, 25 °C	≥ 30 ≥ 60	Ω Ω
ρ	DC, 25 °C	≈ 1	Ωm
T_c		≥ 125	°C
density		≈ 4900	kg/m^3

* measured on a bead Ø5 x Ø2 x 10 mm

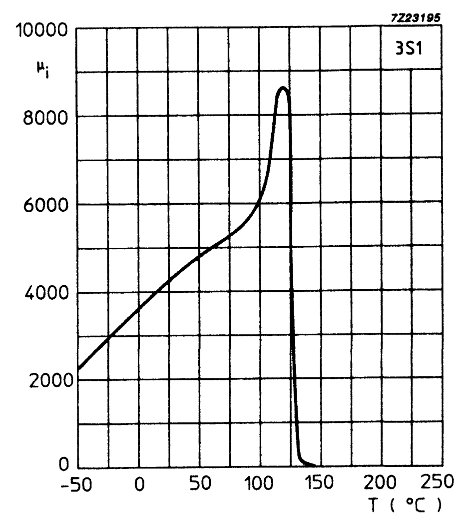


Fig.2 Initial permeability as a function of temperature.

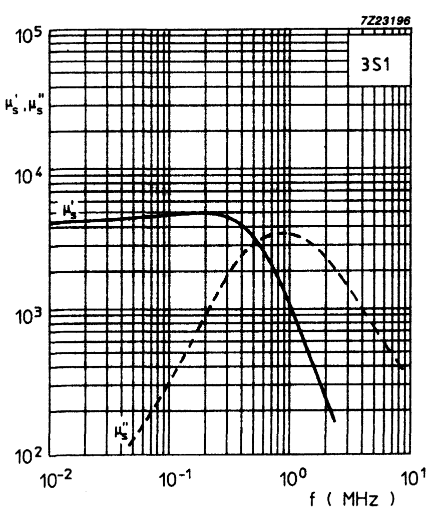


Fig.1 Complex permeability as a function of frequency.

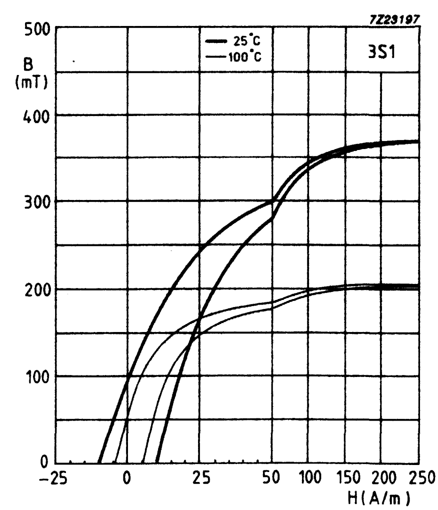


Fig.3 Typical B-H loops.

Material grade specification 4S2

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	≈ 700	
B	10 kHz, 250 A/m, 25 °C	≈ 270	mT
	10 kHz, 250 A/m, 100 °C	≈ 180	mT
$\lvert Z \rvert$*	30 MHz, 25 °C	≥ 50	Ω
	300 MHz, 25 °C	≥ 90	Ω
ρ	DC, 25 °C	≈ 10^5	Ωm
T_c		≥ 125	°C
density		≈ 5000	kg/m^3

* measured on a bead ∅5 x ∅2 x 10 mm

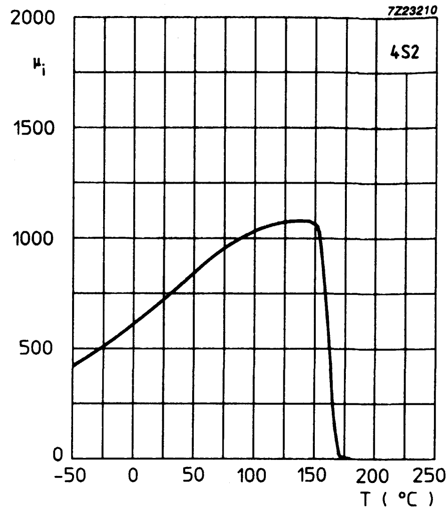


Fig.2 Initial permeability as a function of temperature.

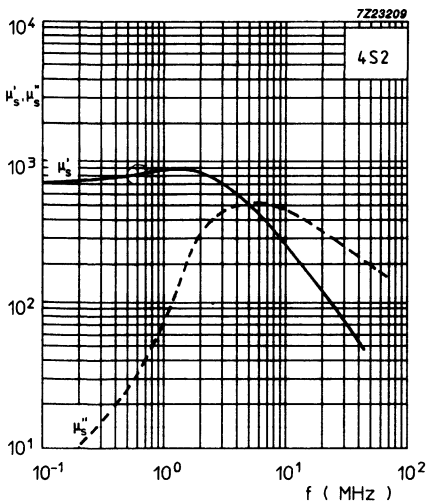


Fig.1 Complex permeability as a function of frequency.

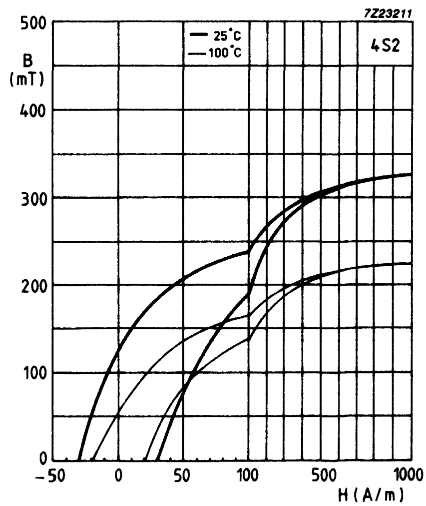


Fig.3 Typical B-H loops.

Material grade specification 4C65

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	125 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 300 ≈ 250	mT mT
$\tan\delta/\mu_i$	3 MHz, 0.1 mT, 25 °C 10 MHz, 0.1 mT, 25 °C	$\leq 80.10^{-6}$ $\leq 130.10^{-6}$	
ρ	DC, 25 °C	$\approx 10^5$	Ωm
T_c		≥ 350	°C
density		≈ 4500	kg/m^3

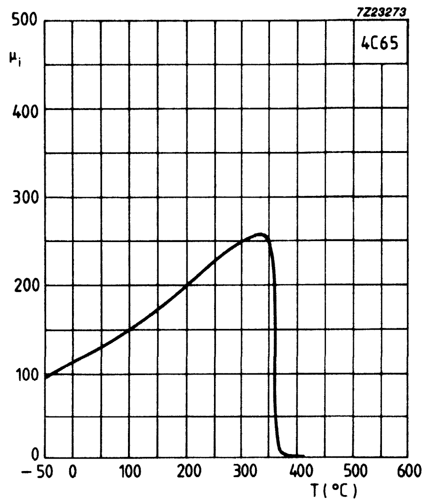


Fig.2 Initial permeability as a function of temperature.

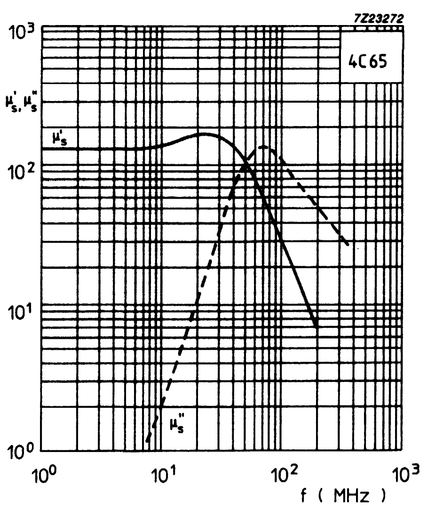


Fig.1 Complex permeability as a function of frequency.

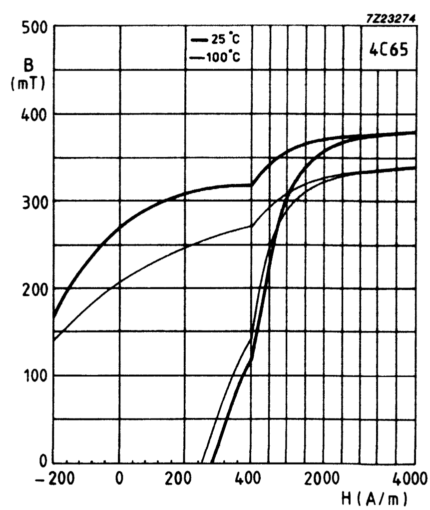


Fig.3 Typical B-H loops.

Material grade specification 4A11

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	700 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 270 ≈ 180	mT mT
$\tan\delta/\mu_i$	1 MHz, 0.1 mT, 25 °C 3 MHz, 0.1 mT, 25 °C	$\leq 100.10^{-6}$ $\leq 1000.10^{-6}$	
ρ	DC, 25 °C	$\approx 10^5$	Ωm
T_C		≥ 125	°C
density		≈ 5100	kg/m³

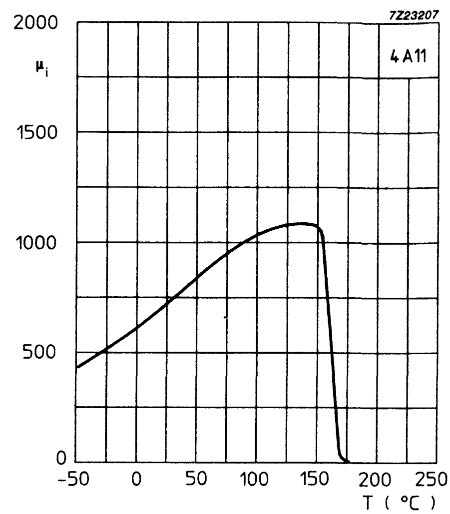


Fig.2 Initial permeability as a function of temperature.

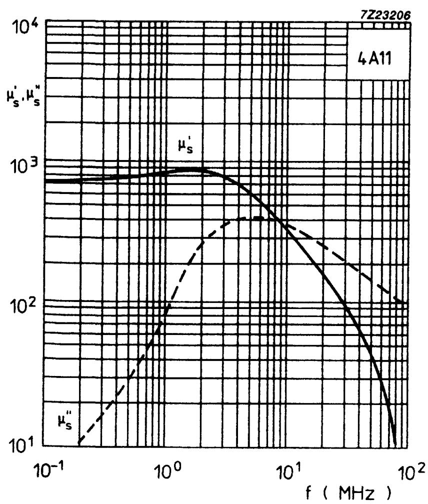


Fig.1 Complex permeability as a function of frequency.

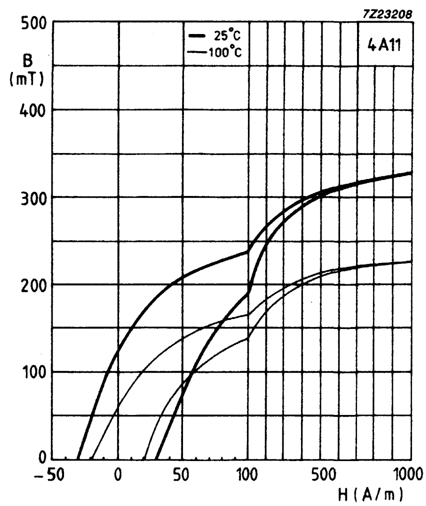


Fig.3 Typical B-H loops.

Material grade specification 3C11

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	4300 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≥ 350 ≥ 180	mT mT
$\tan\delta/\mu_i$	100 kHz, 0.1 mT, 25 °C 300 kHz, 0.1 mT, 25 °C	$\leq 20.10^{-6}$ $\leq 200.10^{-6}$	
ρ	DC, 25 °C	≈ 1	Ωm
T_C		≥ 125	°C
density		≈ 4900	kg/m^3

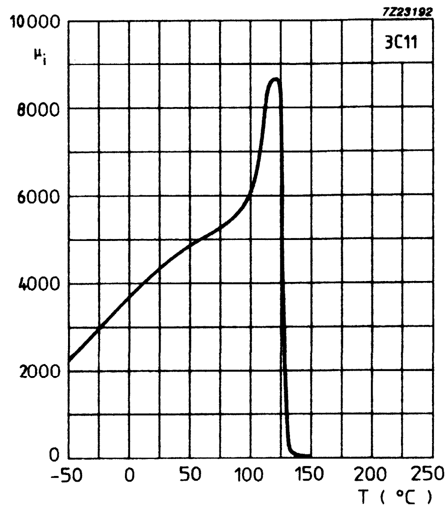


Fig.2 Initial permeability as a function of temperature.

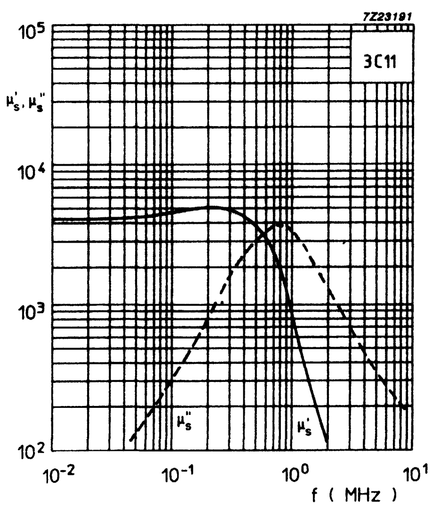


Fig.1 Complex permeability as a function of frequency.

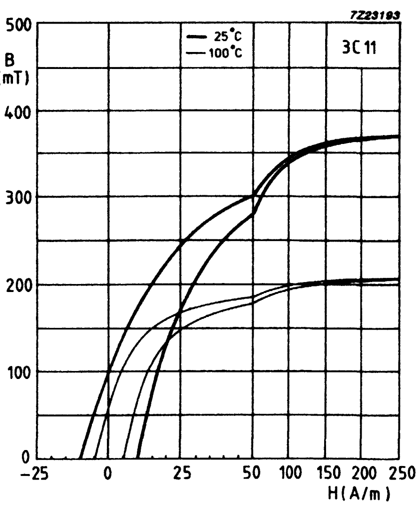


Fig.3 Typical B-H loops.

Material grade specification 3C11

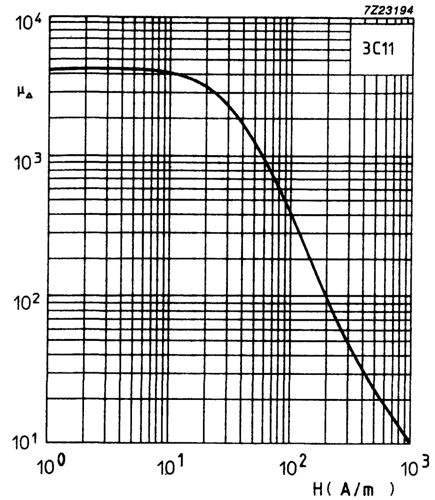


Fig.4 Incremental permeability as a function of magnetic field strength.

Material grade specification 3E25

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C 100 kHz, 0.1 mT, 25 °C	6000 ± 20% 6000 + 30%/ - 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≥ 350 ≥ 180	mT mT
$\tan\delta/\mu_i$	100 kHz, 0.1 mT, 25 °C 300 kHz, 0.1 mT, 25 °C	$\leq 25.10^{-6}$ $\leq 200.10^{-6}$	
ρ	DC, 25 °C	≈ 0.5	Ωm
T_C		≥ 125	°C
density		≈ 4900	kg/m³

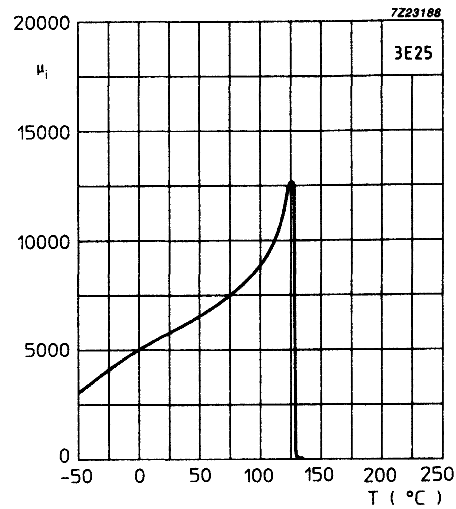


Fig.2 Initial permeability as a function of temperature.

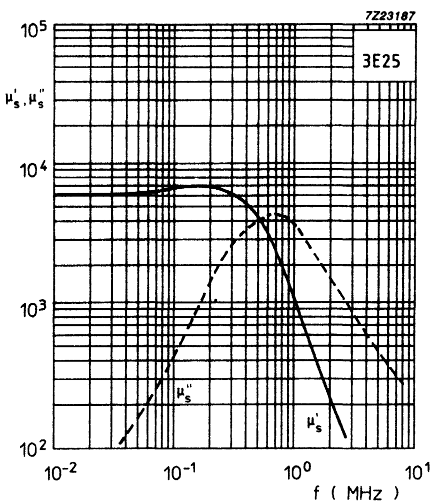


Fig.1 Complex permeability as a function of frequency.

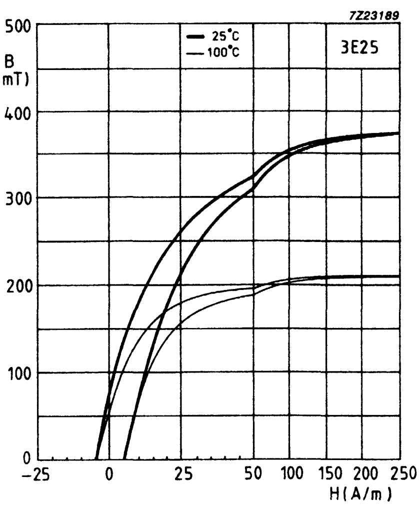


Fig.3 Typical B-H loops.

Material grade specification 3E25

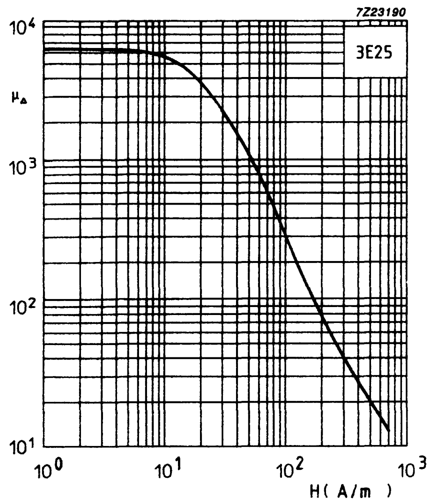


Fig.4 Incremental permeability as a function of magnetic field strength.

Material grade specification 3C2

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	900 ± 25%	
B	10 kHz, 250 A/m, 25 °C	≈ 250	mT
	10 kHz, 250 A/m, 100 °C	≈ 200	mT
ρ	DC, 25 °C	≈ 1	Ωm
T_c		≥ 150	°C
density		≈ 4800	kg/m^3

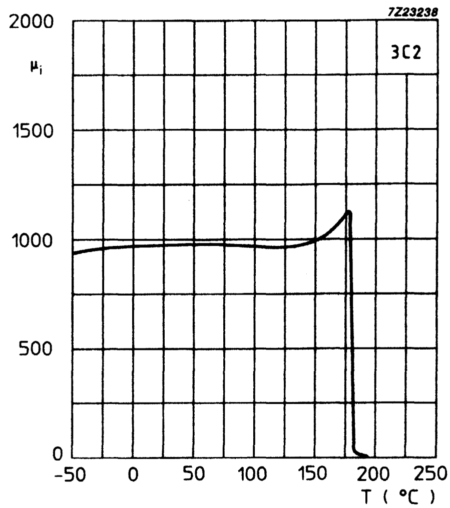


Fig.2 Initial permeability as a function of temperature.

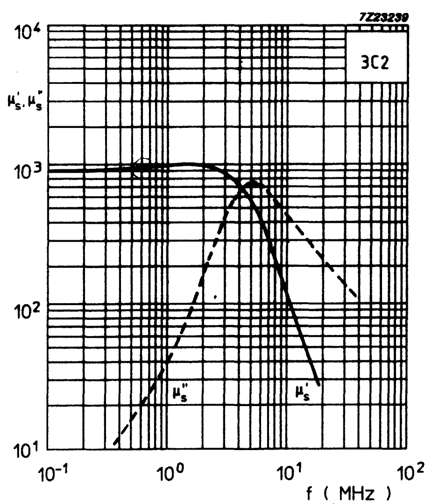


Fig.1 Complex permeability as a function of frequency.

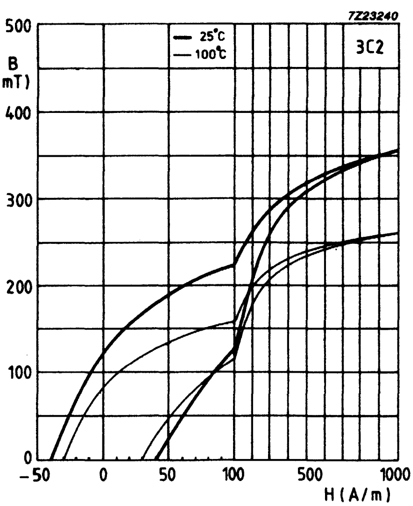


Fig.3 Typical B-H loops.

Material grade specification 3C2

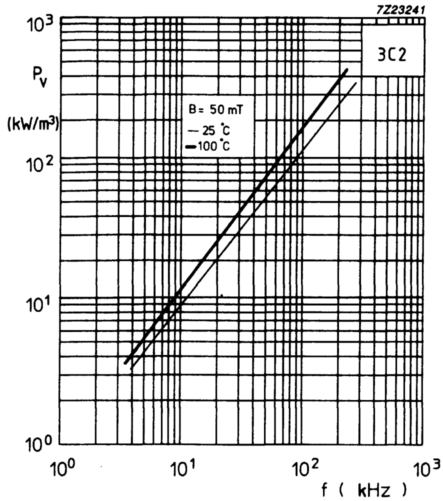


Fig.4 Specific power loss as a function of frequency.

Material grade specification 2A2

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	350 ± 25%	
B	10 kHz, 250 A/m, 25 °C	≈ 200	mT
	10 kHz, 250 A/m, 100 °C	≈ 130	mT
P_V	16 kHz, 100 mT, 25 °C	≈ 250	kW/m^3
	16 kHz, 100 mT, 85 °C	≈ 200	kW/m^3
H_c	from 1 kA/m, 25 °C	≤ 60	A/m
ρ	DC	≈ 10^6	Ωm
T_c		≥ 135	°C
density		≈ 4300	kg/m^3

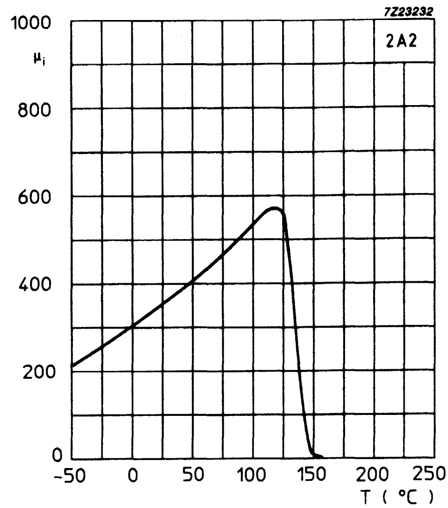


Fig.2 Initial permeability as a function of temperature.

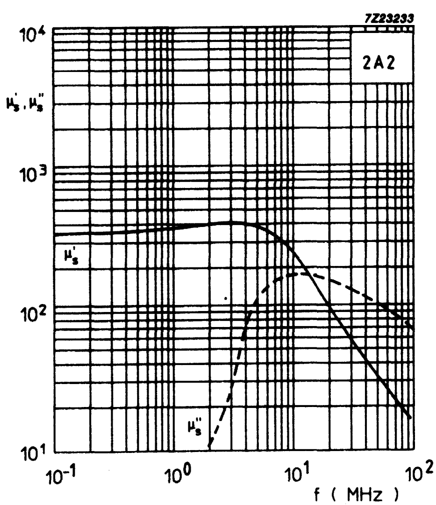


Fig.1 Complex permeability as a function of frequency.

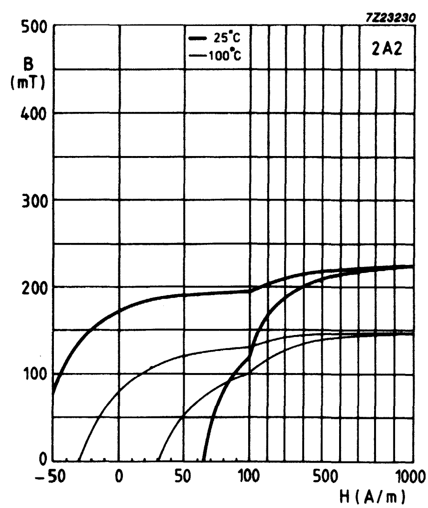


Fig.3 Typical B-H loops.

Material grade specification 2A2

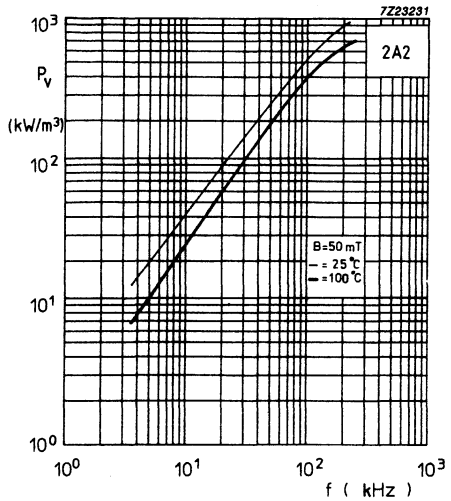


Fig.4 Specific power loss as a function of frequency.

Material grade specification **2B1**

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	500 ± 25%	
B	10 kHz, 250 A/m, 25 °C	≈ 200	mT
	10 kHz, 250 A/m, 100 °C	≈ 130	mT
P_V	16 kHz, 100 mT, 25 °C	≈ 150	kW/m^3
	16 kHz, 100 mT, 100 °C	≈ 60	kW/m^3
	64 kHz, 100 mT, 25 °C	≈ 650	kW/m^3
	64 kHz, 100 mT, 100 °C	≈ 320	kW/m^3
H_c	from 1 kA/m	≤ 30	A/m
ρ	DC, 25 °C	≈ 10^6	Ωm
T_c		≥ 125	°C
density		≈ 4300	kg/m^3

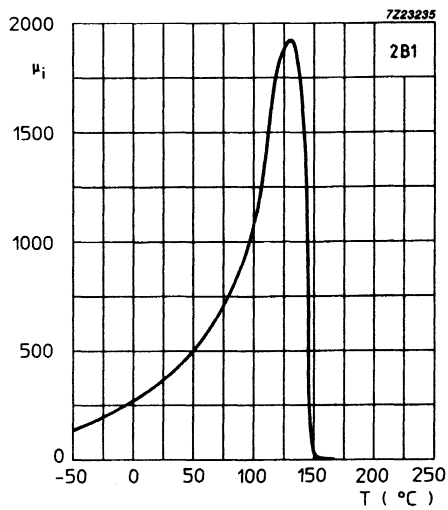


Fig.2 Initial permeability as a function of temperature.

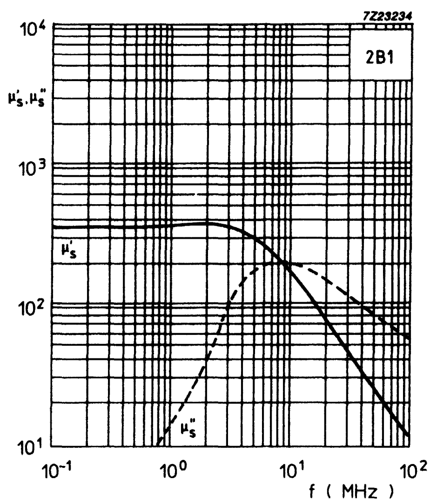


Fig.1 Complex permeability as a function of frequency.

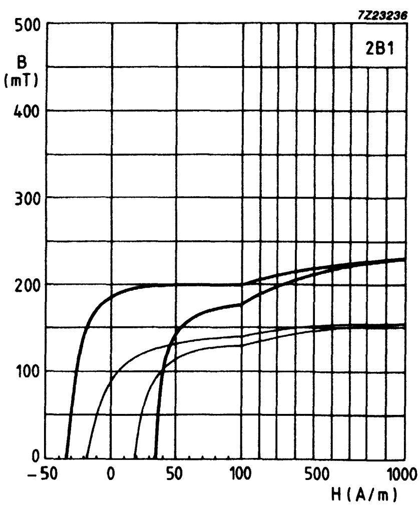


Fig.3 Typical B-H loops.

Material grade specification 2B1

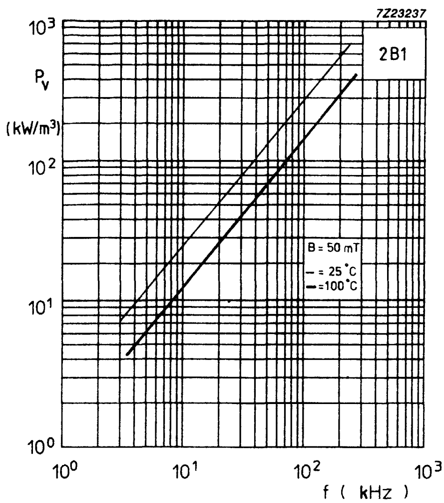


Fig.4 Specific power loss as a function of frequency.

Material grade specification 4E1

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	15 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 80 ≈ 75	mT mT
$\tan\delta/\mu_i$	10 MHz, 0.1 mT, 25 °C 30 MHz, 0.1 mT, 25 °C	$\le 300.10^{-6}$ $\le 350.10^{-6}$	
ρ	DC, 25 °C	$\approx 10^5$	Ωm
T_C		≥ 500	°C
density		≈ 3700	kg/m^3

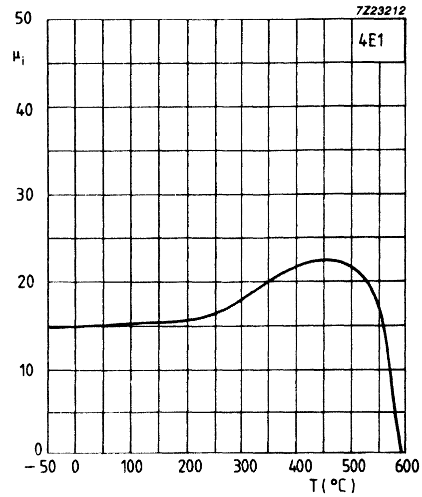


Fig.2 Initial permeability as a function of temperature.

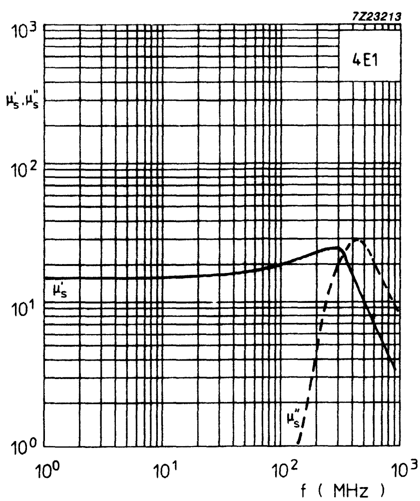


Fig.1 Complex permeability as a function of frequency.

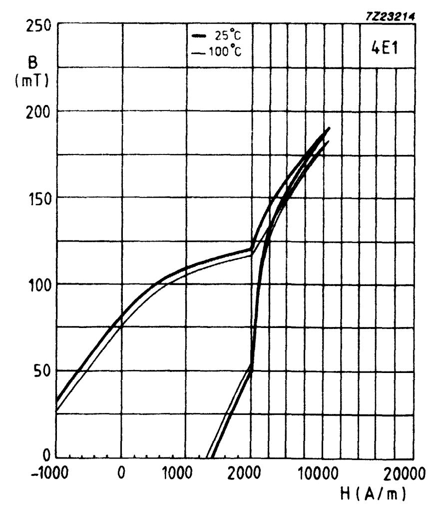


Fig.3 Typical B-H loops.

Material grade specification 4D2

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	60 ± 20%	
B	10 kHz, 250 A/m, 25 °C	≈ 200	mT
	10 kHz, 250 A/m, 100 °C	≈ 180	mT
$\tan\delta/\mu_i$	10 MHz, 0.1 mT, 25 °C	$\leq 100.10^{-6}$	
	30 MHz, 0.1 mT, 25 °C	$\leq 600.10^{-6}$	
ρ	DC, 25 °C	$\approx 10^5$	Ωm
T_c		≥ 400	°C
density		≈ 4200	kg/m^3

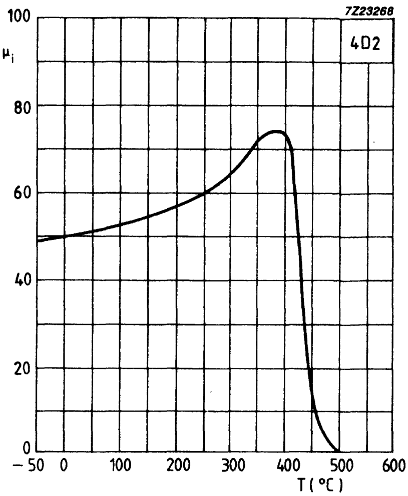


Fig.2 Initial permeability as a function of temperature.

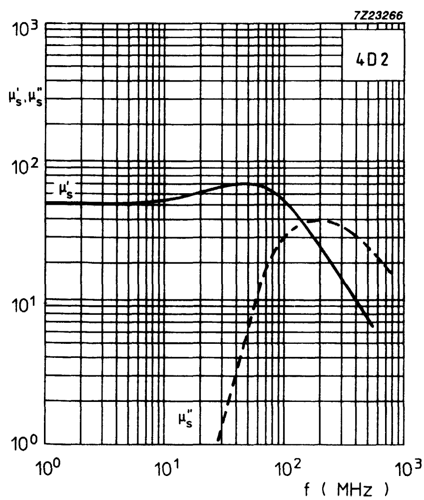


Fig.1 Complex permeability as a function of frequency.

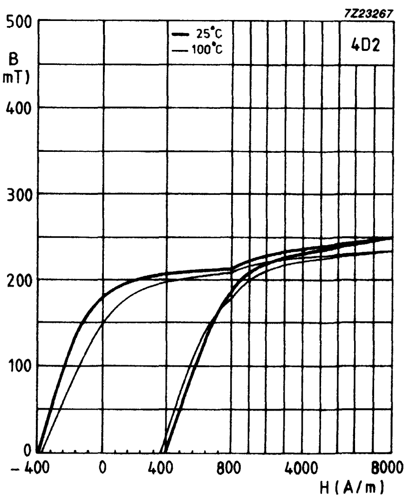


Fig.3 Typical B-H loops.

Material grade specification 4B1

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	250 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 310 ≈ 260	mT mT
$\tan\delta/\mu_i$	1 MHz, 0.1 mT, 25 °C 3 MHz, 0.1 mT, 25 °C	$\leq 90.10^{-6}$ $\leq 300.10^{-6}$	
ρ	DC, 25 °C	≈ 10^5	Ωm
T_c		≥ 250	°C
density		≈ 4600	kg/m³

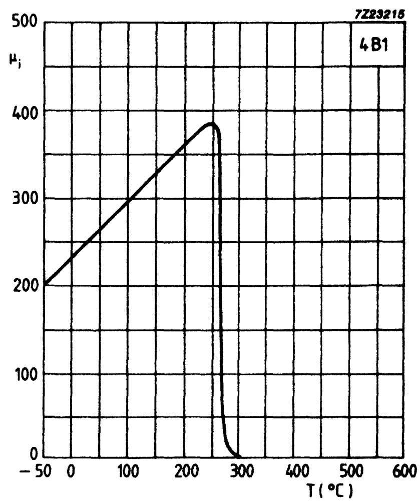


Fig.2 Initial permeability as a function of temperature.

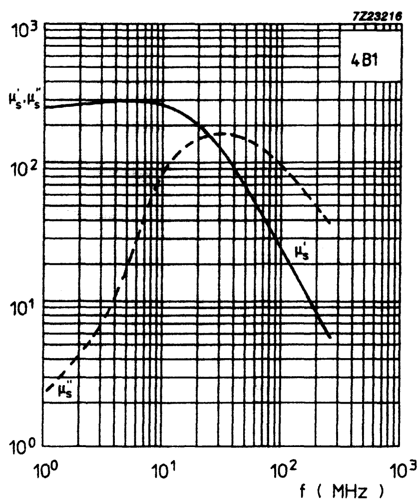


Fig.1 Complex permeability as a function of frequency.

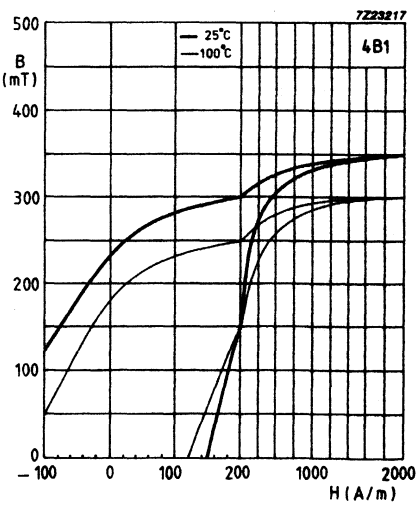


Fig.3 Typical B-H loops.

Material grade specification 6B1

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	250 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 320 ≈ 270	mT mT
$\tan\delta/\mu_i$	1 MHz, 0.1 mT, 25 °C 3 MHz, 0.1 mT, 25 °C	$\leq 90.10^{-6}$ $\leq 300.10^{-6}$	
ρ	DC, 25 °C	$\approx 10^5$	Ωm
T_c		≥ 250	°C
density		≈ 4700	kg/m^3

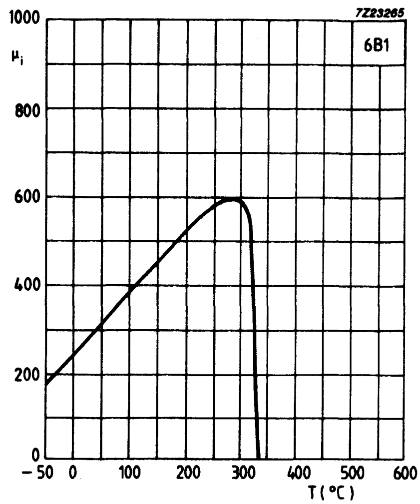


Fig.2 Initial permeability as a function of temperature.

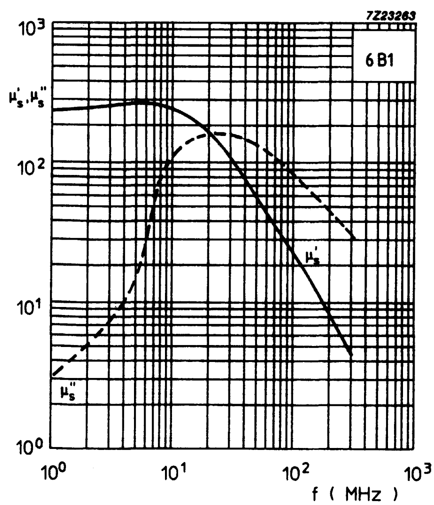


Fig.1 Complex permeability as a function of frequency.

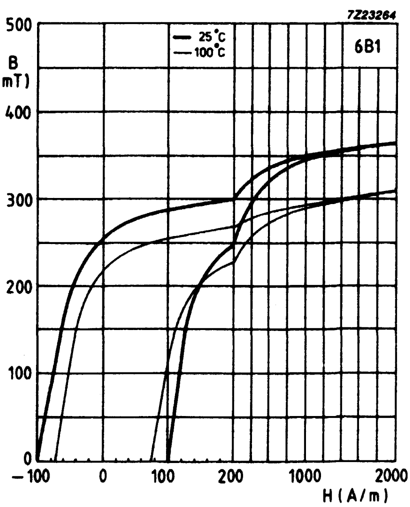


Fig.3 Typical B-H loops.

Material grade specification 3B1

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	900 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 330 ≈ 200	mT mT
$\tan\delta/\mu_i$	100 kHz, 0.1 mT, 25 °C	$\leq 50.10^{-6}$	
ρ	DC, 25 °C	≈ 0.2	Ωm
T_c		≥ 150	°C
density		≈ 4800	kg/m^3

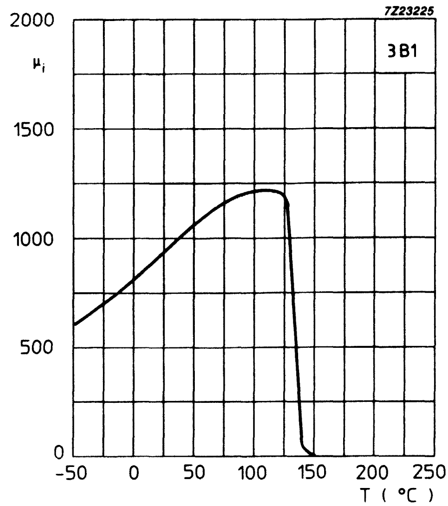


Fig.2 Initial permeability as a function of temperature.

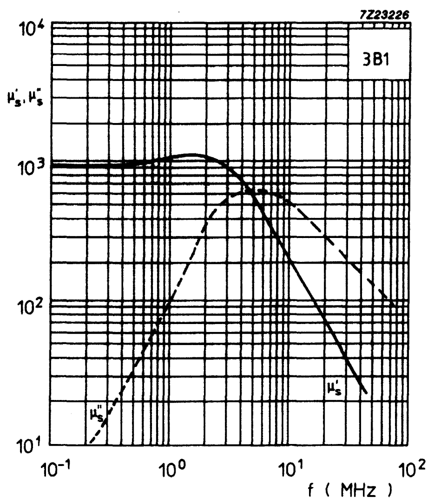


Fig.1 Complex permeability as a function of frequency.

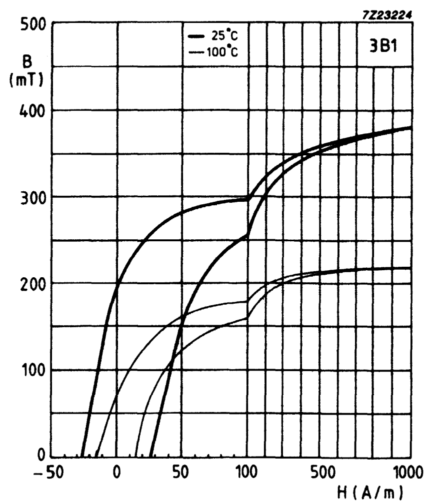


Fig.3 Typical B-H loops.

Material grade specification

3R1

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	800 ± 20%	
B	10 kHz, 250 A/m, 25 °C 10 kHz, 250 A/m, 100 °C	≈ 390 ≈ 300	mT mT
B_r	from 1 kA/m, 25 °C from 1 kA/m, 100 °C	340 ± 25 250 ± 25	mT mT
H_c	after 1 kA/m, 25 °C after 1 kA/m, 100 °C	42 ± 10 20 ± 5	A/m A/m
ρ	DC, 25 °C	≈ 1	Ωm
T_c		≥ 200	°C
density		≈ 4700	kg/m^3

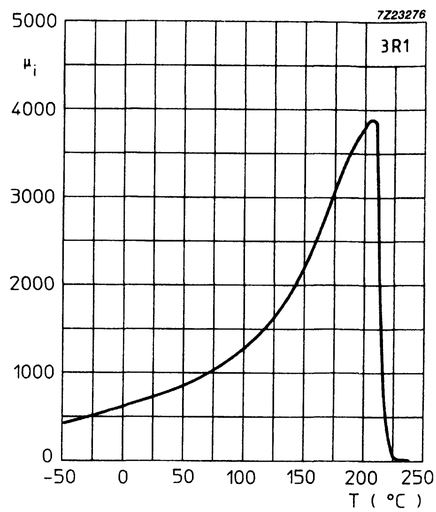


Fig.2 Initial permeability as a function of temperature.

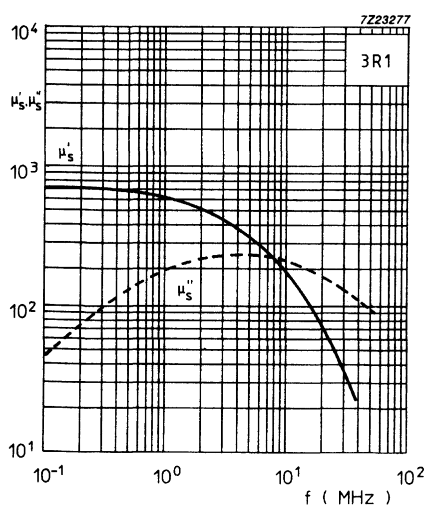


Fig.1 Complex permeability as a function of frequency.

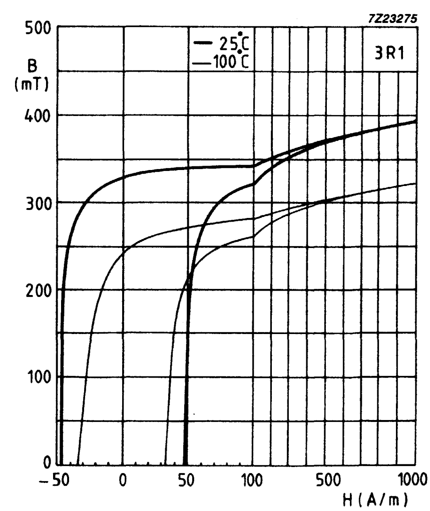


Fig.3 Typical B-H loops.

Material grade specification 1P..

Material grade specification - 1P04

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	4 ± 10%	
$\tan\delta/\mu_i$	3 MHz, 0.1 mT, 25 °C 100 MHz, 0.1 mT, 25 °C	≈ 800.10^{-6} ≈ 3000.10^{-6}	
α_F	25 - 55 °C	≈ 10.10^{-6}	K^{-1}
T_{max}		130	°C

Material grade specification - 1P11

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	11 ± 10%	
$\tan\delta/\mu_i$	1 MHz, 0.1 mT, 25 °C 50 MHz, 0.1 mT, 25 °C	≈ 350.10^{-6} ≈ 2000.10^{-6}	
α_F	25 - 55 °C	≈ 15.10^{-6}	K^{-1}
T_{max}		130	°C

Material grade specification - 1P30

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	30 ± 10%	
$\tan\delta/\mu_i$	100 kHz, 0.1 mT, 25 °C 5 MHz, 0.1 mT, 25 °C	≈ 300.10^{-6} ≈ 2500.10^{-6}	
α_F	25 - 55 °C	≈ 3.10^{-6}	K^{-1}
T_{max}		140	°C

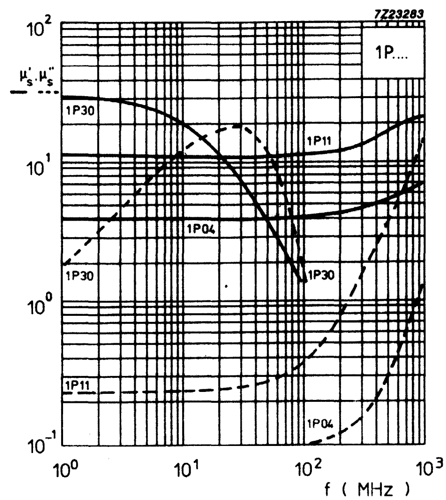


Fig.1 Complex permeability as a function of frequency.

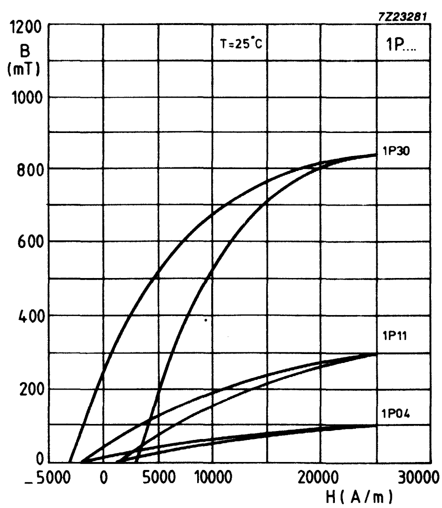


Fig.2 Typical B-H loops.

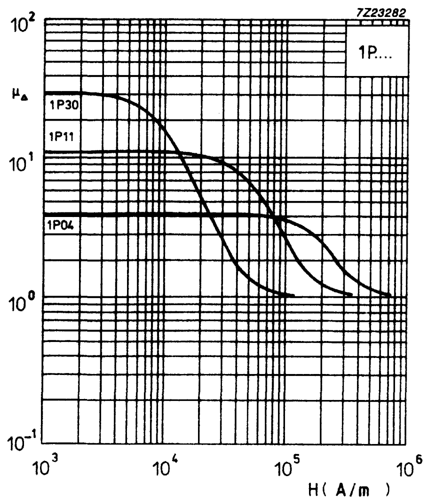


Fig.3 Incremental permeability as a function of magnetic field strength.

Material grade specification 2P..

Material grade specification - 2P40

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	40 ± 10%	
$\tan\delta/\mu_i$	100 kHz, 0.1 mT, 25 °C	≈ 1500.10^{-6}	
B_r	from 25.10^{-3} A/m	≈ 250	mT
H_c	from 25.10^{-3} A/m	≈ 2000	A/m
B	at H = 25.10^{-3} A/m	≈ 950	mT
α_F	25 - 55 °C	≈ 10.10^{-6}	K^{-1}
T_{max}		140	°C

Material grade specification - 2P50

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	50 ± 10%	
$\tan\delta/\mu_i$	100 kHz, 0.1 mT, 25 °C	≈ 1500.10^{-6}	
B_r	from 25.10^{-3} A/m	≈ 300	mT
H_c	from 25.10^{-3} A/m	≈ 1800	A/m
B	at H = 25.10^{-3} A/m	≈ 1000	mT
α_F	25 - 55 °C	≈ 20.10^{-6}	K^{-1}
T_{max}		140	°C

Material grade specification - 2P65

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	65 ± 10%	
$\tan\delta/\mu_i$	100 kHz, 0.1 mT, 25 °C	≈ 1000.10^{-6}	
B_r	from 25.10^{-3} A/m	≈ 350	mT
H_c	from 25.10^{-3} A/m	≈ 1500	A/m
B	at H = 25.10^{-3} A/m	≈ 1150	mT
α_F	25 - 55 °C	≈ 15.10^{-6}	K^{-1}
T_{max}		140	°C

Material grade specification - 2P80

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	80 ± 10%	
$\tan\delta/\mu_i$	100 kHz, 0.1 mT, 25 °C	≈ 1000.10^{-6}	
B_r	from 25.10^{-3} A/m	≈ 400	mT
H_c	from 25.10^{-3} A/m	≈ 1200	A/m
B	at H = 25.10^{-3} A/m	≈ 1400	mT
α_F	25 - 55 °C	≈ 15.10^{-6}	K^{-1}
T_{max}		140	°C

Material grade specification - 2P90

SYMBOL	CONDITIONS	VALUE	UNIT
μ_i	≤ 10 kHz, 0.1 mT, 25 °C	90 ± 10%	
$\tan\delta/\mu_i$	100 kHz, 0.1 mT, 25 °C	≈ 1000.10^{-6}	
B_r	from 25.10^{-3} A/m	≈ 450	mT
H_c	from 25.10^{-3} A/m	≈ 900	A/m
B	at H = 25.10^{-3} A/m	≈ 1600	mT
α_F	25 - 55 °C	≈ 15.10^{-6}	K^{-1}
T_{max}		140	°C

Material grade specification 2P..

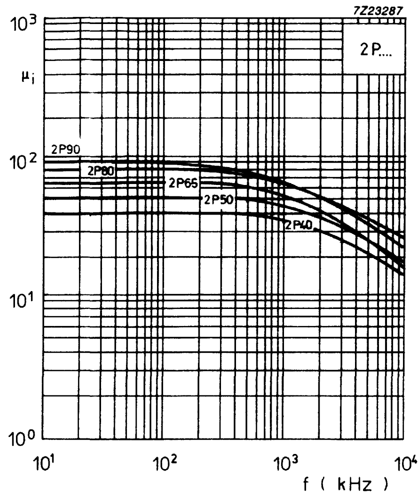


Fig.1 Initial permeability as a function of frequency.

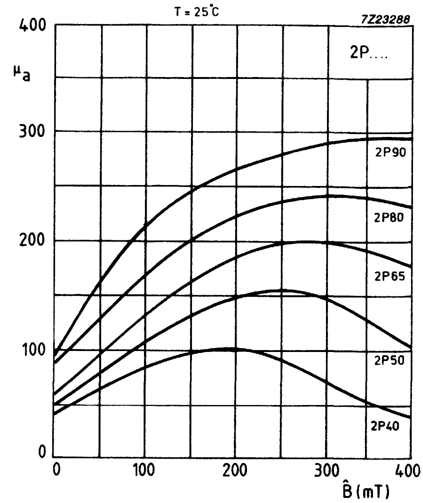


Fig.3 Amplitude permeability as a function of peak flux density.

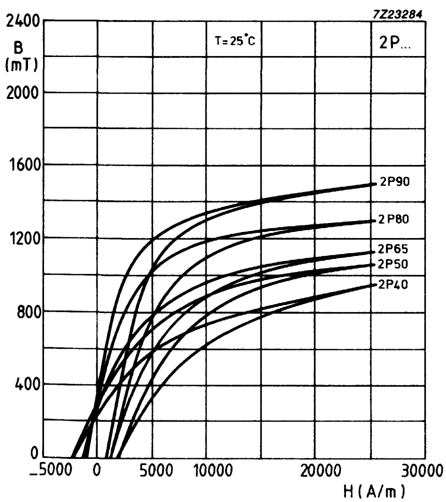


Fig.2 Typical B-H loops.

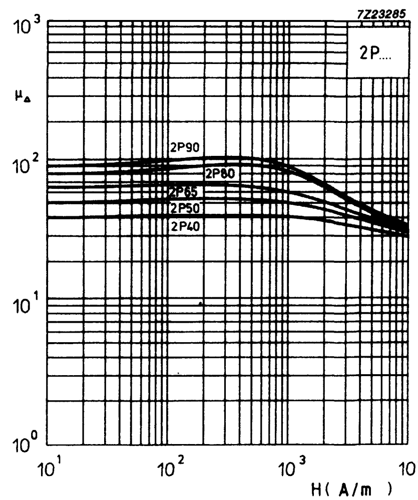


Fig.4 Incremental permeability as a function of magnetic field strength.

Material grade specification

2P..

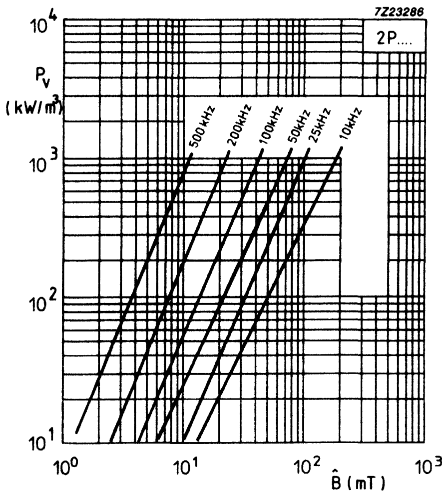


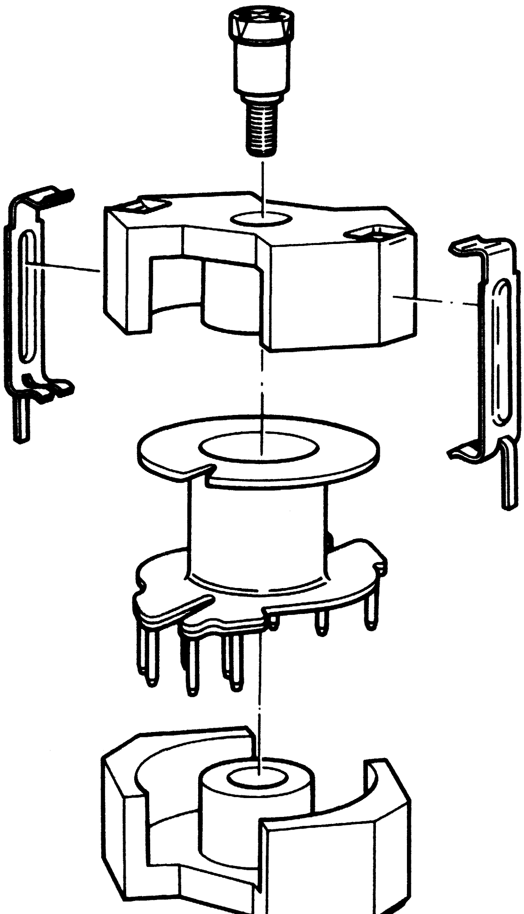
Fig.5 Specific power loss as a function of peak flux density with frequency as parameter.

RM cores and accessories

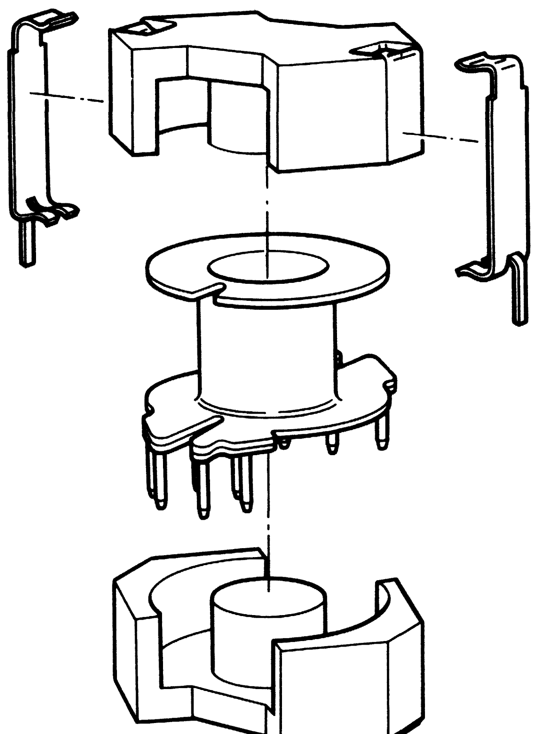
Philips Components

Data sheet	
status	Product specification
date of issue	August 1990

RM4 to RM14/i
RM cores and accessories



7Z30026



7Z30027

RM cores and accessories | RM4

Dimensions in mm

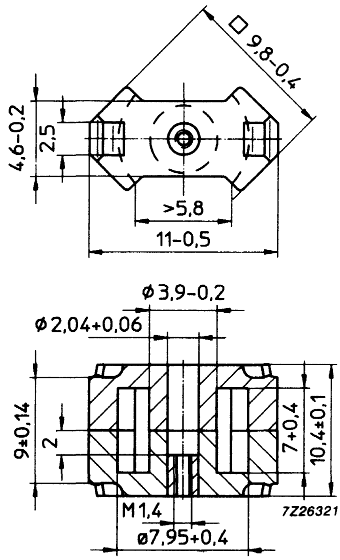


Fig.1 RM4 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	1.94	mm^{-1}
V_e	effective volume	230	mm^3
l_e	effective length	21.3	mm
A_e	effective area	11.0	mm^2
A_{min}	minimum area	8.1	mm^2
	mass of set	≈ 2.5	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
4C6	16 ± 3%	≈ 24	≈ 1500	4322 022 7780	4322 022 5780
	25 ± 3%	≈ 38	≈ 700	4322 022 7781	4322 022 5781
	65 ± 25%	≈ 100	≈ 0	–	4322 022 5779
3D3	40 ± 3%	≈ 62	≈ 400	4322 022 7742	4322 022 5742
	63 ± 3%	≈ 96	≈ 200	4322 022 7743	4322 022 5743
	400 ± 25%	≈ 610	≈ 0	–	4322 022 5739
3H3	63 ± 3%	≈ 96	≈ 200	4322 022 7753	4322 022 5753
	100 ± 3%	≈ 152	≈ 120	4322 022 7754	4322 022 5754
	160 ± 3%	≈ 242	≈ 60	4322 022 7755	4322 022 5755
	900 ± 25%	≈ 1360	≈ 0	–	4322 022 5750
3H1	63 ± 3%	≈ 96	≈ 200	4322 022 7723	4322 022 5723
	100 ± 3%	≈ 152	≈ 120	4322 022 7724	4322 022 5724
	160 ± 3%	≈ 242	≈ 60	4322 022 7725	4322 022 5725
	950 ± 25%	≈ 1440	≈ 0	–	4322 022 5720

* clamping force 20 ± 10 N

RM cores and accessories RM4/i

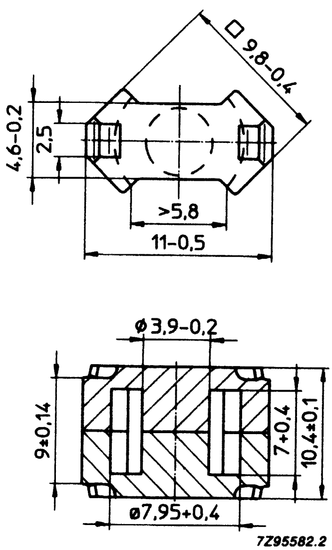


Fig.2 RM4/i core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	1.69	mm^{-1}
V_e	effective volume	322	mm^3
l_e	effective length	23.3	mm
A_e	effective area	13.8	mm^2
A_{min}	minimum area	11.5	mm^2
	mass of set	≈ 2.8	g

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3F3	100 ± 3%	≈ 134	≈ 170	4322 022 5714
	160 ± 3%	≈ 215	≈ 100	4322 022 5715
	250 ± 10%	≈ 336	≈ 50	4322 022 5716
	950 ± 25%	≈ 1280	≈ 0	4322 022 5710

* clamping force 10 ± 5 N

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	1800 ± 25%	≈ 2400	4322 022 5770
3E4	2500 + 40/- 30%	≈ 3360	4322 022 5791
3E5	3500 + 40/- 30%	≈ 4700	4322 022 5775

* clamping force 10 ± 5 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3F3	≥ 315	–	≤ 0.05	≤ 0.07

RM cores and accessories RM4

Dimensions in mm

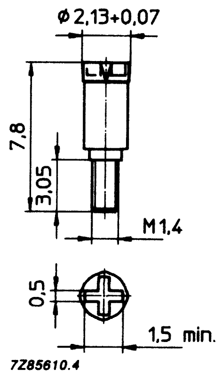


Fig.3 RM4 inductance adjuster.

INDUCTANCE ADJUSTERS – GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3870	black
4322 021 3871	brown
4322 021 3872	red
4322 021 3875	green
4322 021 3878	white
4322 021 3879	grey

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1	40	–		4322 021 3875	20	-	
	63	–		4322 021 3875	14	4322 021 3872	27
	100	4322 021 3875	9	4322 021 3872	17	4322 021 3871	22
	160	4322 021 3875	6	4322 021 3871	14	4322 021 3879	19
	250	4322 021 3872	7	4322 021 3879	12	4322 021 3870	17

COIL FORMER DATA

Coil former material:	phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	180 °C
Resistance to soldering heat:	430 °C, 2 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	20 mm

Dimensions in mm

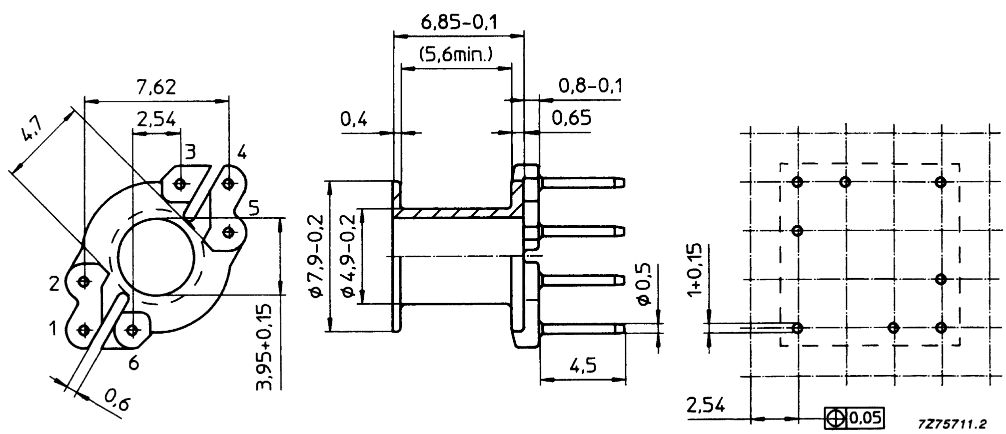


Fig.4 RM4, RM4/i coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	ORDERING CODE
1	6	all	7.4	5.5	4322 021 3221

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	5	4322 021 3190	clamping force ≈ 10 N each material: steel, Ag plated
mounting clip	6	4322 021 3429	clamping force ≈ 5 N each material: stainless steel, SnPb plated

Dimensions in mm

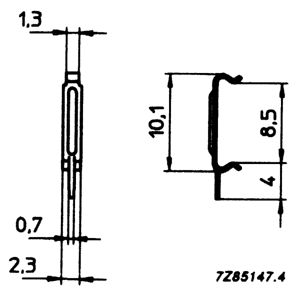


Fig.5 Mounting clip.

Dimensions in mm

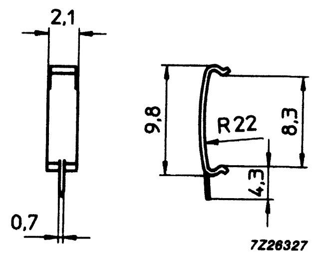


Fig.6 Mounting clip.

Dimensions in mm

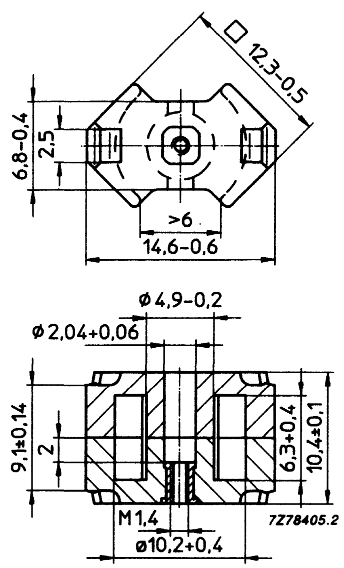


Fig.1 RM5 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	1.01	mm^{-1}
V_e	effective volume	450	mm^3
l_e	effective length	21.4	mm
A_e	effective area	21.2	mm^2
A_{min}	minimum area	14.8	mm^2
	mass of set	≈ 3.0	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
4C6	25 ± 3%	≈ 20	≈ 1200	4322 022 7981	4322 022 5981
	40 ± 3%	≈ 33	≈ 500	4322 022 7982	4322 022 5982
	120 ± 25%	≈ 95	≈ 0	–	4322 022 5984
3D3	63 ± 3%	≈ 51	≈ 400	4322 022 7943	4322 022 5943
	100 ± 3%	≈ 82	≈ 210	4322 022 7944	4322 022 5944
	800 ± 25%	≈ 630	≈ 0	–	4322 022 5940
3H3	160 ± 3%	≈ 130	≈ 130	4322 022 7955	4322 022 5955
	250 ± 3%	≈ 200	≈ 70	4322 022 7956	4322 022 5956
	315 ± 3%	≈ 250	≈ 50	4322 022 7957	4322 022 5957
	1650 ± 25%	≈ 1310	≈ 0	–	4322 022 5970
3H1	160 ± 3%	≈ 130	≈ 130	4322 022 7925	4322 022 5925
	250 ± 3%	≈ 200	≈ 70	4322 022 7926	4322 022 5926
	315 ± 3%	≈ 250	≈ 50	4322 022 7927	4322 022 5927
	1800 ± 25%	≈ 1430	≈ 0	–	4322 022 5920

* clamping force 25 ± 10 N

RM cores and accessories

RM5/i

Dimensions in mm

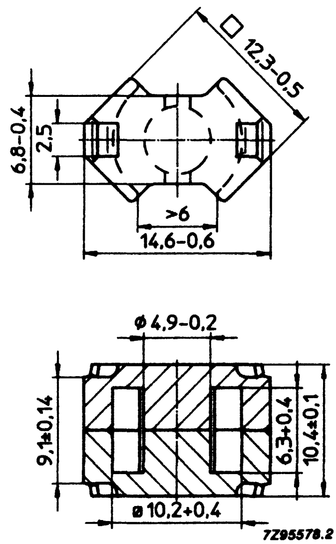


Fig.2 RM5/i core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	0.935	mm^{-1}
V_e	effective volume	574	mm^3
l_e	effective length	23.2	mm
A_e	effective area	24.8	mm^2
A_{min}	minimum area	18.1	mm^2
	mass of set	≈ 3.3	g

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	100 ± 3%	≈ 119	≈ 160	4322 022 5947
	160 ± 3%	≈ 186	≈ 90	4322 022 5948
	250 ± 3%	≈ 234	≈ 70	4322 022 5949
	2000 ± 25%	≈ 1490	≈ 0	4322 022 5946
3C85	100 ± 3%	≈ 119	≈ 160	4322 025 0404
	160 ± 3%	≈ 186	≈ 90	4322 025 0405
	250 ± 3%	≈ 234	≈ 70	4322 025 0406
	1800 ± 25%	≈ 1340	≈ 0	4322 025 0400
3F3	100 ± 3%	≈ 119	≈ 160	4322 025 0414
	160 ± 3%	≈ 186	≈ 90	4322 025 0415
	250 ± 3%	≈ 234	≈ 70	4322 025 0416
	1700 ± 25%	≈ 1270	≈ 0	4322 025 0410

* clamping force 12 ± 5 N

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	3150 ± 25%	≈ 2350	4322 022 5990
3E4	4500 + 40/- 30%	≈ 3350	4322 022 5991
3E5	6700 + 40/- 30%	≈ 4980	4322 022 5992

* clamping force 12 ± 5 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥315	≤0.16	–	-
3C85	≥315	≤0.09	≤0.11	-
3F3	≥315	–	≤0.08	≤0.11

Dimensions in mm

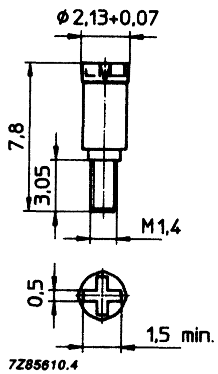


Fig.3 RM5 inductance adjuster.

INDUCTANCE ADJUSTERS – GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3870	black
4322 021 3871	brown
4322 021 3872	red
4322 021 3875	green
4322 021 3878	white
4322 021 3879	grey

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1, 3H3	63	–		4322 021 3875	12	4322 021 3872	23
	100	4322 021 3875	8	4322 021 3872	15	4322 021 3871	24
	160	4322 021 3872	9	4322 021 3871	15	4322 021 3879	27
	250	4322 021 3872	6	4322 021 3871	10	4322 021 3879	17
	315	4322 021 3871	8	4322 021 3879	14	4322 021 3878	21
	400	4322 021 3871	6	4322 021 3870	13	4322 021 3878	17
3D3	25	–		4322 021 3875	19	–	
	40	–		4322 021 3875	16	–	
	63	–		4322 021 3875	11	4322 021 3872	20
	100	4322 021 3875	7	4322 021 3872	16	–	
4C6	16	–		4322 021 3875	18	–	
	25	–		4322 021 3875	15	–	
	40	–		4322 021 3875	9	4322 021 3872	17
	63	4322 021 3875	6	4322 021 3872	8		

RM cores and accessories RM5, RM5/i

COIL FORMER DATA

Coil former material:	phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	180 °C
Resistance to soldering heat:	430 °C, 2 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	25 mm

Dimensions in mm

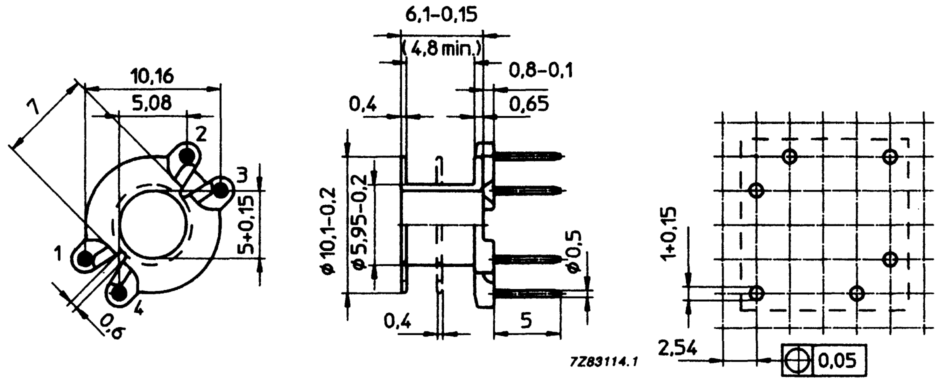


Fig.4 RM5, RM5/i coil former, 4 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	WINDING WIDTH (mm)	ORDERING CODE
1	4	all	9.5	4.8	4322 021 3445
2	4	all	2 x 4.35	2 x 2.2	4322 021 3448

RM cores and accessories RM5, RM5/i

Dimensions in mm

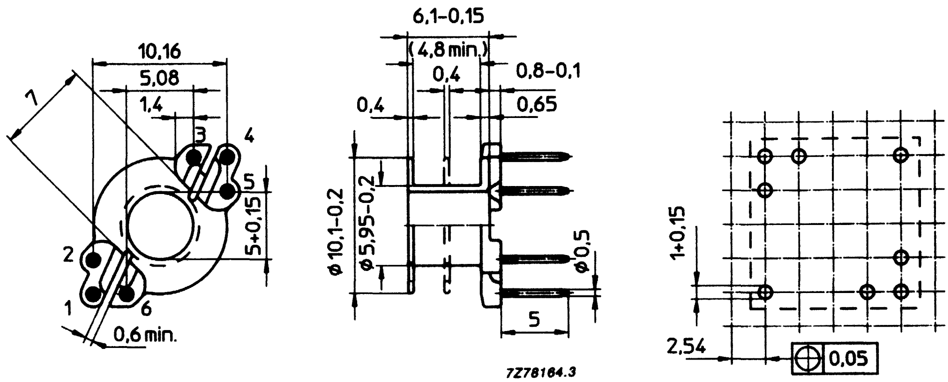


Fig.5 RM5, RM5/i coil former, 6 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	ORDERING CODE
1	5	1,2,3,5,6	9.5	4.8	4322 021 3446
1	6	all	9.5	4.8	4322 021 3447
2	5	1,2,3,5,6	2 x 4.35	2 x 2.2	4322 021 3449
2	6	all	2 x 4.35	2 x 2.2	4322 021 3450

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	6	4322 021 3190	clamping force ≈ 12 N each material: steel, Ag plated
mounting clip	7	4322 021 3429	clamping force ≈ 6 N each material: stainless steel, SnPb plated

Dimensions in mm

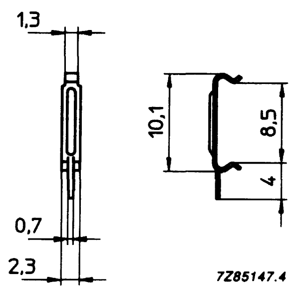


Fig.6 Mounting clip.

Dimensions in mm

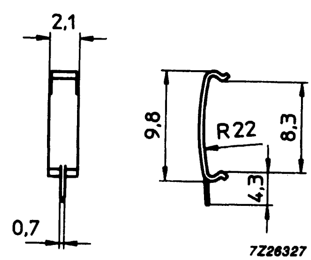


Fig.7 Mounting clip.

RM cores and accessories | RM6R

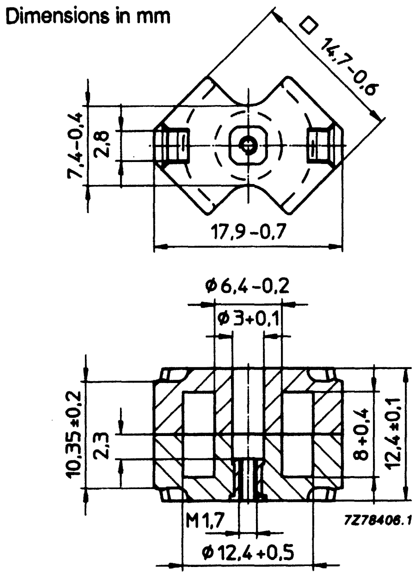


Fig.1 RM6R core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.810	mm^{-1}
V_e	effective volume	810	mm^3
l_e	effective length	25.6	mm
A_e	effective area	32.0	mm^2
A_{min}	minimum area	23.8	mm^2
	mass of set	≈ 4.5	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
4C6	25 ± 3%	≈ 16	≈ 2500	4322 022 7581	4322 022 5581
	40 ± 3%	≈ 26	≈ 1000	4322 022 7582	4322 022 5582
	63 ± 3%	≈ 41	≈ 400	4322 022 7583	4322 022 5583
	150 ± 25%	≈ 97	≈ 0	–	4322 022 5566
3D3	63 ± 3%	≈ 41	≈ 700	4322 022 7543	4322 022 5543
	100 ± 3%	≈ 65	≈ 400	4322 022 7544	4322 022 5544
	160 ± 3%	≈ 103	≈ 200	4322 022 7545	4322 022 5545
	1000 ± 25%	≈ 650	≈ 0	–	4322 022 5540
3H3	160 ± 3%	≈ 103	≈ 230	4322 022 7555	4322 022 5555
	200 ± 3%	≈ 129	≈ 160	4322 022 7568	4322 022 5568
	250 ± 3%	≈ 161	≈ 110	4322 022 7556	4322 022 5556
	315 ± 3%	≈ 203	≈ 90	4322 022 7557	4322 022 5557
	400 ± 3%	≈ 258	≈ 70	4322 022 7558	4322 022 5558
	2200 ± 25%	≈ 1420	≈ 0	–	4322 022 5562
3H1	160 ± 3%	≈ 103	≈ 230	4322 022 7525	4322 022 5525
	250 ± 3%	≈ 161	≈ 110	4322 022 7526	4322 022 5526
	315 ± 3%	≈ 203	≈ 90	4322 022 7527	4322 022 5527
	400 ± 3%	≈ 258	≈ 70	4322 022 7528	4322 022 5528
	2450 ± 25%	≈ 1580	≈ 0	–	4322 022 5520

* clamping force 40 ± 20 N

RM cores and accessories RM6R

Dimensions in mm

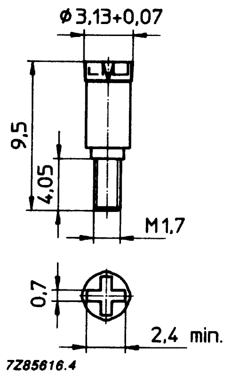


Fig.2 RM6R inductance adjuster.

INDUCTANCE ADJUSTERS – GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3860	black
4322 021 3861	brown
4322 021 3862	red
4322 021 3864	yellow
4322 021 3865	green
4322 021 3867	violet
4322 021 3868	white
4322 021 3869	grey

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1, 3H3	40	–		4322 021 3864	17	4322 021 3865	20
	63	4322 021 3864	12	4322 021 3865	14	4322 021 3862	22
	100	4322 021 3865	10	4322 021 3862	16	–	
	160	4322 021 3865	6	4322 021 3862	11	4322 021 3868	19
	200	4322 021 3862	8	4322 021 3868	15	4322 021 3867	18
	250	4322 021 3868	12	4322 021 3867	14	4322 021 3861	19
	315	4322 021 3868	10	4322 021 3861	15	4322 021 3860	20
	400	4322 021 3867	9	4322 021 3860	16	4322 021 3869	24
	630	4322 021 3860	10	4322 021 3869	15	–	
	1000	4322 021 3860	6	4322 021 3869	10	–	
	1250	–		4322 021 3869	8	–	
3D3	40	–		4322 021 3864	17	4322 021 3865	20
	63	4322 021 3864	12	4322 021 3865	14	4322 021 3862	23
	100	4322 021 3865	9	4322 021 3862	16	4322 021 3868	27
	160	4322 021 3862	10	4322 021 3868	17	–	
4C6	25	–		4322 021 3864	18	4322 021 3865	20
	40	4322 021 3864	12	4322 021 3865	14	4322 021 3862	20
	63	4322 021 3865	8	4322 021 3862	12	–	

RM cores and accessories RM6R

COIL FORMER DATA

Coil former material:	phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	180 °C
Resistance to soldering heat:	430 °C, 2 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	25 mm

Dimensions in mm

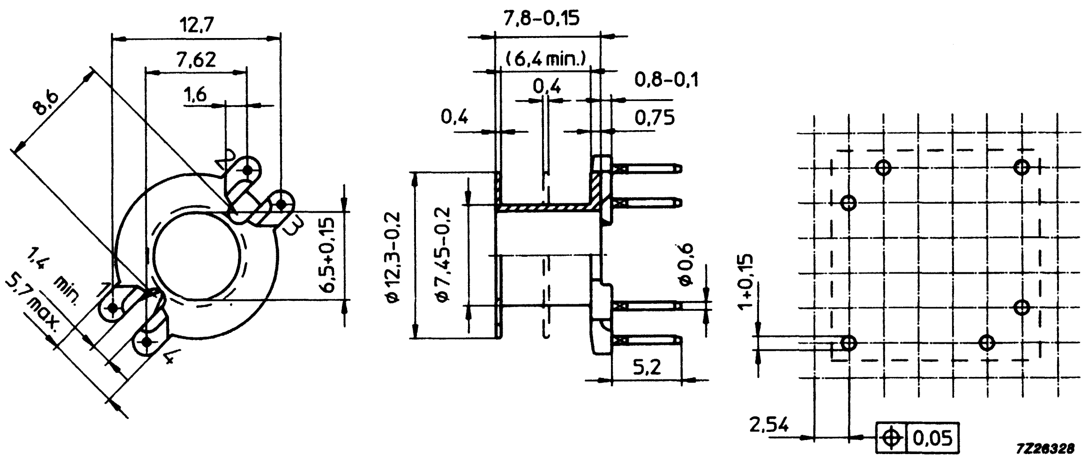


Fig.3 RM6R coil former, 4 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	WINDING WIDTH (mm)	ORDERING CODE
1	4	all	15	6.4	4322 021 3451
2	4	all	2 x 7.0	2 x 3.0	4322 021 3452

Dimensions in mm

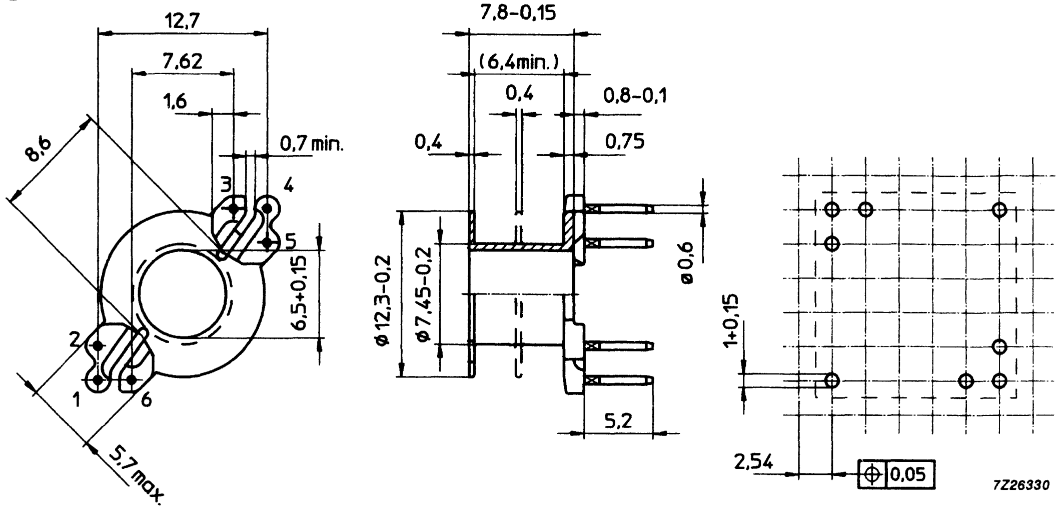


Fig.4 RM6R coil former, 6 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	WINDING WIDTH (mm)	ORDERING CODE
1	5	1,2,3,5,6	15	6.4	4322 021 3453
1	6	all	15	6.4	4322 021 3454
2	5	1,2,3,5,6	2 x 7.0	2 x 3.0	4322 021 3455
2	6	all	2 x 7.0	2 x 3.0	4322 021 3456

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	5	4322 021 3178	clamping force ≈ 20 N each material: steel, Ag plated
mounting clip	6	4322 021 3430	clamping force ≈ 10 N each material: stainless steel, SnPb plated

Dimensions in mm

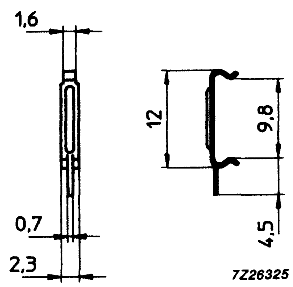


Fig.5 Mounting clip.

Dimensions in mm

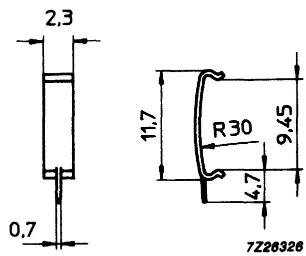


Fig.6 Mounting clip.

RM cores and accessories RM6S

Dimensions in mm

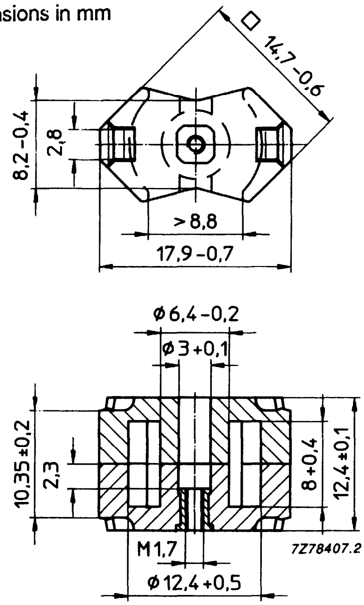


Fig.1 RM6S core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.863	mm^{-1}
V_e	effective volume	840	mm^3
l_e	effective length	27.3	mm
A_e	effective area	31.0	mm^2
A_{min}	minimum area	23.8	mm^2
	mass of set	≈ 4.5	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
4C6	25 ± 3%	≈ 17	≈ 2000	4322 022 6781	4322 022 4781
	40 ± 3%	≈ 27	≈ 1000	4322 022 6782	4322 022 4782
	63 ± 3%	≈ 43	≈ 400	4322 022 6783	4322 022 4783
	140 ± 25%	≈ 96	≈ 0	–	4322 022 4778
3D3	63 ± 3%	≈ 43	≈ 700	4322 022 6743	4322 022 4743
	100 ± 3%	≈ 69	≈ 400	4322 022 6744	4322 022 4744
	160 ± 3%	≈ 110	≈ 200	4322 022 6745	4322 022 4745
	950 ± 25%	≈ 650	≈ 0	–	4322 022 4740
3H3	160 ± 3%	≈ 110	≈ 230	4322 022 6755	4322 022 4755
	200 ± 3%	≈ 137	≈ 160	4322 022 6768	4322 022 4768
	250 ± 3%	≈ 171	≈ 110	4322 022 6756	4322 022 4756
	315 ± 3%	≈ 216	≈ 90	4322 022 6757	4322 022 4757
	400 ± 3%	≈ 274	≈ 70	4322 022 6758	4322 022 4758
	2100 ± 25%	≈ 1440	≈ 0	–	4322 022 4750
3H1	160 ± 3%	≈ 110	≈ 230	4322 022 6725	4322 022 4725
	250 ± 3%	≈ 171	≈ 110	4322 022 6726	4322 022 4726
	315 ± 3%	≈ 216	≈ 90	4322 022 6727	4322 022 4727
	400 ± 3%	≈ 274	≈ 70	4322 022 6728	4322 022 4728
	2300 ± 25%	≈ 1580	≈ 0	–	4322 022 4721

* clamping force 40 ± 20 N

RM cores and accessories

RM6S/i

Dimensions in mm

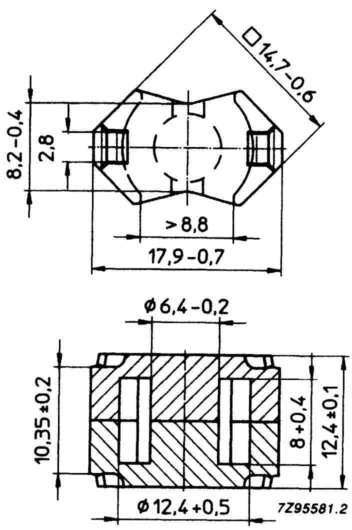


Fig.2 RM6S/i core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.784	mm^{-1}
V_e	effective volume	1090	mm^3
l_e	effective length	29.2	mm
A_e	effective area	37.0	mm^2
A_{min}	minimum area	31.2	mm^2
	mass of set	≈ 4.9	g

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	63 ± 3%	≈ 39	≈ 950	4322 022 4772
	100 ± 3%	≈ 62	≈ 500	4322 022 4774
	160 ± 3%	≈ 100	≈ 160	4322 022 4773
	250 ± 3%	≈ 156	≈ 150	4322 022 4788
	2600 ± 25%	≈ 1620	≈ 0	4322 022 4785
3C85	63 ± 3%	≈ 39	≈ 950	4322 025 0503
	100 ± 3%	≈ 62	≈ 500	4322 025 0504
	160 ± 3%	≈ 100	≈ 300	4322 025 0505
	250 ± 3%	≈ 156	≈ 150	4322 025 0506
	2350 ± 25%	≈ 1470	≈ 0	4322 025 0500
3F3	63 ± 3%	≈ 39	≈ 950	4322 025 0513
	100 ± 3%	≈ 62	≈ 500	4322 025 0514
	160 ± 3%	≈ 100	≈ 300	4322 025 0515
	250 ± 3%	≈ 156	≈ 150	4322 025 0516
	2150 ± 25%	≈ 1350	≈ 0	4322 025 0511

* clamping force 20 ± 10 N

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	4100 ± 25%	≈ 2600	4322 022 4786
3E4	5750 + 40/- 30%	≈ 3590	4322 022 4793
3E5	8600 + 40/- 30%	≈ 5370	4322 022 4787

* clamping force 20 ± 10 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥315	≤0.30	–	-
3C85	≥315	≤0.17	≤0.20	-
3F3	≥315	–	≤0.14	≤0.20

Dimensions in mm

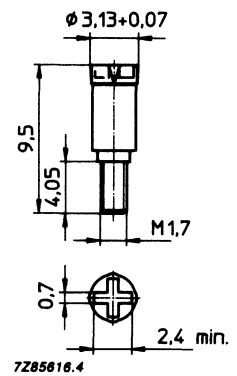


Fig.3 RM6S inductance adjuster.

INDUCTANCE ADJUSTERS – GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3860	black
4322 021 3861	brown
4322 021 3862	red
4322 021 3864	yellow
4322 021 3865	green
4322 021 3867	violet
4322 021 3868	white
4322 021 3869	grey

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1, 3H3	40	–		4322 021 3864	17	4322 021 3865	20
	63	4322 021 3864	12	4322 021 3865	14	4322 021 3862	22
	100	4322 021 3865	10	4322 021 3862	16	–	
	160	4322 021 3865	6	4322 021 3862	11	4322 021 3868	19
	200	4322 021 3862	8	4322 021 3868	15	4322 021 3867	18
	250	4322 021 3868	12	4322 021 3867	14	4322 021 3861	19
	315	4322 021 3868	10	4322 021 3861	15	4322 021 3860	20
	400	4322 021 3867	9	4322 021 3860	16	4322 021 3869	24
	630	4322 021 3860	10	4322 021 3869	15	–	
	1000	4322 021 3860	6	4322 021 3869	10	–	
	1250	–		4322 021 3869	8	–	
3D3	40	–		4322 021 3864	17	4322 021 3865	20
	63	4322 021 3864	12	4322 021 3865	14	4322 021 3862	23
	100	4322 021 3865	9	4322 021 3862	16	4322 021 3868	27
	160	4322 021 3862	10	4322 021 3868	17	–	
4C6	25	–		4322 021 3864	18	4322 021 3865	20
	40	4322 021 3864	12	4322 021 3865	14	4322 021 3862	20
	63	4322 021 3865	8	4322 021 3862	12	–	

COIL FORMER DATA

Coil former material: phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 180 °C

Resistance to soldering heat: 430 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Average length of turn: 30 mm

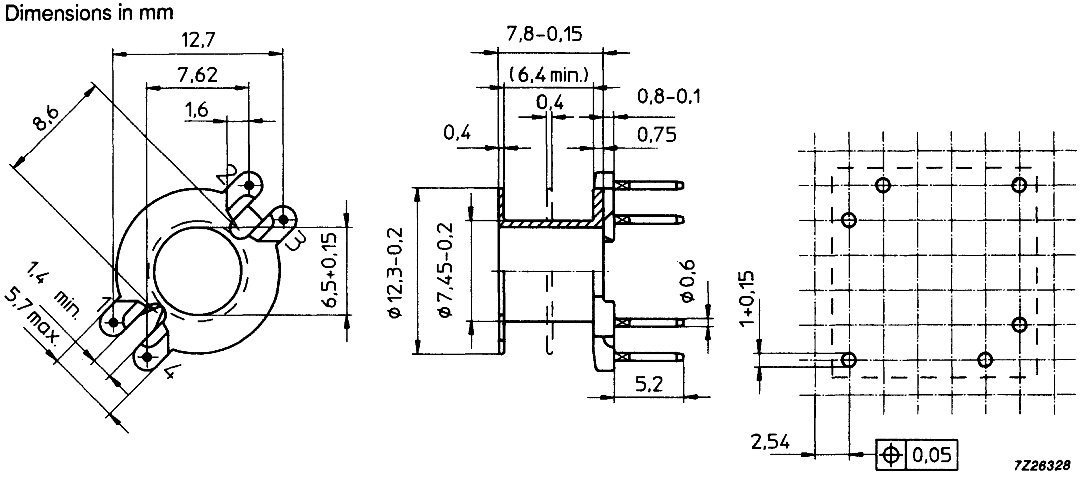


Fig.4 RM6S, RM6S/i coil former, 4 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	WINDING WIDTH (mm)	ORDERING CODE
1	4	all	15	6.4	4322 021 3451
2	4	all	2 x 7.0	2 x 3.0	4322 021 3452

Dimensions in mm

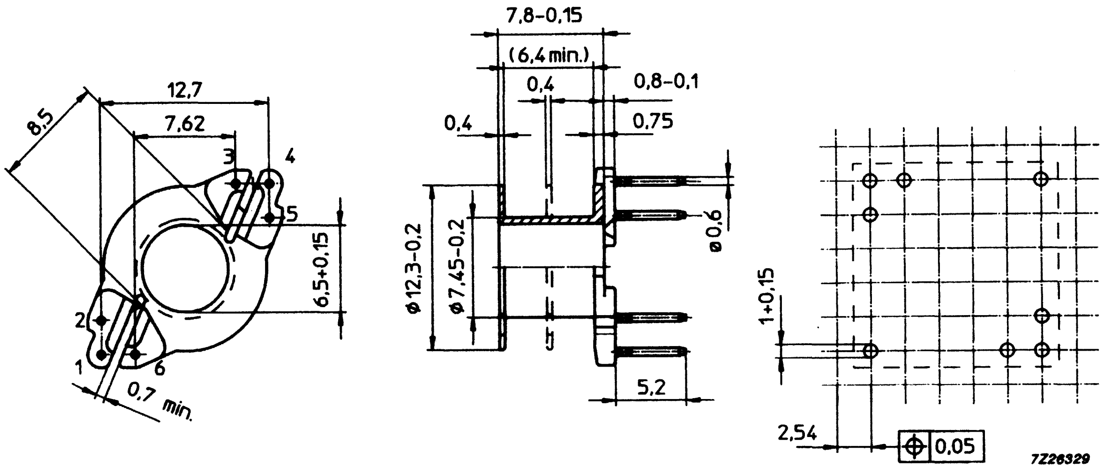


Fig.5 RM6S, RM6S/i coil former, 6 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	WINDING WIDTH (mm)	ORDERING CODE
1	5	1,2,3,5,6	15	6.4	4322 021 3457
1	6	all	15	6.4	4322 021 3458
2	5	1,2,3,5,6	2 x 7.0	2 x 3.0	4322 021 3459
2	6	all	2 x 7.0	2 x 3.0	4322 021 3460

DIL COIL FORMER DATA

Coil former material:	polybutyleneterephthalate (PBT), glass reinforced, flame retardent in accordance with UL 94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	130 °C
Resistance to soldering heat:	400 °C, 2 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	31 mm

Dimensions in mm

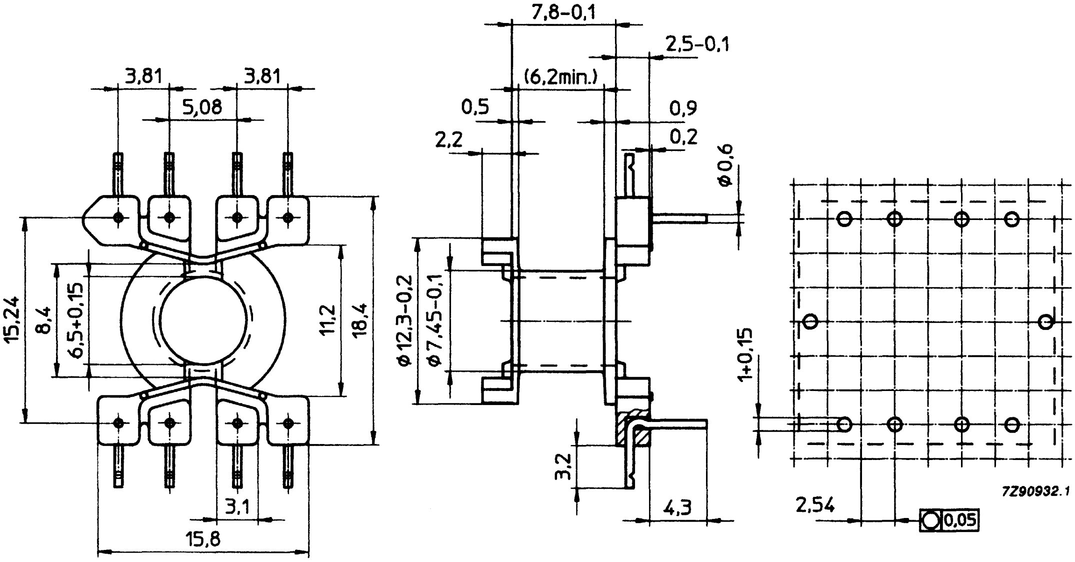


Fig.6 RM6S/i DIL coil former, 8 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	ORDERING CODE
1	8	all	15.7	6.2	4322 021 3404

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	7	4322 021 3178	clamping force ≈ 20 N each material: steel, Ag plated
mounting clip	8	4322 021 3430	clamping force ≈ 10 N each material: stainless steel, SnPb plated

Dimensions in mm

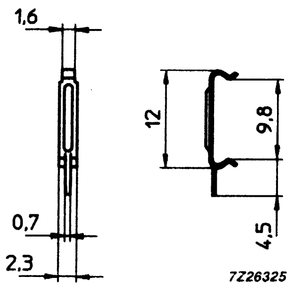


Fig.7 Mounting clip.

Dimensions in mm

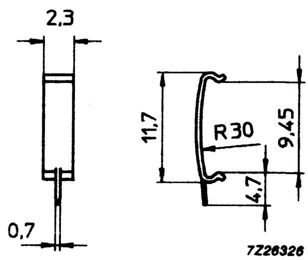


Fig.8 Mounting clip.

Dimensions in mm

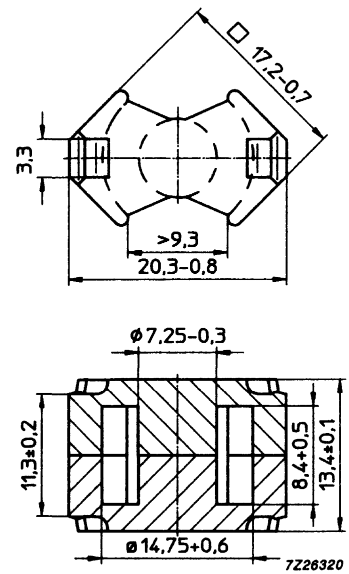


Fig.1 RM7/i core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.680	mm^{-1}
V_e	effective volume	1325	mm^3
l_e	effective length	30.0	mm
A_e	effective area	44.1	mm^2
A_{min}	minimum area	39.6	mm^2
	mass of set	≈ 7.7	g

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	160 ± 3%	≈ 89	≈ 400	4322 025 0065
	250 ± 3%	≈ 139	≈ 200	4322 025 0066
	3000 ± 25%	≈ 1670	≈ 0	4322 025 0060
3C85	160 ± 3%	≈ 89	≈ 400	4322 025 0045
	250 ± 3%	≈ 139	≈ 200	4322 025 0046
	2700 ± 25%	≈ 1500	≈ 0	4322 025 0040
3F3	160 ± 3%	≈ 89	≈ 400	4322 025 0085
	250 ± 3%	≈ 139	≈ 200	4322 025 0086
	2500 ± 25%	≈ 1390	≈ 0	4322 025 0080

* clamping force 40 ± 20 N

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	4750 ± 25%	≈ 2570	4322 025 0099
3E4	6600 + 40/- 30%	≈ 3590	4322 025 0090
3E5	10000 + 40/- 30%	≈ 5370	4322 025 0095

* clamping force 25 ± 10 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥315	≤0.40	–	-
3C85	≥315	≤0.20	≤0.24	-
3F3	≥315	–	≤0.15	≤0.25

COIL FORMER DATA

Coil former material: phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0
Pin material: CuSn, SnPb plated
Maximum operating temperature: 180 °C
Resistance to soldering heat: 430 °C, 2 s
Solderability: IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn: 35 mm

Dimensions in mm

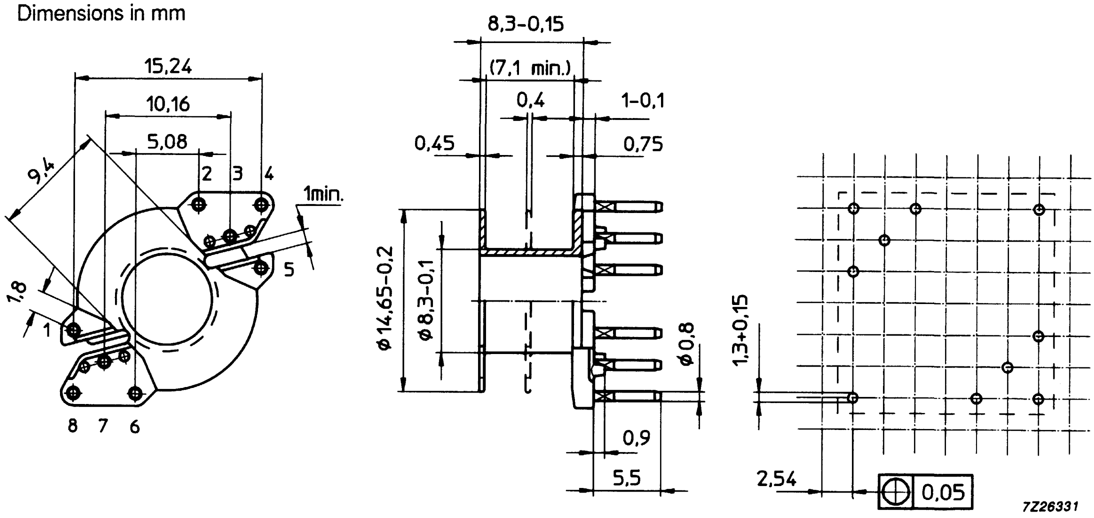


Fig.2 RM7/i coil former, 8 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	WINDING WIDTH (mm)	ORDERING CODE
1	4	1,2,5,6	21	7.1	4322 021 3461
1	5	1,2,4,5,8	21	7.1	4322 021 3462
1	8	all	21	7.1	4322 021 3463
2	5	1,2,4,5,8	2 x 9.8	2 x 3.3	4322 021 3464
2	8	all	2 x 9.8	2 x 3.3	4322 021 3465

RM cores and accessories RM7/i

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	3	4313 021 0395	clamping force ≈ 20 N each material: stainless steel, SnPb plated

Dimensions in mm

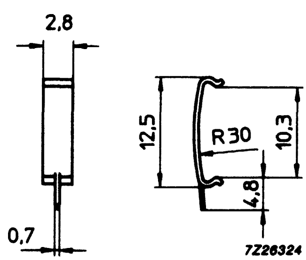


Fig.3 Mounting clip.

RM cores and accessories RM8

Dimensions in mm

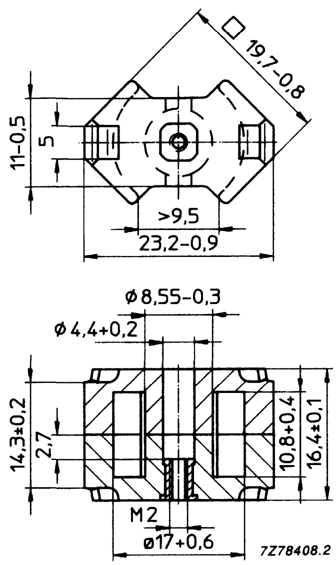


Fig.1 RM8 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.683	mm^{-1}
V_e	effective volume	1850	mm^3
I_e	effective length	35.5	mm
A_e	effective area	52.0	mm^2
A_{min}	minimum area	39.5	mm^2
	mass of set	≈ 10.9	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
4C6	40 ± 3%	≈ 22	≈ 2700	4322 022 7182	4322 022 5182
	63 ± 3%	≈ 34	≈ 1200	4322 022 7183	4322 022 5183
	180 ± 25%	≈ 97	≈ 0	–	4322 022 5181
3D3	100 ± 3%	≈ 54	≈ 750	4322 022 7144	4322 022 5144
	160 ± 3%	≈ 87	≈ 400	4322 022 7145	4322 022 5145
	1240 ± 25%	≈ 670	≈ 0	–	4322 022 5140
3H3	250 ± 3%	≈ 135	≈ 210	4322 022 7156	4322 022 5156
	315 ± 3%	≈ 170	≈ 160	4322 022 7157	4322 022 5157
	400 ± 3%	≈ 220	≈ 130	4322 022 7158	4322 022 5158
	630 ± 5%	≈ 340	≈ 100	4322 022 7160	4322 022 5160
	2850 ± 25%	≈ 1540	≈ 0	–	4322 022 5170
3H1	250 ± 3%	≈ 135	≈ 210	4322 022 7126	4322 022 5126
	315 ± 3%	≈ 170	≈ 160	4322 022 7127	4322 022 5127
	400 ± 3%	≈ 220	≈ 130	4322 022 7128	4322 022 5128
	630 ± 5%	≈ 340	≈ 100	4322 022 7130	4322 022 5130
	3150 ± 25%	≈ 1700	≈ 0	–	4322 022 5120

* clamping force 60 ± 30 N

Dimensions in mm

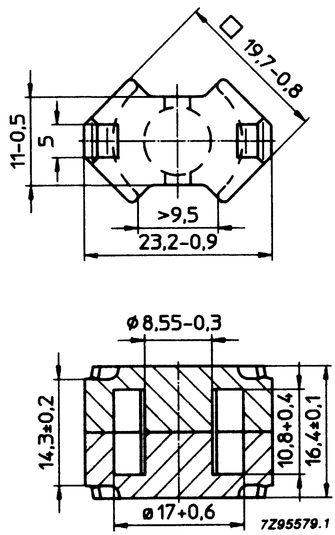


Fig.2 RM8/i core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	0.604	mm^{-1}
V_e	effective volume	2440	mm^3
l_e	effective length	38.4	mm
A_e	effective area	63.0	mm^2
A_{min}	minimum area	55.4	mm^2
	mass of set	≈ 12.0	g

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	160 ± 3%	≈ 77	≈ 550	4322 022 5147
	250 ± 3%	≈ 120	≈ 300	4322 022 5148
	315 ± 3%	≈ 151	≈ 250	4322 022 5149
	400 ± 3%	≈ 192	≈ 180	4322 022 5150
	3600 ± 25%	≈ 1730	≈ 0	4322 022 5146
3C85	160 ± 3%	≈ 77	≈ 550	4322 025 0145
	250 ± 3%	≈ 120	≈ 300	4322 025 0146
	315 ± 3%	≈ 151	≈ 250	4322 025 0147
	400 ± 3%	≈ 192	≈ 180	4322 025 0148
	3250 ± 25%	≈ 1560	≈ 0	4322 025 0120
3F3	160 ± 3%	≈ 77	≈ 550	4322 025 0165
	250 ± 3%	≈ 120	≈ 300	4322 025 0166
	315 ± 3%	≈ 151	≈ 250	4322 025 0167
	400 ± 3%	≈ 192	≈ 180	4322 025 0168
	3000 ± 25%	≈ 1440	≈ 0	4322 025 0160

* clamping force 30 ± 10 N

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	5800 ± 25%	≈ 2800	4322 022 5186
3E4	8000 + 40/- 30%	≈ 3800	4322 022 5187
3E5	12500 + 40/- 30%	≈ 6000	4322 022 5198

* clamping force 30 ± 10 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥ 315	≤ 0.70	–	-
3C85	≥ 315	≤ 0.40	≤ 0.45	-
3F3	≥ 315	–	≤ 0.27	≤ 0.47

Dimensions in mm

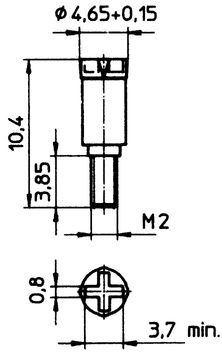


Fig.3 RM8 inductance adjuster.

INDUCTANCE ADJUSTERS – GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3840	black
4322 021 3841	brown
4322 021 3842	red
4322 021 3843	orange
4322 021 3844	yellow
4322 021 3845	green
4322 021 3848	white
4322 021 3849	grey

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1,	63	–		4322 021 3845	19	4322 021 3842	25
3H3	100	4322 021 3845	12	4322 021 3842	16	4322 021 3843	21
	160	4322 021 3845	8	4322 021 3843	14	4322 021 3844	18
	250	4322 021 3842	7	4322 021 3844	12	4322 021 3848	18
	315	4322 021 3844	9	4322 021 3848	15	4322 021 3841	19
	400	4322 021 3844	7	4322 021 3848	12	4322 021 3841	15
	630	4322 021 3844	5	4322 021 3841	10	4322 021 3840	16
	1000	4322 021 3841	6	4322 021 3840	10	–	
	1250	–		4322 021 3840	8	–	
3D3	40	–		4322 021 3845	27	–	
	63	–		4322 021 3845	17	4322 021 3842	24
	100	4322 021 3845	11	4322 021 3842	15	4322 021 3843	20
	160	4322 021 3845	7	4322 021 3843	13	4322 021 3844	17
4C6	40	–		4322 021 3845	18	4322 021 3842	23
	63	4322 021 3845	12	4322 021 3842	16	4322 021 3843	20
	100	4322 021 3845	6	4322 021 3843	11	4322 021 3848	19
	160	4322 021 3843	7	4322 021 3848	12	–	

COIL FORMER DATA

Coil former material: phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 180 °C

Resistance to soldering heat: 430 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Average length of turn: 42 mm

Dimensions in mm

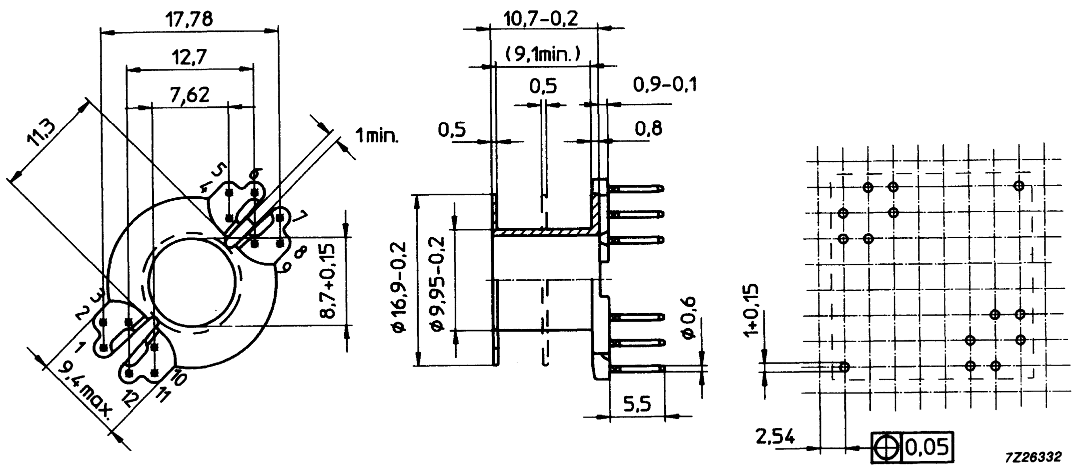


Fig.4 RM8, RM8/i coil former, 12 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	WINDING WIDTH (mm)	ORDERING CODE
1	4	3,4,9,10	31	9.1	4322 021 3486
1	5	1,2,5,8,11	31	9.1	4322 021 3466
1	8	1,2,5,6,7,8,11,12	31	9.1	4322 021 3467
1	12	all	31	9.1	4322 021 3468
2	5	1,2,5,8,11	2 x 14.5	2 x 4.3	4322 021 3469
2	8	1,2,5,6,7,8,11,12	2 x 14.5	2 x 4.3	4322 021 3470
2	12	all	2 x 14.5	2 x 4.3	4322 021 3471

RM cores and accessories RM8/i

DIL COIL FORMER DATA

Coil former material: polybutyleneterephthalate (PBT), glass reinforced, flame retardent in accordance with UL 94V-0
Pin material: CuSn, SnPb plated
Maximum operating temperature: 130 °C
Resistance to soldering heat: 400 °C, 2 s
Solderability: IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn: 42 mm

Dimensions in mm

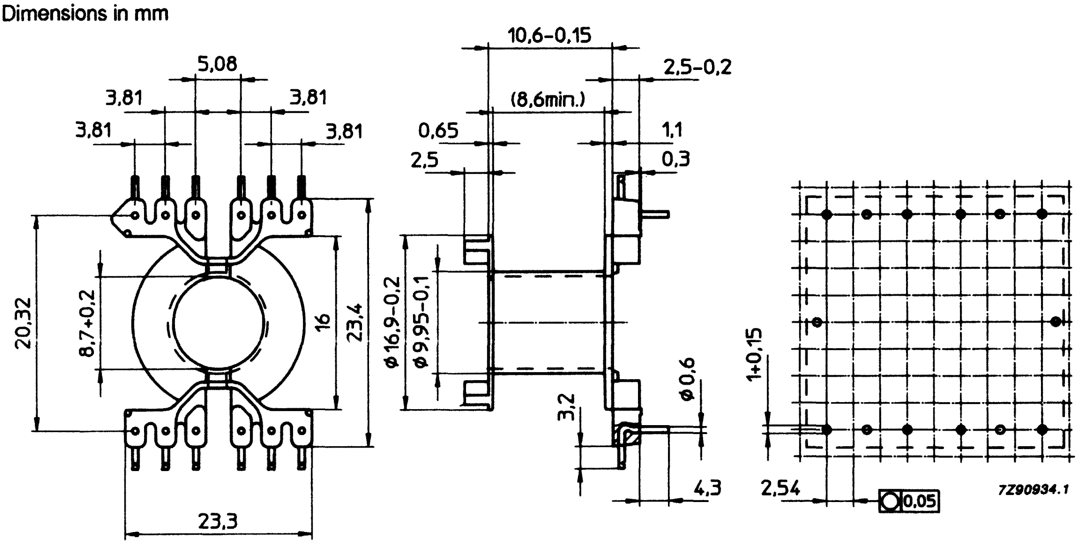


Fig.5 RM8/i DIL coil former, 12 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	WINDING WIDTH (mm)	ORDERING CODE
1	12	all	30.9	8.6	4322 021 3405

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	6	4322 021 3184	clamping force ≈ 30 N each material: steel, Ag plated
mounting clip	7	4322 021 3431	clamping force ≈ 15 N each material: stainless steel, SnPb plated

Dimensions in mm

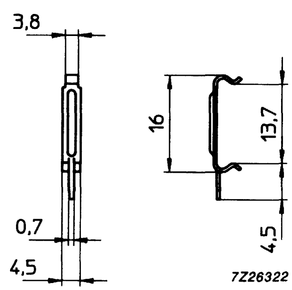


Fig.6 Mounting clip.

Dimensions in mm

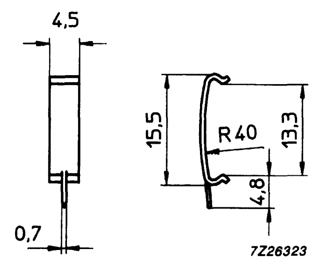


Fig.7 Mounting clip.

RM cores and accessories RM10

Dimensions in mm

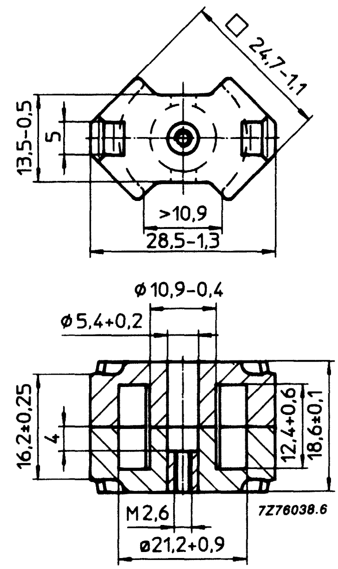


Fig.1 RM10 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	0.501	mm^{-1}
V_e	effective volume	3470	mm^3
l_e	effective length	41.7	mm
A_e	effective area	83.2	mm^2
A_{min}	minimum area	65.3	mm^2
	mass of set	≈ 20	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (µm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
3H1	250 ± 3%	≈ 100	≈ 400	4322 022 7026	4322 022 5026
	315 ± 3%	≈ 126	≈ 300	4322 022 7027	4322 022 5027
	400 ± 3%	≈ 160	≈ 230	4322 022 7028	4322 022 5028
	630 ± 3%	≈ 251	≈ 130	4322 022 7030	4322 022 5030
	4500 ± 25%	≈ 1800	≈ 0	–	4322 022 5020

* clamping force 60 ± 20 N

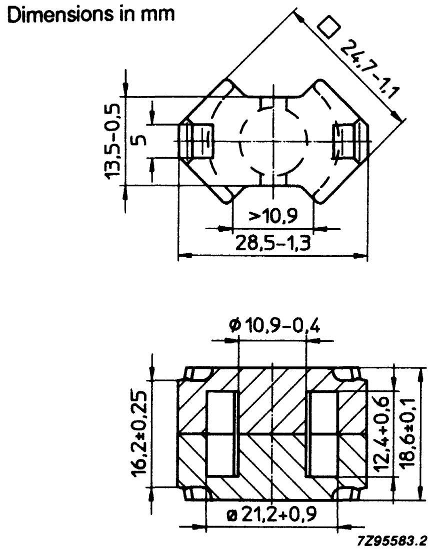


Fig.2 RM10/i core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.462	mm^{-1}
V_e	effective volume	4310	mm^3
l_e	effective length	44.6	mm
A_e	effective area	96.6	mm^2
A_{min}	minimum area	80.9	mm^2
	mass of set	≈ 22	g

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	160 ± 3%	≈ 59	≈ 900	4322 022 5046
	250 ± 3%	≈ 92	≈ 500	4322 022 5048
	315 ± 3%	≈ 116	≈ 400	4322 022 5049
	400 ± 3%	≈ 147	≈ 300	4322 022 5050
	630 ± 3%	≈ 232	≈ 150	4322 022 5052
	4950 ± 25%	≈ 1820	≈ 0	4322 022 5040
3C85	160 ± 3%	≈ 59	≈ 900	4322 022 5099
	250 ± 3%	≈ 92	≈ 500	4322 022 5086
	315 ± 3%	≈ 116	≈ 400	4322 022 5087
	400 ± 3%	≈ 147	≈ 300	4322 022 5088
	630 ± 3%	≈ 232	≈ 150	4322 022 5089
	4400 ± 25%	≈ 1620	≈ 0	4322 022 5060
3F3	160 ± 3%	≈ 59	≈ 900	4322 025 0265
	250 ± 3%	≈ 92	≈ 500	4322 025 0266
	315 ± 3%	≈ 116	≈ 400	4322 025 0267
	400 ± 3%	≈ 147	≈ 300	4322 025 0268
	630 ± 3%	≈ 232	≈ 150	4322 025 0269
	4050 ± 25%	≈ 1490	≈ 0	4322 025 0260

* clamping force 60 ± 20 N

RM cores and accessories | RM10/i

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	8000 ± 25%	≈ 2900	4322 022 5090
3E4	11000 + 40/- 30%	≈ 4040	4322 022 5093
3E5	16000 + 40/- 30%	≈ 5900	4322 022 5094

* clamping force 60 ± 20 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥ 315	≤ 1.20	–	-
3C85	≥ 315	≤ 0.65	≤ 0.80	-
3F3	≥ 315	–	≤ 0.48	≤ 0.82

RM cores and accessories RM10

Dimensions in mm

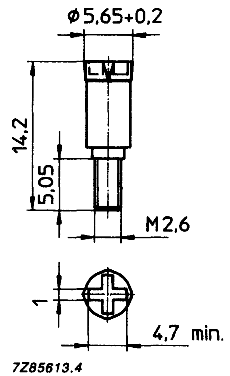


Fig.3 RM10 inductance adjuster.

INDUCTANCE ADJUSTERS - GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3832	red
4322 021 3834	yellow
4322 021 3838	white
4322 021 3839	grey

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1	160	–		4322 021 3832	16	4322 021 3834	26
	250	4322 021 3832	10	4322 021 3834	16	4322 021 3838	19
	315	4322 021 3832	8	4322 021 3834	14	4322 021 3838	15
	400	4322 021 3832	6	4322 021 3838	11	-	
	630	–		4322 021 3838	8	4322 021 3839	20
	1000	4322 021 3838	5	4322 021 3839	11	–	

COIL FORMER DATA

Coil former material:	phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	180 °C
Resistance to soldering heat:	430 °C, 2 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	52 mm

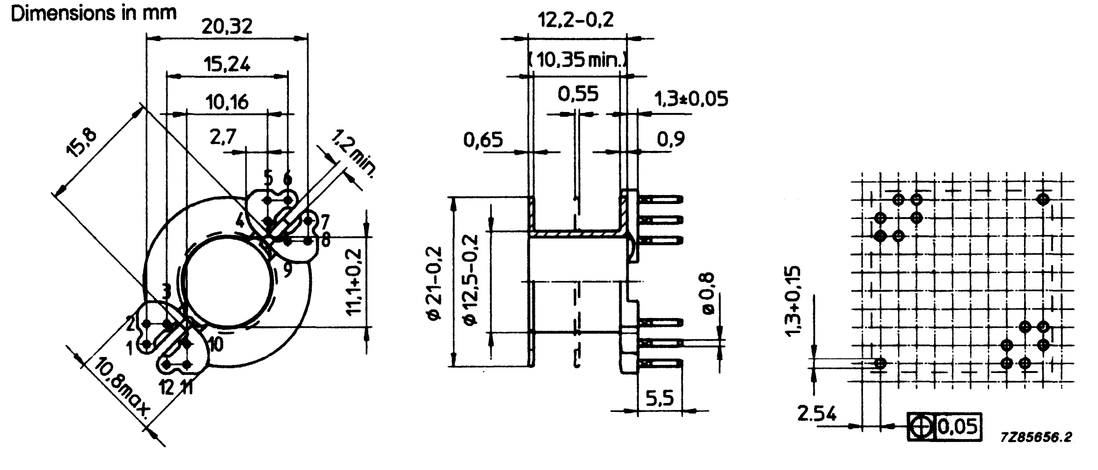


Fig.4 RM10, RM10/i coil former, 12 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	WINDING WIDTH (mm)	ORDERING CODE
1	5	3,4,6,9,10	43	10.4	4322 021 3472
1	8	1,3,4,6,7,9,10,12	43	10.4	4322 021 3473
1	10	1,3,4,5,6,7,8,9,10,12	43	10.4	4322 021 3474
1	11	1,2,3,4,5,6,7,8,10,11,12	43	10.4	4322 021 3475
1	12	all	43	10.4	4322 021 3476
2	5	3,4,6,9,10	2 x 20.5	2 x 4.9	4322 021 3477
2	8	1,3,4,6,7,9,10,12	2 x 20.5	2 x 4.9	4322 021 3478
2	10	1,3,4,5,6,7,8,9,10,12	2 x 20.5	2 x 4.9	4322 021 3479
2	11	1,2,3,4,5,6,7,8,10,11,12	2 x 20.5	2 x 4.9	4322 021 3480
2	12	all	2 x 20.5	2 x 4.9	4322 021 3481

DIL COIL FORMER DATA

Coil former material: polybutyleneterephthalate (PBT), glass reinforced, flame retardent in accordance with UL 94V-0
Pin material: CuSn, SnPb plated
Maximum operating temperature: 130 °C
Resistance to soldering heat: 400 °C, 2 s
Solderability: IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn: 52 mm

Dimensions in mm

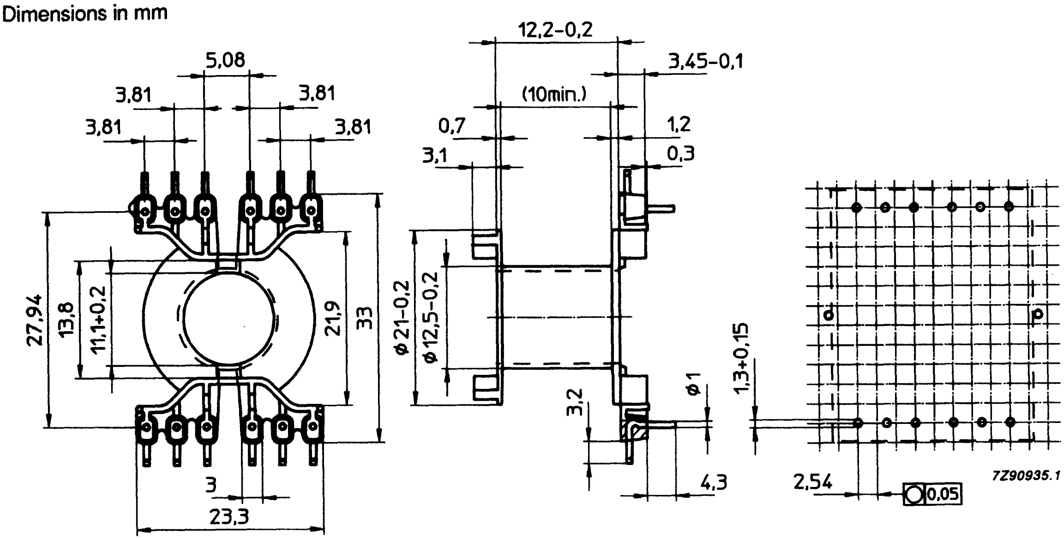


Fig.5 RM10/i coil former, 12 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	ORDERING CODE
1	12	all	44.2	10.0	4322 021 3406

RM cores and accessories RM10, RM10/i

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	6	4322 021 3432	clamping force ≈ 30 N each material: stainless steel, SnPb plated

Dimensions in mm

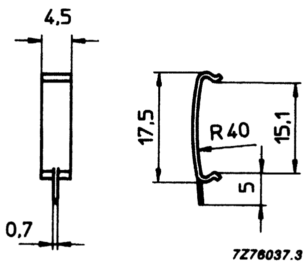


Fig.6 Mounting clip.

RM cores and accessories RM12/i

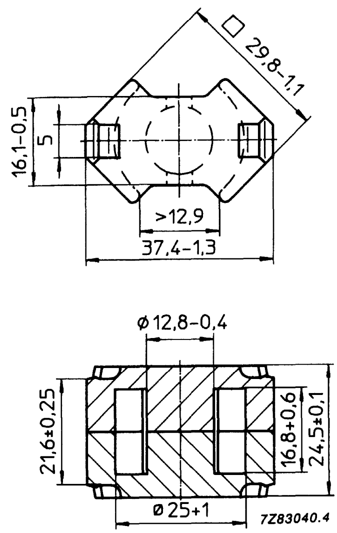


Fig.1 RM12/i core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.388	mm^{-1}
V_e	effective volume	8340	mm^3
l_e	effective length	56.6	mm
A_e	effective area	146	mm^2
A_{min}	minimum area	125	mm^2
	mass of set	≈ 45	g

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	160 ± 3%	≈ 49	≈ 1400	4322 025 0645
	250 ± 3%	≈ 77	≈ 800	4322 025 0646
	315 ± 5%	≈ 97	≈ 550	4322 025 0647
	400 ± 5%	≈ 123	≈ 450	4322 025 0648
	6200 ± 25%	≈ 1910	≈ 0	4322 025 0640
3C85	160 ± 3%	≈ 49	≈ 1400	4322 025 0605
	250 ± 3%	≈ 77	≈ 800	4322 025 0606
	315 ± 5%	≈ 97	≈ 550	4322 025 0607
	400 ± 5%	≈ 123	≈ 450	4322 025 0608
	5500 ± 25%	≈ 1700	≈ 0	4322 025 0600
3F3	160 ± 3%	≈ 49	≈ 1400	4322 025 0625
	250 ± 3%	≈ 77	≈ 800	4322 025 0626
	315 ± 5%	≈ 97	≈ 550	4322 025 0627
	400 ± 5%	≈ 123	≈ 450	4322 025 0628
	5050 ± 25%	≈ 1560	≈ 0	4322 025 0620

* clamping force 70 ± 20 N

RM cores and accessories RM12/I

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	9200 ± 25%	≈ 2850	4322 025 0670
3E4	13300 + 40/- 30%	≈ 4100	4322 025 0660

* clamping force 70 ± 20 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥315	≤2.35	–	-
3C85	≥315	≤1.30	≤1.50	-
3F3	≥315	–	≤0.92	≤1.60

DIL COIL FORMER DATA

Coil former material: polybutyleneterephthalate (PBT), glass reinforced, flame retardent in accordance with UL 94V-0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 130 °C

Resistance to soldering heat: 400 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Average length of turn: 61 mm

Dimensions in mm

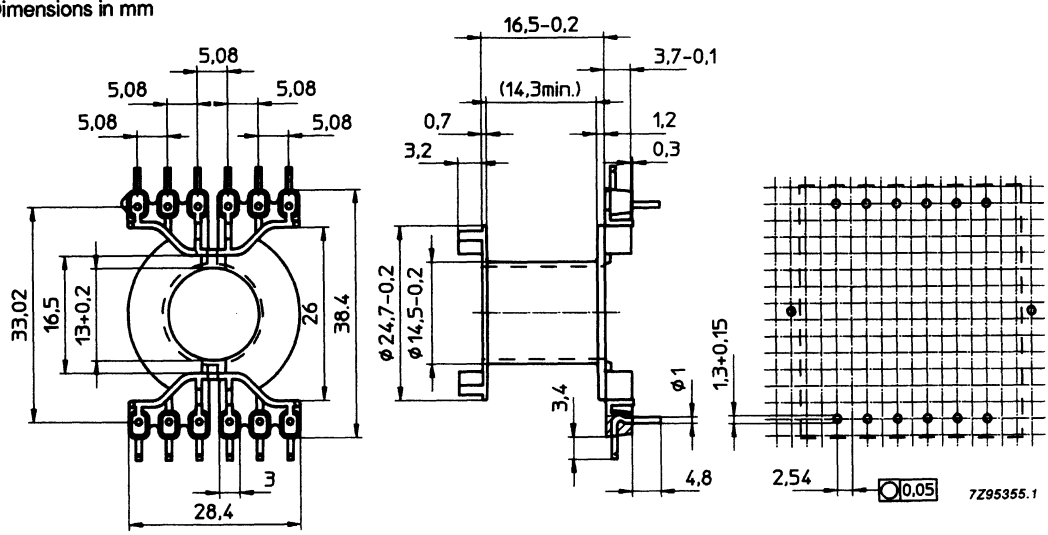


Fig.2 RM12/i DIL coil former, 12 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	ORDERING CODE
1	12	all	75.0	14.3	4322 021 3411

RM cores and accessories RM12/i

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	3	4322 021 3491	clamping force ≈ 35 N each material: stainless steel, SnPb plated

Dimensions in mm

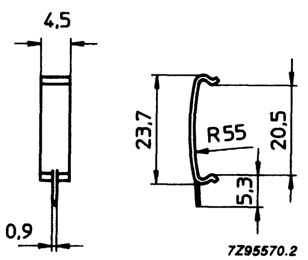


Fig.3 Mounting clip.

RM cores and accessories RM14/i

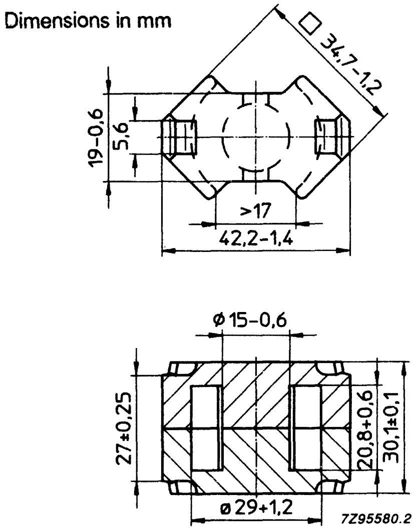


Fig.1 RM14/i core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.353	mm^{-1}
V_e	effective volume	13900	mm^3
l_e	effective length	70.0	mm
A_e	effective area	198	mm^2
A_{min}	minimum area	168	mm^2
	mass of set	≈ 74	g

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	250 ± 3%	≈ 70	≈ 950	4322 025 0386
	315 ± 3%	≈ 88	≈ 700	4322 025 0387
	400 ± 3%	≈ 112	≈ 550	4322 025 0388
	630 ± 5%	≈ 177	≈ 250	4322 025 0390
	1000 ± 5%	≈ 281	≈ 150	4322 025 0391
	7100 ± 25%	≈ 1990	≈ 0	4322 025 0380
3C85	250 ± 3%	≈ 70	≈ 950	4322 025 0316
	315 ± 3%	≈ 88	≈ 700	4322 025 0317
	400 ± 3%	≈ 112	≈ 550	4322 025 0318
	630 ± 5%	≈ 177	≈ 250	4322 025 0320
	1000 ± 5%	≈ 281	≈ 150	4322 025 0321
	6250 ± 25%	≈ 1750	≈ 0	4322 025 0300
3F3	250 ± 3%	≈ 70	≈ 950	4322 025 0366
	315 ± 3%	≈ 88	≈ 700	4322 025 0367
	400 ± 3%	≈ 112	≈ 550	4322 025 0368
	630 ± 5%	≈ 177	≈ 250	4322 025 0370
	1000 ± 5%	≈ 281	≈ 150	4322 025 0371
	5700 ± 25%	≈ 1600	≈ 0	4322 025 0360

* clamping force 80 ± 20 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥ 315	≤ 3.9	–	-
3C85	≥ 315	≤ 2.15	≤ 2.50	-
3F3	≥ 315	–	≤ 1.55	≤ 2.65

COIL FORMER DATA

Coil former material:	phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	180 °C
Resistance to soldering heat:	430 °C, 2 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	71 mm

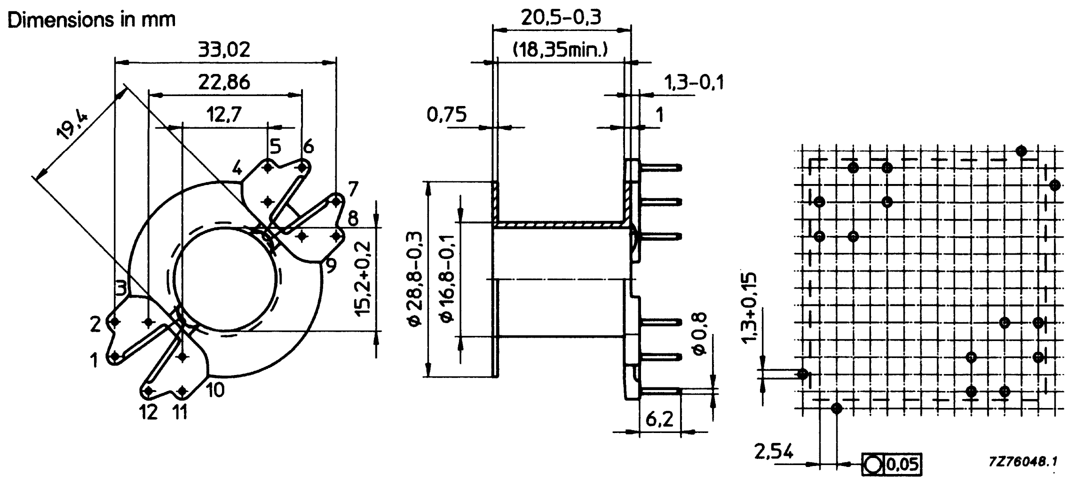


Fig.2 RM14/i coil former, 12 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	ORDERING CODE
1	10	1,2,3,4,6,7,9,10,11,12	112	18.4	4322 021 3352
1	12	all	112	18.4	4322 021 3353

RM cores and accessories | RM14/i

DIL COIL FORMER DATA

Coil former material:	polybutyleneterephthalate (PBT), glass reinforced, flame retardent in accordance with UL 94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	130 °C
Resistance to soldering heat:	400 °C, 2 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	71 mm

Dimensions in mm

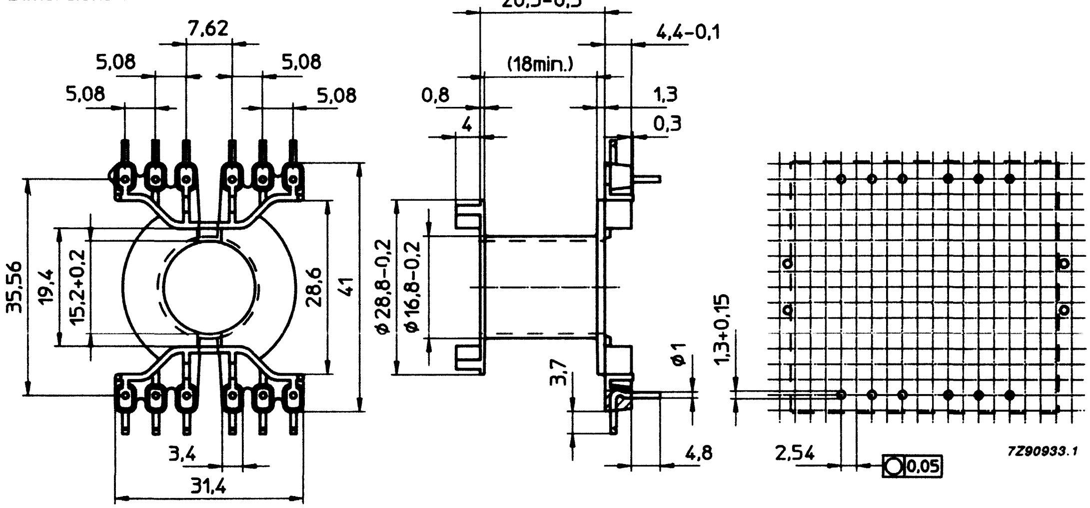


Fig.3 RM14/i DIL coil former,12 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	ORDERING CODE
1	12	all	111.0	18.0	4322 021 3407

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	4	4322 021 3492	clamping force ≈ 40 N each material: stainless steel, SnPb plated

Dimensions in mm

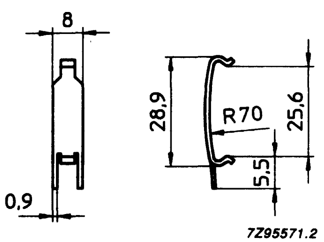


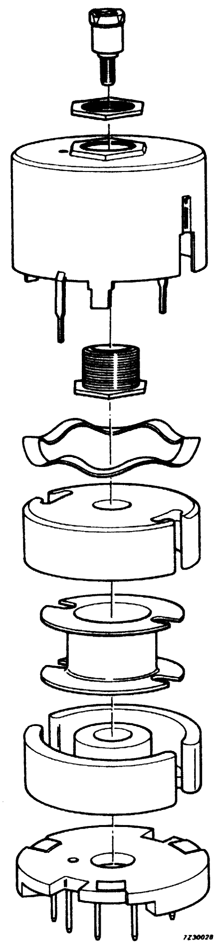
Fig.4 Mounting clip.

P cores and accessories
PH cores and accessories

Philips Components

Data sheet	
status	Product specification
date of issue	August 1990

P5.8/2.5 to P66/56
P cores and accessories
PH5.6 to PH26/9.2
PH cores and accessories



# P cores and accessories	P5.8/2.5

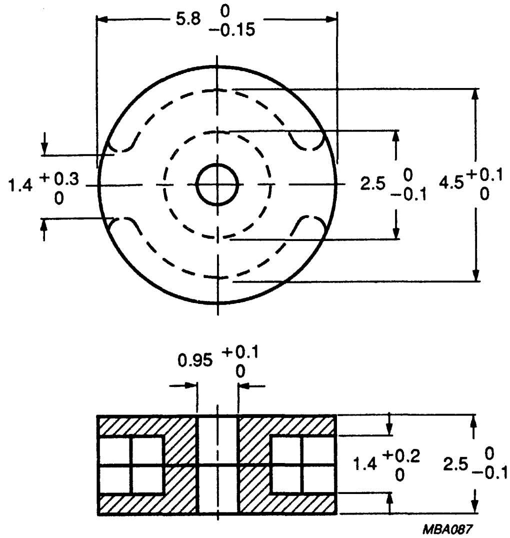


Fig.1 P5.8/2.5 core halves.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	1.39	mm^{-1}
V_e	effective volume	23.6	mm^3
l_e	effective length	5.73	mm
A_e	effective area	4.12	mm^2
A_{min}	minimum area	3.93	mm^2
	mass of set	≈ 0.2	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
3H1	800 ± 25%	≈ 880	≈ 0	–	4322 025 3100

* clamping force 15 ± 5 N

P cores and accessories P5.8/3.3

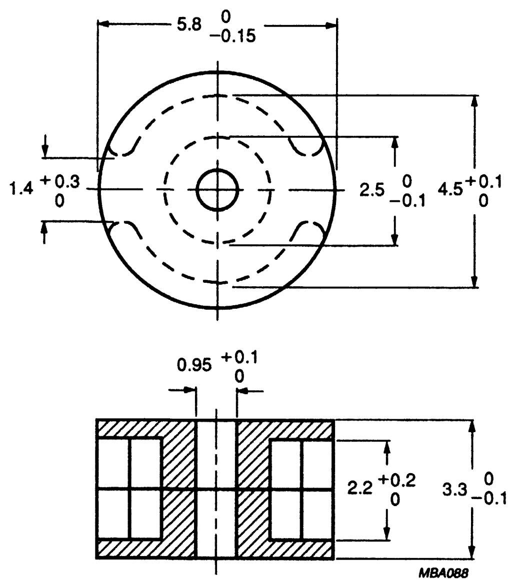


Fig.1 P5.8/3.3 core halves.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	1.68	mm^{-1}
V_e	effective volume	37.1	mm^3
l_e	effective length	7.90	mm
A_e	effective area	4.70	mm^2
A_{min}	minimum area	3.93	mm^2
	mass of set	≈ 0.25	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (µm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
3H1	750 ± 25%	≈ 1000	≈ 0	–	4322 025 3200

* clamping force 15 ± 5 N

P cores and accessories — P5.8/3.3

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

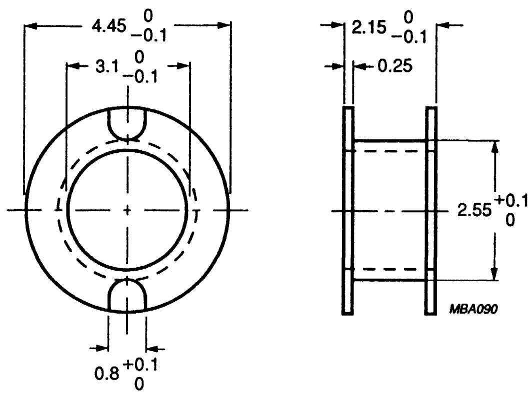


Fig.2 P5.8/3.3 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	1.1	1.45	11.7	4322 021 3355

P cores and accessories

P7.4/4.2

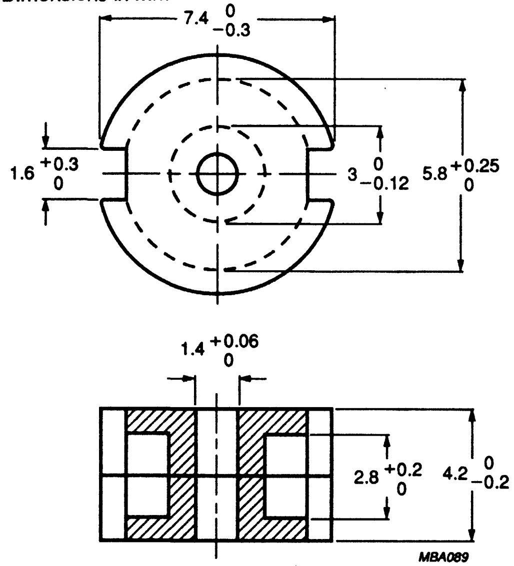


Fig.1 P7.4/4.2 core halves.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	1.43	mm^{-1}
V_e	effective volume	70.0	mm^3
l_e	effective length	10.0	mm
A_e	effective area	7.0	mm^2
A_{min}	minimum area	5.18	mm^2
	mass of set	≈ 0.5	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
3H1	63 ± 3%	≈ 70	≈ 200	–	4322 025 0703
	100 ± 3%	≈ 110	≈ 100	–	4322 025 0704
	970 ± 25%	≈ 1100	≈ 0	–	4322 025 0700

* clamping force 20 ± 5 N

P cores and accessories | P7.4/4.2

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

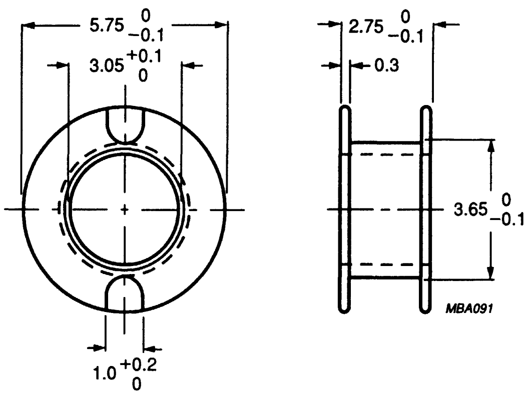


Fig.2 P7.4/4.2 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	2.2	1.95	14.6	4322 021 3299

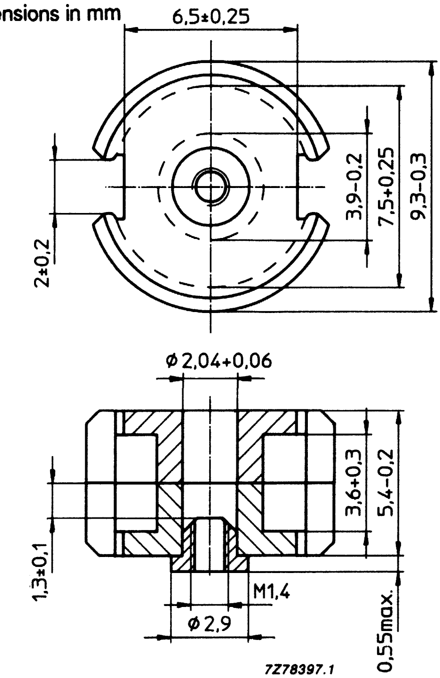


Fig.1 P9/5 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	1.24	mm^{-1}
V_e	effective volume	126	mm^3
l_e	effective length	12.5	mm
A_e	effective area	10.1	mm^2
A_{min}	minimum area	8.0	mm^2
	mass of set	≈ 0.8	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
4C6	16 ± 3%	≈ 16	≈ 1100	4322 022 6180	4322 022 4180
	25 ± 3%	≈ 25	≈ 500	4322 022 6181	4322 022 4181
	40 ± 3%	≈ 40	≈ 300	4322 022 6182	4322 022 4182
	100 ± 25%	≈ 100	≈ 0	–	4322 022 4179
3D3	40 ± 3%	≈ 40	≈ 400	4322 022 6142	4322 022 4142
	63 ± 3%	≈ 63	≈ 200	4322 022 6143	4322 022 4143
	630 ± 25%	≈ 630	≈ 0	–	4322 022 4140
3H1	63 ± 3%	≈ 63	≈ 200	4322 022 6123	4322 022 4123
	100 ± 3%	≈ 100	≈ 120	4322 022 6124	4322 022 4124
	160 ± 3%	≈ 160	≈ 70	4322 022 6125	4322 022 4125
	1260 ± 25%	≈ 1260	≈ 0	–	4322 022 4120

* clamping force 25 ± 5 N

P cores and accessories P9/5

Dimensions in mm

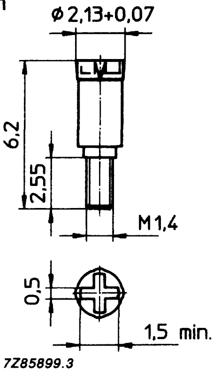


Fig.2 P9/5 inductance adjuster.

INDUCTANCE ADJUSTERS - GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3981	brown
4322 021 3984	yellow
4322 021 3985	green
4322 021 3989	grey

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1	63	4322 021 3985	11	4322 021 3984	18	4322 021 3981	35
	100	4322 021 3985	7	4322 021 3984	11	4322 021 3981	22
	160	4322 021 3984	9	4322 021 3981	14	4322 021 3989	15
	250	4322 021 3984	6	4322 021 3989	10	-	
4C6	16	-		4322 021 3985	15	4322 021 3984	27
	25	-		4322 021 3985	16	4322 021 3984	27
	40	4322 021 3985	7	4322 021 3984	11	-	

P cores and accessories P9/5

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

Dimensions in mm

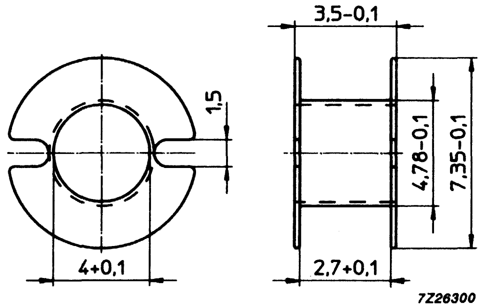


Fig.3 P9/5 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	3.4	2.7	19	4322 021 3170

P cores and accessories P11/7

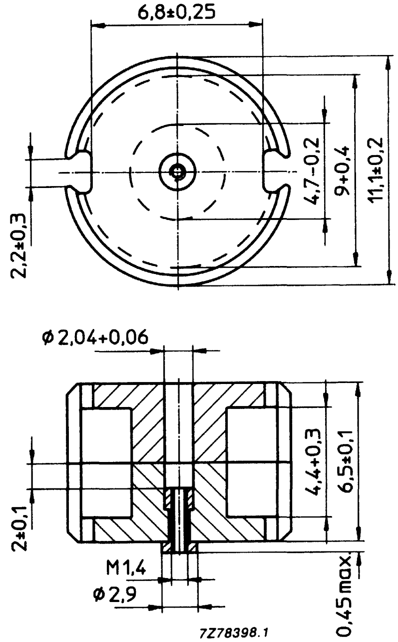


Fig.1 P11/7 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	0.956	mm^{-1}
V_e	effective volume	251	mm^3
l_e	effective length	15.5	mm
A_e	effective area	16.2	mm^2
A_{min}	minimum area	13.3	mm^2
	mass of set	≈ 1.8	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
4C6	25 ± 3%	≈ 19	≈ 1000	4322 022 2181	4322 022 0181
	40 ± 3%	≈ 31	≈ 400	4322 022 2182	4322 022 0182
	120 ± 25%	≈ 100	≈ 0	–	4322 022 0179
3D3	63 ± 3%	≈ 48	≈ 350	4322 022 2143	4322 022 0143
	100 ± 3%	≈ 76	≈ 200	4322 022 2144	4322 022 0144
	800 ± 25%	≈ 610	≈ 0	–	4322 022 0139
3H3	160 ± 3%	≈ 122	≈ 110	4322 022 2155	4322 022 0155
	250 ± 3%	≈ 190	≈ 70	4322 022 2156	4322 022 0156
	1650 ± 25%	≈ 1250	≈ 0	–	4322 022 0150
3H1	160 ± 3%	≈ 122	≈ 110	4322 022 2125	4322 022 0125
	250 ± 3%	≈ 190	≈ 70	4322 022 2126	4322 022 0126
	1800 ± 25%	≈ 1360	≈ 0	–	4322 022 0120

* clamping force 35 ± 10 N

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	100 ± 3%	≈ 76	≈ 200	4322 022 0190
	160 ± 3%	≈ 122	≈ 110	4322 022 0191
	250 ± 3%	≈ 190	≈ 70	4322 022 0192
	1800 ± 25%	≈ 1370	≈ 0	4322 022 0188
3F3	100 ± 3%	≈ 76	≈ 200	4322 022 0171
	160 ± 3%	≈ 122	≈ 110	4322 022 0172
	250 ± 3%	≈ 190	≈ 70	4322 022 0173
	1550 ± 25%	≈ 1170	≈ 0	4322 022 0169

* clamping force 35 ± 10 N

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	2800 ± 25%	≈ 2150	4322 022 0166
3E4	4100 + 40/- 30%	≈ 3100	4322 022 0164

* clamping force 35 ± 10 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥ 315	≤ 0.07	–	–
3F3	≥ 315	–	≤ 0.03	≤ 0.05

P cores and accessories P11/7

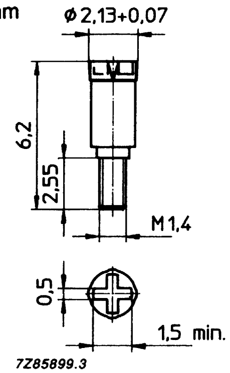


Fig.2 P11/7 inductance adjuster.

INDUCTANCE ADJUSTERS – GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3981	brown
4322 021 3984	yellow
4322 021 3985	green
4322 021 3989	grey

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1,	100	4322 021 3985	7	4322 021 3984	13	4322 021 3981	24
3H3	160	4322 021 3984	7	4322 021 3981	15	4322 021 3989	22
	250	4322 021 3981	10	4322 021 3989	14	–	
3D3	16	4322 021 3985	12	4322 021 3984	19	–	
	25	–		4322 021 3985	18	4322 021 3984	27
	40	–		4322 021 3985	15	4322 021 3984	24
	63	4322 021 3985	10	4322 021 3984	18	–	
	100	4322 021 3985	6	4322 021 3984	11	–	
4C6	16	–		4322 021 3985	13	4322 021 3984	19
	25	–		4322 021 3985	15	4322 021 3984	22
	40	4322 021 3985	9	4322 021 3984	16	–	

P cores and accessories | P11/7

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

Dimensions in mm

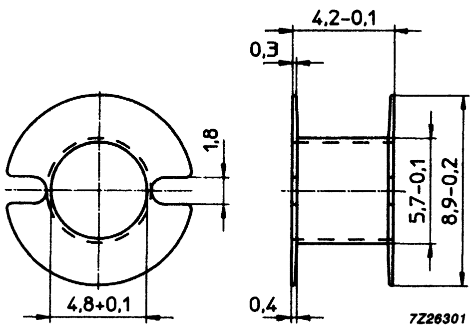


Fig.3 P11/7 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	5.5	3.2	23	4322 021 3024

P cores and accessories P11/7

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS	
Tag plate (4 pins)	4	4322 021 3018	**Material:**	phenolformaldehyde (PF), glass reinforced
			Flammability:	in accordance with UL94V-0
			Maximum operating temperature:	180 °C
			Pins:	CuSn, SnPb plated
Container	5	4322 021 3051	**Material:**	nickel plated brass
			Earth pins:	presoldered
Spring	6	4322 021 3062	**Material:**	NiCr steel
			Spring force:	≈ 35 N when mounted

Dimensions in mm

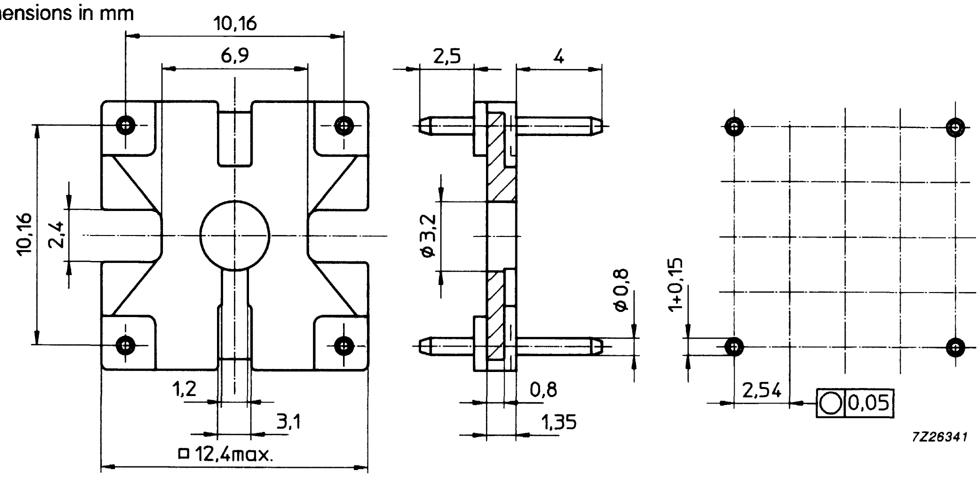


Fig.4 P11/7 tag plate.

P cores and accessories P11/7

Dimensions in mm

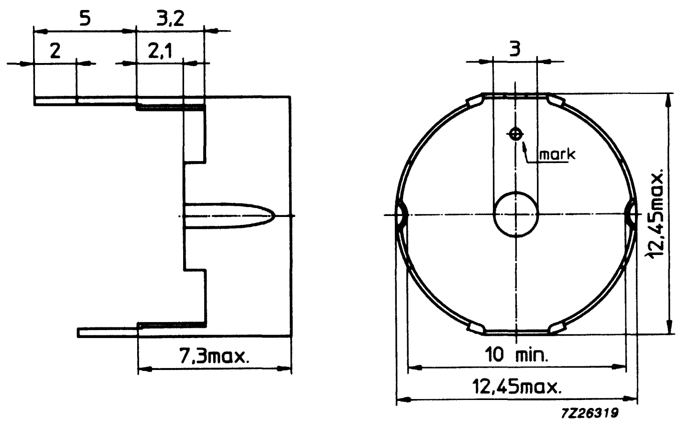


Fig. 5 P11/7 container.

Dimensions in mm

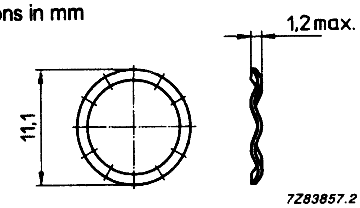


Fig. 6 P11/7 spring.

P cores and accessories P14/8

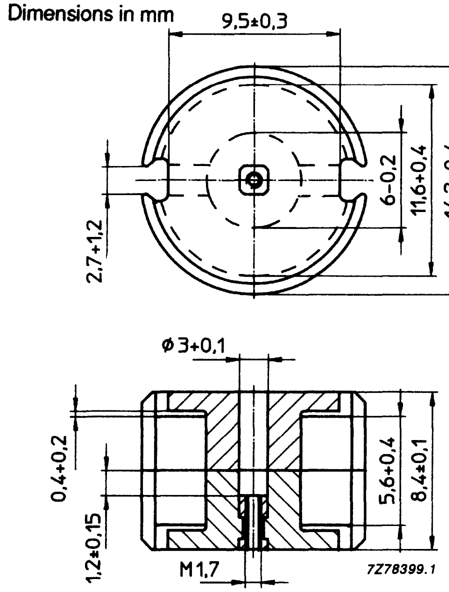


Fig.1 P14/8 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.789	mm^{-1}
V_e	effective volume	495	mm^3
l_e	effective length	19.8	mm
A_e	effective area	25.1	mm^2
A_{min}	minimum area	19.8	mm^2
	mass of set	≈ 3.2	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
4C6	25 ± 3%	≈ 16	≈ 1700	4322 022 2381	4322 022 0381
	40 ± 3%	≈ 25	≈ 800	4322 022 2382	4322 022 0382
	63 ± 3%	≈ 40	≈ 350	4322 022 2383	4322 022 0383
	160 ± 25%	≈ 100	≈ 0	−	4322 022 0380
3D3	63 ± 3%	≈ 40	≈ 550	4322 022 2343	4322 022 0343
	100 ± 3%	≈ 63	≈ 300	4322 022 2344	4322 022 0344
	1000 ± 25%	≈ 630	≈ 0	−	4322 022 0340
3H3	160 ± 3%	≈ 100	≈ 180	4322 022 2355	4322 022 0355
	250 ± 3%	≈ 157	≈ 110	4322 022 2356	4322 022 0356
	315 ± 3%	≈ 198	≈ 80	4322 022 2357	4322 022 0357
	400 ± 3%	≈ 252	≈ 60	4322 022 2358	4322 022 0358
	2150 ± 25%	≈ 1350	≈ 0	−	4322 022 0360
3H1	160 ± 3%	≈ 100	≈ 180	4322 022 2325	4322 022 0325
	250 ± 3%	≈ 157	≈ 110	4322 022 2326	4322 022 0326
	315 ± 3%	≈ 198	≈ 80	4322 022 2327	4322 022 0327
	400 ± 3%	≈ 252	≈ 60	4322 022 2328	4322 022 0328
	2350 ± 25%	≈ 1480	≈ 0	−	4322 022 0321

* clamping force 60 ± 20 N

P cores and accessories P14/8

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	160 ± 3%	≈ 100	≈ 180	4322 022 0385
	250 ± 3%	≈ 157	≈ 110	4322 022 0386
	315 ± 3%	≈ 198	≈ 80	4322 022 0387
	400 ± 3%	≈ 252	≈ 60	4322 022 0388
	2350 ± 25%	≈ 1480	≈ 0	4322 022 0397
3C85	160 ± 3%	≈ 100	≈ 180	4322 022 0367
	250 ± 3%	≈ 157	≈ 110	4322 022 0368
	315 ± 3%	≈ 198	≈ 80	4322 022 0369
	400 ± 3%	≈ 252	≈ 60	4322 022 0370
	2150 ± 25%	≈ 1350	≈ 0	4322 022 0366
3F3	160 ± 3%	≈ 100	≈ 180	4322 022 0393
	250 ± 3%	≈ 157	≈ 110	4322 022 0394
	315 ± 3%	≈ 198	≈ 80	4322 022 0395
	400 ± 3%	≈ 252	≈ 60	4322 022 0396
	2000 ± 25%	≈ 1250	≈ 0	4322 022 0392

* clamping force 60 ± 20 N

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	3700 ± 25%	≈ 2350	4322 022 0379
3E4	5300 + 40/- 30%	≈ 3300	4322 022 0377

* clamping force 60 ± 20 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥ 315	≤ 0.15	–	–
3C85	≥ 315	≤ 0.08	≤ 0.10	
3F3	≥ 315	–	≤ 0.06	≤ 0.10

P cores and accessories P14/8

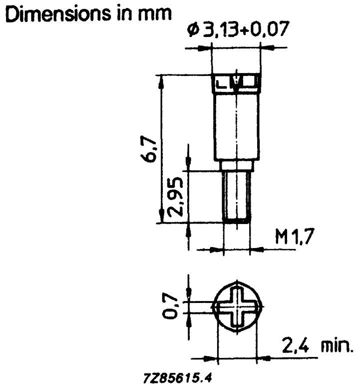


Fig.2 P14/8 inductance adjuster.

INDUCTANCE ADJUSTERS – GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3970	black
4322 021 3971	brown
4322 021 3972	red
4322 021 3973	orange
4322 021 3974	yellow
4322 021 3975	green
4322 021 3978	white
4322 021 3979	grey

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1, 3H3	100	4322 021 3975	9	4322 021 3973	14	4322 021 3974	19
	160	4322 021 3972	11	4322 021 3978	17	4322 021 3971	23
	250	4322 021 3978	11	4322 021 3971	15	4322 021 3970	19
	315	4322 021 3978	9	4322 021 3970	15	4322 021 3979	19
	400	4322 021 3971	9	4322 021 3979	15	–	
	630	4322 021 3971	6	4322 021 3979	10	–	
3D3	40	–		4322 021 3975	16	4322 021 3973	24
	63	–		4322 021 3975	13	4322 021 3973	20
	100	4322 021 3973	11	4322 021 3974	15	–	
4C6	25	–		4322 021 3975	16	4322 021 3973	20
	40	4322 021 3975	12	4322 021 3973	18	4322 021 3972	22
	63	4322 021 3973	10	4322 021 3972	3	–	

P cores and accessories P14/8

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

Dimensions in mm

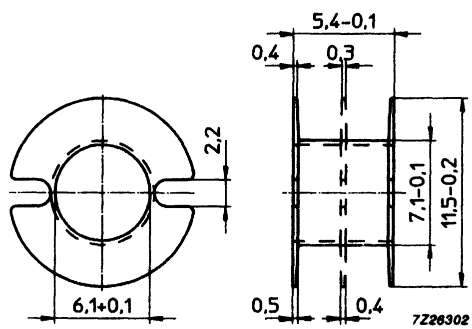


Fig.3 P14/8 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	9.7	4.2	29	4322 021 3025
2	2 x 4.5	2 x 1.9	29	4322 021 3026

P cores and accessories P14/8

COIL FORMER DATA

Coil former material: phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL94V-0

Pin material: CuZn, SnPb plated

Maximum operating temperature: 180 °C

Resistance to soldering heat: 430 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

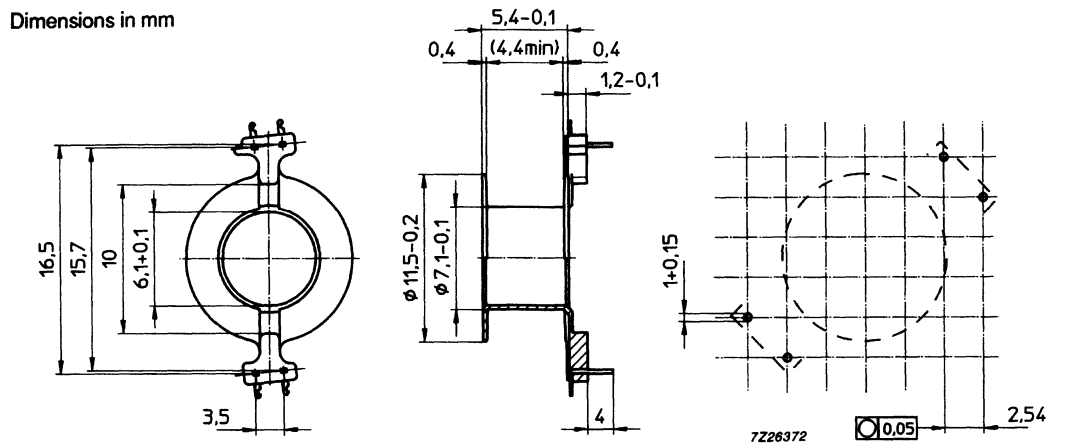


Fig.4 P14/8 coil former with pins.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	9.7	4.2	29	4322 021 3007

P cores and accessories P14/8

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS	
Tag plate	5	4322 021 3044	**Material:** **Flammability:** **Maximum operating temperature:** **Pins:**	phenolformaldehyde (PF) glass reinforced in accordance with UL94V-0 180 °C CuSn, SnPb plated
Container	6	4322 021 3052	**Material:** **Earth pins:**	nickel plated brass presoldered
Spring	7	4322 021 3063	**Material:** **Spring force:**	NiCr steel ≈ 60 N when mounted

Dimensions in mm

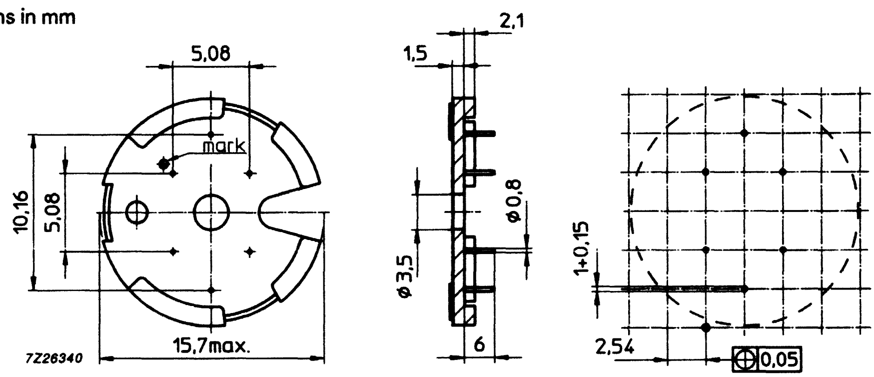


Fig.5 P14/8 tag plate.

P cores and accessories

P14/8

Dimensions in mm

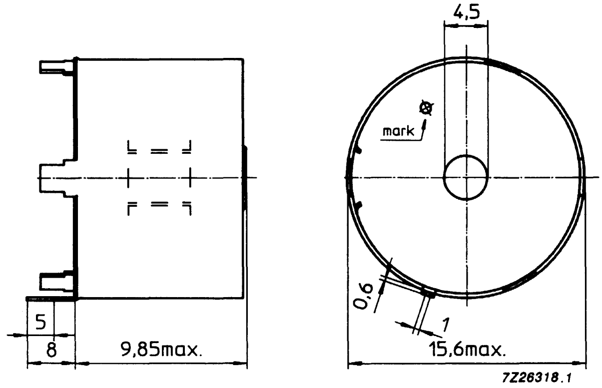


Fig.6 P14/8 container.

Dimensions in mm

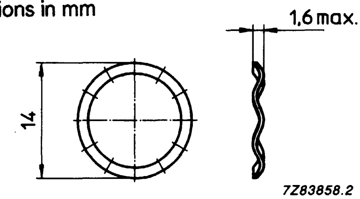


Fig.7 P14/8 spring.

P cores and accessories

P18/11

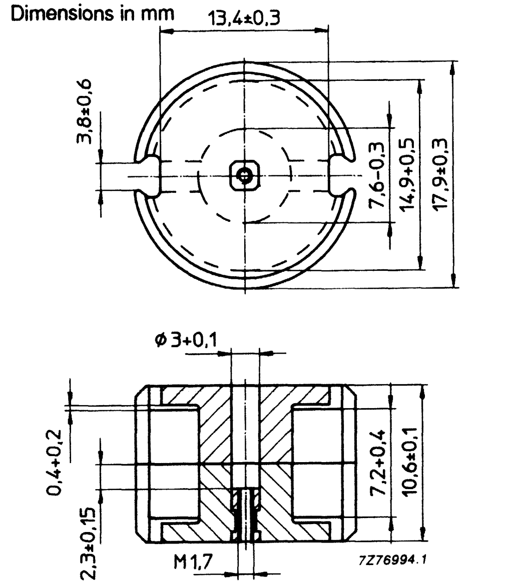


Fig.1 P18/11 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.597	mm^{-1}
V_e	effective volume	1120	mm^3
l_e	effective length	25.8	mm
A_e	effective area	43.3	mm^2
A_{min}	minimum area	36.1	mm^2
	mass of set	≈ 6.0	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
4C6	25 ± 3%	≈ 12	≈ 3500	4322 022 2581	4322 022 0581
	40 ± 3%	≈ 19	≈ 1800	4322 022 2582	4322 022 0582
	63 ± 3%	≈ 30	≈ 750	4322 022 2583	4322 022 0583
	210 ± 25%	≈ 100	≈ 0	–	4322 022 0580
3D3	63 ± 3%	≈ 30	≈ 1100	4322 022 2543	4322 022 0543
	100 ± 3%	≈ 48	≈ 550	4322 022 2544	4322 022 0544
	160 ± 3%	≈ 76	≈ 300	4322 022 2545	4322 022 0545
	1400 ± 25%	≈ 670	≈ 0	–	4322 022 0540
3H3	160 ± 3%	≈ 76	≈ 350	4322 022 2555	4322 022 0555
	250 ± 3%	≈ 119	≈ 200	4322 022 2556	4322 022 0556
	315 ± 3%	≈ 149	≈ 150	4322 022 2557	4322 022 0557
	400 ± 3%	≈ 190	≈ 120	4322 022 2558	4322 022 0558
	3100 ± 25%	≈ 1470	≈ 0	–	4322 022 0550
3H1	160 ± 3%	≈ 76	≈ 350	4322 022 2525	4322 022 0525
	250 ± 3%	≈ 119	≈ 200	4322 022 2526	4322 022 0526
	315 ± 3%	≈ 149	≈ 150	4322 022 2527	4322 022 0527
	400 ± 3%	≈ 190	≈ 120	4322 022 2528	4322 022 0528
	3400 ± 25%	≈ 1620	≈ 0	–	4322 022 0521

* clamping force 80 ± 20 N

P cores and accessories P18/11

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	160 ± 3%	≈ 76	≈ 350	4322 022 0591
	250 ± 3%	≈ 119	≈ 200	4322 022 0592
	315 ± 3%	≈ 149	≈ 150	4322 022 0590
	400 ± 3%	≈ 190	≈ 120	4322 022 0594
	3400 ± 25%	≈ 1620	≈ 0	4322 022 0577
3C85	160 ± 3%	≈ 76	≈ 350	4322 022 0586
	250 ± 3%	≈ 119	≈ 200	4322 022 0587
	315 ± 3%	≈ 149	≈ 150	4322 022 0588
	400 ± 3%	≈ 190	≈ 120	4322 022 0589
	3100 ± 25%	≈ 1470	≈ 0	4322 022 0578
3F3	160 ± 3%	≈ 76	≈ 350	4322 022 0568
	250 ± 3%	≈ 119	≈ 200	4322 022 0569
	315 ± 3%	≈ 149	≈ 150	4322 022 0570
	400 ± 3%	≈ 190	≈ 120	4322 022 0571
	2850 ± 25%	≈ 1350	≈ 0	4322 022 0566

* clamping force 80 ± 20 N

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	5400 ± 25%	≈ 2600	4322 022 0547
3E4	7550 + 40/- 30%	≈ 3600	4322 022 0579

* clamping force 100 ± 20 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥ 315	≤ 0.35	–	–
3C85	≥ 315	≤ 0.18	≤ 0.22	–
3F3	≥ 315	–	≤ 0.13	≤ 0.22

P cores and accessories | P18/11

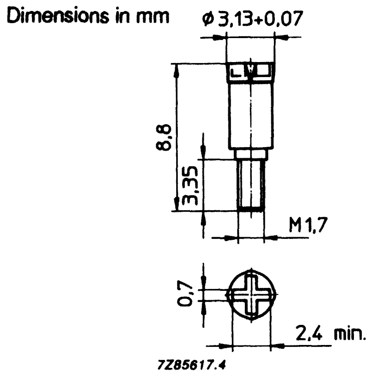


Fig.2 P18/11 inductance adjuster.

INDUCTANCE ADJUSTERS – GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3960	black
4322 021 3961	brown
4322 021 3962	red
4322 021 3963	orange
4322 021 3964	yellow
4322 021 3965	green
4322 021 3967	violet
4322 021 3968	white

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1, 3H3	63	4322 021 3965	12	4322 021 3964	17	4322 021 3963	20
	100	4322 021 3965	9	4322 021 3963	15	4322 021 3961	29
	160	4322 021 3964	9	4322 021 3962	18	4322 021 3961	28
	250	4322 021 3962	12	4322 021 3968	14	4322 021 3961	18
	315	4322 021 3962	9	4322 021 3961	14	4322 021 3967	20
	400	4322 021 3968	9	4322 021 3967	16	4322 021 3960	24
	630	4322 021 3967	10	4322 021 3960	15	–	
	1000	4322 021 3967	6	4322 021 3960	10	–	
	1250	–		4322 021 3960	8	–	
3D3	40	–		4322 021 3965	15	4322 021 3964	20
	63	4322 021 3965	13	4322 021 3964	17	4322 021 3963	20
	100	4322 021 3965	9	4322 021 3963	14	4322 021 3962	24
	160	4322 021 3963	8	4322 021 3962	15	–	
4C6	25	4322 021 3965	13	4322 021 3964	15	4322 021 3963	19
	40	4322 021 3965	13	4322 021 3964	17	4322 021 3963	20
	63	4322 021 3965	8	4322 021 3963	12	–	

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

Dimensions in mm

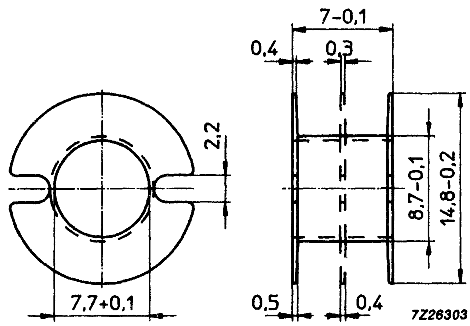


Fig.3 P18/11 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	18	5.8	37	4322 021 3027
2	2 x 8.7	2 x 2.6	37	4322 021 3028
3	3 x 5.4	3 x 1.6	37	4322 021 3029

COIL FORMER DATA

Coil former material: phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL94V-0

Pin material: CuZn, SnPb plated

Maximum operating temperature: 180 °C

Resistance to soldering heat: 430 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Dimensions in mm

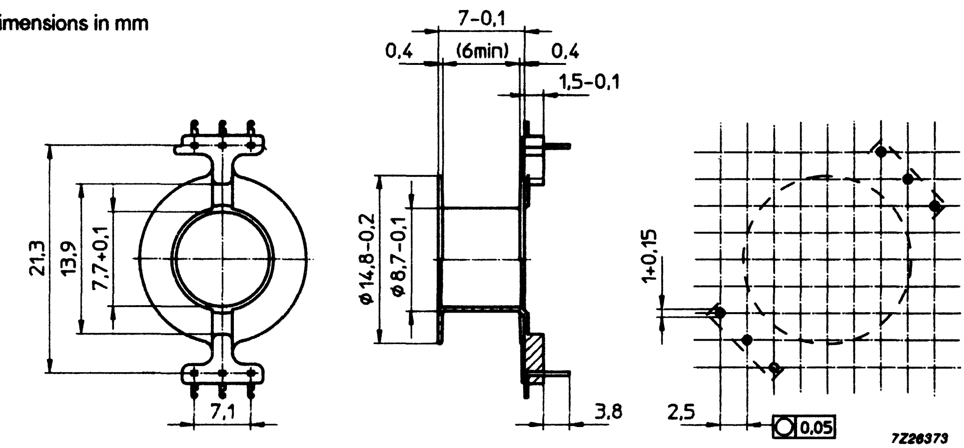


Fig.4 P18/11 coil former with pins.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	18	5.8	37	4322 021 3009

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS	
Tag plate (8 pins)	5	4322 021 3045	**Material:**	phenolformaldehyde (PF), glass reinforced
			Flammability:	in accordance with UL94V-0
			Maximum operating temperature:	180 °C
			Pins:	CuSn, SnPb plated
Container	6	4322 021 3053	**Material:**	nickel plated brass
			Earth pins:	presoldered
Spring	7	4322 021 3064	**Material:**	NiCr steel
			Spring force:	≈ 100 N when mounted
Nut	8	4322 021 3071	**Material:**	nickel plated brass
Bush	9	4322 021 3072	**Material:**	nickel plated brass

Dimensions in mm

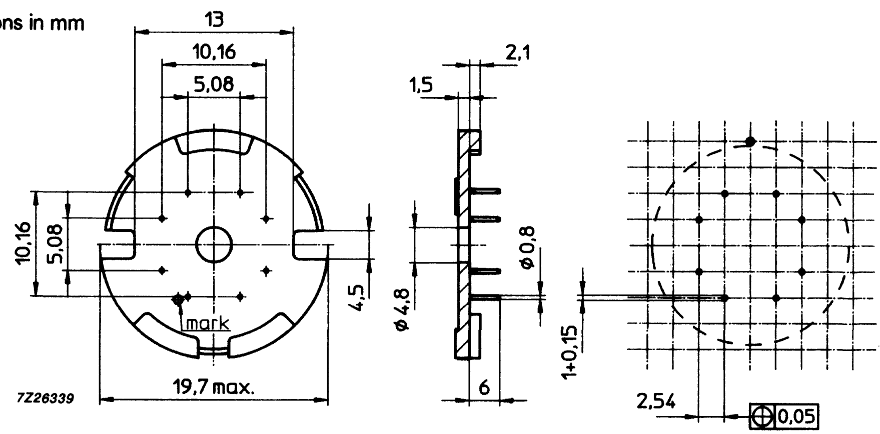


Fig.5 P18/11 tag plate.

P cores and accessories
P18/11

Dimensions in mm

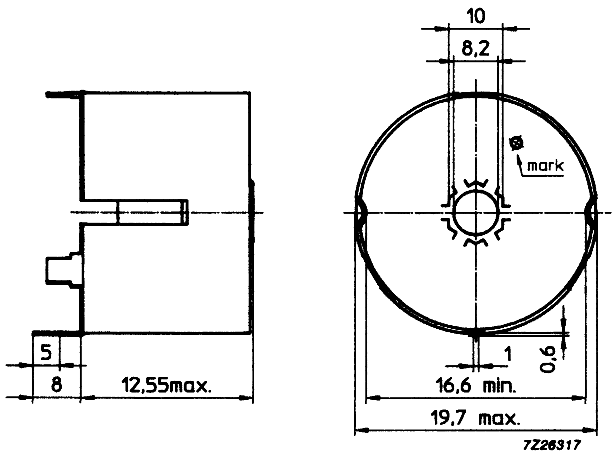


Fig.6 P18/11 container.

Dimensions in mm

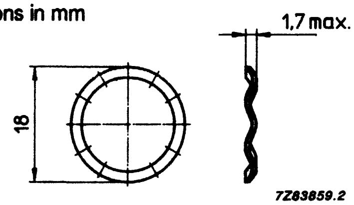


Fig.7 P18/11 spring.

Dimensions in mm

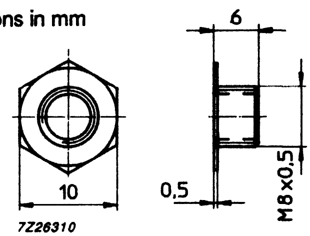


Fig.9 P18/11 bush.

Dimensions in mm

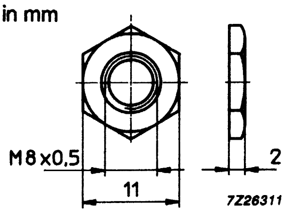


Fig.8 P18/11 nut.

P cores and accessories

P22/13

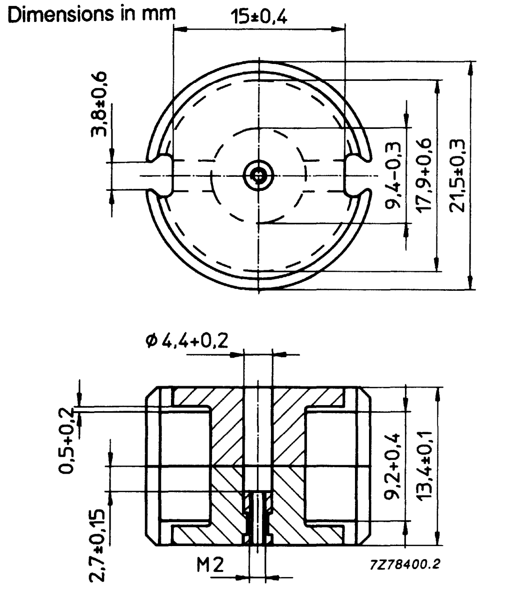


Fig.1 P22/13 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	0.497	mm^{-1}
V_e	effective volume	2000	mm^3
l_e	effective length	31.5	mm
A_e	effective area	63.4	mm^2
A_{min}	minimum area	51.3	mm^2
	mass of set	≈ 12	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
4C6	25 ± 3%	≈ 10	≈ 5600	4322 022 2781	4322 022 0781
	40 ± 3%	≈ 16	≈ 2900	4322 022 2782	4322 022 0782
	63 ± 3%	≈ 25	≈ 1400	4322 022 2783	4322 022 0783
	250 ± 25%	≈ 100	≈ 0	–	4322 022 0779
3D3	100 ± 3%	≈ 40	≈ 900	4322 022 2744	4322 022 0744
	160 ± 3%	≈ 64	≈ 500	4322 022 2745	4322 022 0745
	1700 ± 25%	≈ 670	≈ 0	–	4322 022 0740
3H3	160 ± 3%	≈ 64	≈ 500	4322 022 2755	4322 022 0755
	250 ± 3%	≈ 99	≈ 300	4322 022 2756	4322 022 0756
	315 ± 3%	≈ 125	≈ 250	4322 022 2757	4322 022 0757
	400 ± 3%	≈ 158	≈ 170	4322 022 2758	4322 022 0758
	630 ± 3%	≈ 249	≈ 100	4322 022 2760	4322 022 0760
	3900 ± 25%	≈ 1540	≈ 0	–	4322 022 0759
3H1	160 ± 3%	≈ 64	≈ 500	4322 022 2725	4322 022 0725
	250 ± 3%	≈ 99	≈ 300	4322 022 2726	4322 022 0726
	315 ± 3%	≈ 125	≈ 250	4322 022 2727	4322 022 0727
	400 ± 3%	≈ 158	≈ 170	4322 022 2728	4322 022 0728
	630 ± 3%	≈ 249	≈ 100	4322 022 2730	4322 022 0730
	4300 ± 25%	≈ 1700	≈ 0	–	4322 022 0720

* clamping force 140 ± 30 N

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	160 ± 3%	≈ 64	≈ 500	4322 022 0791
	250 ± 3%	≈ 99	≈ 300	4322 022 0792
	315 ± 3%	≈ 125	≈ 250	4322 022 0793
	400 ± 3%	≈ 158	≈ 170	4322 022 0794
	630 ± 3%	≈ 249	≈ 100	4322 022 0795
	4300 ± 25%	≈ 1700	≈ 0	4322 022 0797
3C85	160 ± 3%	≈ 64	≈ 500	4322 022 0785
	250 ± 3%	≈ 99	≈ 300	4322 022 0786
	315 ± 3%	≈ 125	≈ 250	4322 022 0787
	400 ± 3%	≈ 158	≈ 170	4322 022 0788
	630 ± 3%	≈ 249	≈ 100	4322 022 0789
	3900 ± 25%	≈ 1540	≈ 0	4322 022 0777
3F3	160 ± 3%	≈ 64	≈ 500	4322 022 0765
	250 ± 3%	≈ 99	≈ 300	4322 022 0766
	315 ± 3%	≈ 125	≈ 250	4322 022 0767
	400 ± 3%	≈ 158	≈ 170	4322 022 0768
	630 ± 3%	≈ 249	≈ 100	4322 022 0769
	3550 ± 25%	≈ 1410	≈ 0	4322 022 0764

* clamping force 140 ± 30 N

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	6900 ± 25%	≈ 2700	4322 022 0772
3E4	9450 + 40/- 30%	≈ 3740	4322 022 0773

* clamping force 140 ± 30 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥ 315	≤ 0.56	–	–
3C85	≥ 315	≤ 0.32	≤ 0.38	–
3F3	≥ 315	–	≤ 0.22	≤ 0.40

P cores and accessories P22/13

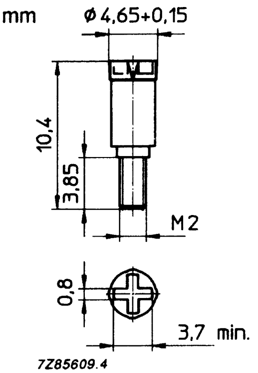


Fig.2 P22/13 inductance adjuster.

INDUCTANCE ADJUSTERS - GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3840	black
4322 021 3841	brown
4322 021 3842	red
4322 021 3843	orange
4322 021 3844	yellow
4322 021 3845	green
4322 021 3848	white
4322 021 3849	grey

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1, 3H3	100	4322 021 3845	12	4322 021 3842	16	4322 021 3843	21
	160	4322 021 3842	11	4322 021 3844	18	4322 021 3848	28
	250	4322 021 3844	11	4322 021 3848	18	4322 021 3849	23
	315	4322 021 3844	9	4322 021 3849	18	4322 021 3841	22
	400	4322 021 3848	12	4322 021 3841	17	4322 021 3840	28
	630	4322 021 3841	11	4322 021 3840	18	–	
	1000	4322 021 3841	7	4322 021 3840	11	–	
	1250	4322 021 3841	5	4322 021 3840	9	–	
3D3	40	–		4322 021 3845	19	4322 021 3843	27
	63	–		4322 021 3845	16	4322 021 3843	25
	100	4322 021 3845	12	4322 021 3842	16	4322 021 3844	27
	160	4322 021 3842	10	4322 021 3844	17	4322 021 3849	28
	250	4322 021 3844	11	4322 021 3849	18	–	
4C6	25	4322 021 3845	14	4322 021 3842	16	–	
	40	–		4322 021 3845	16	4322 021 3843	24
	63	4322 021 3845	10	4322 021 3842	15	4322 021 3843	19
	100	4322 021 3845	6	4322 021 3843	10	4322 021 3848	20

P cores and accessories

P22/13

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

Dimensions in mm

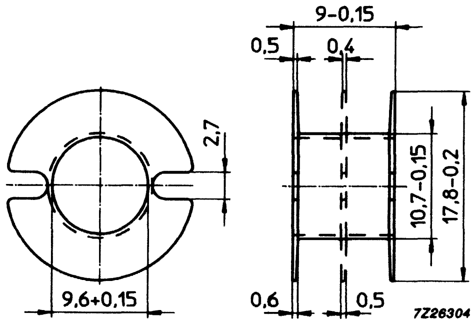


Fig.3 P22/13 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	28	7.5	44	4322 021 3030
2	2 x 13	2 x 3.5	44	4322 021 3031
3	3 x 8.2	3 x 2.1	44	4322 021 3032

P cores and accessories **P22/13**

COIL FORMER DATA

Coil former material:	phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL94V-0
Pin material:	CuZn, SnPb plated
Maximum operating temperature:	180 °C
Resistance to soldering heat:	430 °C, 2 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1

Dimensions in mm

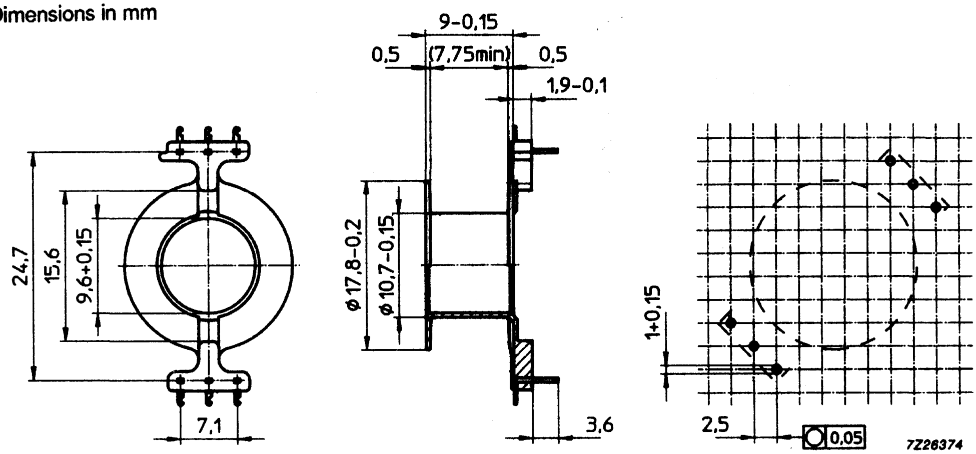


Fig.4 P22/13 coil former with pins.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	28	7.5	44	4322 021 3011

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS	
Tag plate (8 pins)	5	4322 021 3046	**Material:**	phenolformaldehyde (PF), glass reinforced
			Flammability:	in accordance with UL94V-0
			Maximum operating temperature:	180 °C
			Pins:	CuSn, SnPb plated
Container	6	4322 021 3054	**Material:**	nickel plated brass
			Earth pins:	presoldered
Spring	7	4322 021 3065	**Material:**	NiCr steel
			Spring force:	≈ 140 N when mounted
Nut	8	4322 021 3071	**Material:**	nickel plated brass
Bush	9	4322 021 3072	**Material:**	nickel plated brass

Dimensions in mm

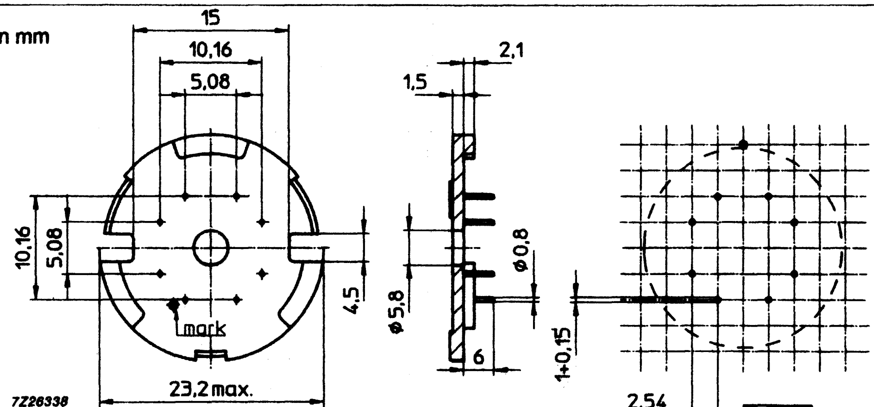


Fig.5 P22/13 tag plate.

P cores and accessories

P22/13

Dimensions in mm

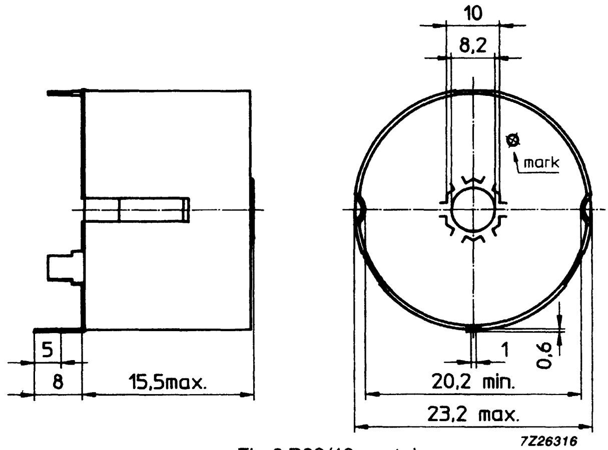


Fig.6 P22/13 container.

Dimensions in mm

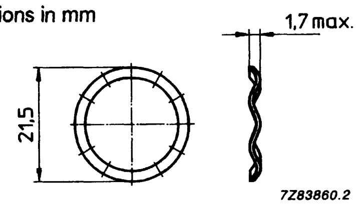


Fig.7 P22/13 spring.

Dimensions in mm

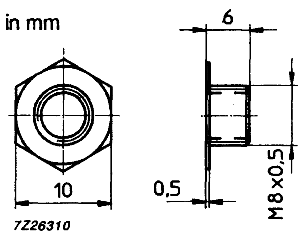


Fig.9 P22/13 bush.

Dimensions in mm

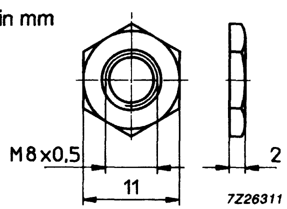


Fig.8 P22/13 nut.

P cores and accessories | P26/16

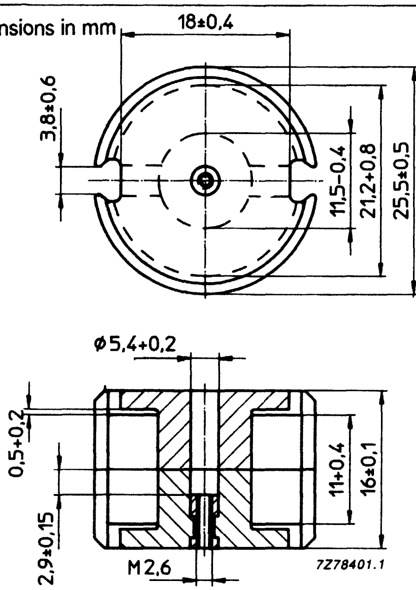


Fig.1 P26/16 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.400	mm^{-1}
V_e	effective volume	3530	mm^3
l_e	effective length	37.6	mm
A_e	effective area	93.9	mm^2
A_{min}	minimum area	76.5	mm^2
	mass of set	≈ 20	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
4C6	63 ± 3%	≈ 20	≈ 2500	4322 022 2983	4322 022 0983
	100 ± 3%	≈ 32	≈ 1100	4322 022 2984	4322 022 0984
	310 ± 25%	≈ 100	≈ 0	−	4322 022 0980
3D3	100 ± 3%	≈ 32	≈ 1600	4322 022 2944	4322 022 0944
	160 ± 3%	≈ 51	≈ 900	4322 022 2945	4322 022 0945
	250 ± 3%	≈ 80	≈ 500	4322 022 2946	4322 022 0946
	2150 ± 25%	≈ 680	≈ 0	−	4322 022 0949
3H3	160 ± 3%	≈ 51	≈ 900	4322 022 2955	4322 022 0955
	250 ± 3%	≈ 80	≈ 500	4322 022 2956	4322 022 0956
	315 ± 3%	≈ 100	≈ 370	4322 022 2957	4322 022 0957
	400 ± 3%	≈ 127	≈ 260	4322 022 2958	4322 022 0958
	630 ± 3%	≈ 200	≈ 150	4322 022 2960	4322 022 0960
	5000 ± 25%	≈ 1590	≈ 0	−	4322 022 0951
3H1	160 ± 3%	≈ 51	≈ 900	4322 022 2925	4322 022 0925
	250 ± 3%	≈ 80	≈ 500	4322 022 2926	4322 022 0926
	315 ± 3%	≈ 100	≈ 370	4322 022 2927	4322 022 0927
	400 ± 3%	≈ 127	≈ 260	4322 022 2928	4322 022 0928
	630 ± 3%	≈ 200	≈ 150	4322 022 2930	4322 022 0930
	5550 ± 25%	≈ 1760	≈ 0	−	4322 022 0972

* clamping force 200 ± 50 N

P cores and accessories P26/16

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	250 ± 3%	≈ 80	≈ 500	4322 022 0986
	315 ± 3%	≈ 100	≈ 370	4322 022 0987
	400 ± 3%	≈ 127	≈ 260	4322 022 0988
	630 ± 3%	≈ 200	≈ 150	4322 022 0989
	5550 ± 25%	≈ 1760	≈ 0	4322 022 0985
3C85	250 ± 3%	≈ 80	≈ 500	4322 025 3026
	315 ± 3%	≈ 100	≈ 370	4322 025 3027
	400 ± 3%	≈ 127	≈ 260	4322 025 3028
	630 ± 3%	≈ 200	≈ 150	4322 025 3030
	5000 ± 25%	≈ 1590	≈ 0	4322 022 0973
3F3	250 ± 3%	≈ 80	≈ 500	4322 025 3046
	315 ± 3%	≈ 100	≈ 370	4322 025 3047
	400 ± 3%	≈ 127	≈ 260	4322 025 3048
	630 ± 3%	≈ 200	≈ 150	4322 025 3050
	4600 ± 25%	≈ 1460	≈ 0	4322 022 0950

* clamping force 200 ± 50 N

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	9000 ± 25%	≈ 2850	4322 022 0967
3E4	12100 + 40/- 30%	≈ 3840	4322 022 0965

* clamping force 200 ± 50 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥ 315	≤ 1.0	–	–
3C85	≥ 315	≤ 0.56	≤ 0.67	–
3F3	≥ 315	–	≤ 0.40	≤ 0.65

P cores and accessories

P26/16

Dimensions in mm

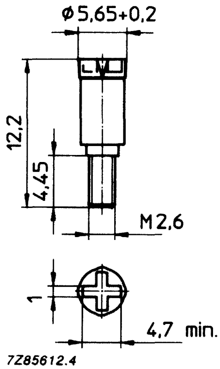


Fig.2 P26/16 inductance adjuster.

INDUCTANCE ADJUSTERS - GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3941	brown
4322 021 3942	red
4322 021 3945	green
4322 021 3948	white
4322 021 3949	grey

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1, 3H3	63	–		4322 021 3945	18	4322 021 3942	25
	100	–		4322 021 3945	15	4322 021 3942	22
	160	4322 021 3945	10	4322 021 3942	15	4322 021 3948	28
	250	4322 021 3942	11	4322 021 3948	18	4322 021 3941	21
	315	4322 021 3942	9	4322 021 3948	14	4322 021 3941	17
	400	4322 021 3942	7	4322 021 3941	13	4322 021 3949	25
	630	4322 021 3941	8	4322 021 3949	16	–	
	1000	4322 021 3941	5	4322 021 3949	9	–	
	1600	–		4322 021 3949	6	–	
3D3	63	–		4322 021 3945	22	–	
	100	–		4322 021 3945	14	4322 021 3942	21
	160	4322 021 3945	10	4322 021 3942	14	4322 021 3948	23
	250	4322 021 3942	9	4322 021 3948	15	4322 021 3949	27
	400	4322 021 3948	9	4322 021 3949	17	–	
4C6	63	–		4322 021 3945	15	4322 021 3942	21
	100	4322 021 3945	10	4322 021 3942	15	–	

P cores and accessories P26/16

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

Dimensions in mm

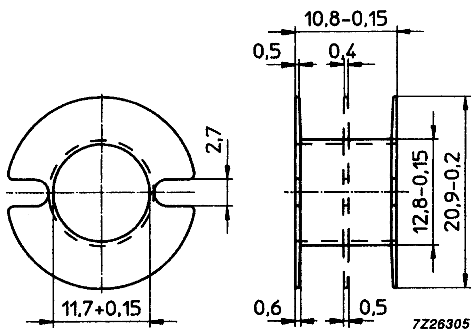


Fig.3 P26/16 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	39	9.3	53	4322 021 3033
2	2 x 19	2 x 4.4	53	4322 021 3034
3	3 x 12	3 x 2.7	53	4322 021 3035

P cores and accessories P26/16

COIL FORMER DATA

Coil former material: phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL94V-0

Pin material: CuZn, SnPb plated

Maximum operating temperature: 180 °C

Resistance to soldering heat: 430 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Dimensions in mm

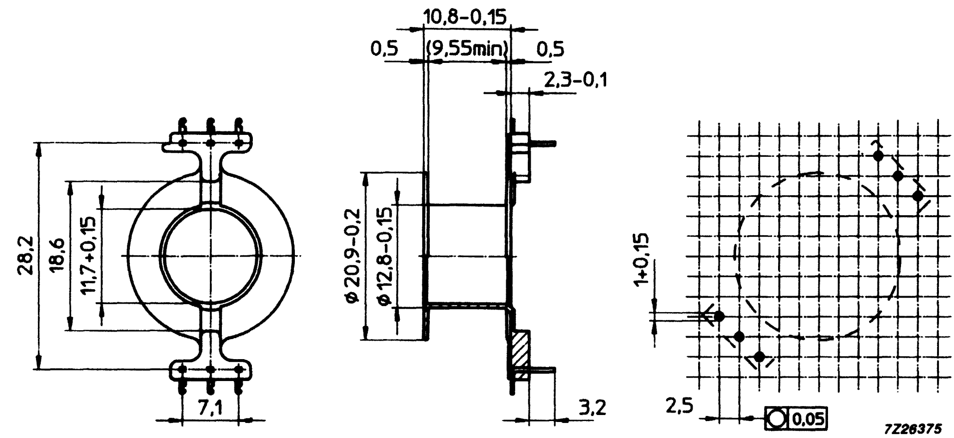


Fig.4 P26/16 coil former with pins.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	39	9.3	53	4322 021 3013

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS	
Tag plate (8 pins)	5	4322 021 3047	**Material:**	phenolformaldehyde (PF), glass reinforced
			Flammability:	in accordance with UL94V-0
			Maximum operating temperature:	180 °C
			Pins:	CuSn, SnPb plated
Container	6	4322 021 3055	**Material:**	nickel plated brass
			Earth pins:	presoldered
Spring	7	4322 021 3066	**Material:**	NiCr steel
			Spring force:	≈ 200 N when mounted
Nut	8	4322 021 3071	**Material:**	nickel plated brass
Bush	9	4322 021 3072	**Material:**	nickel plated brass

Dimensions in mm

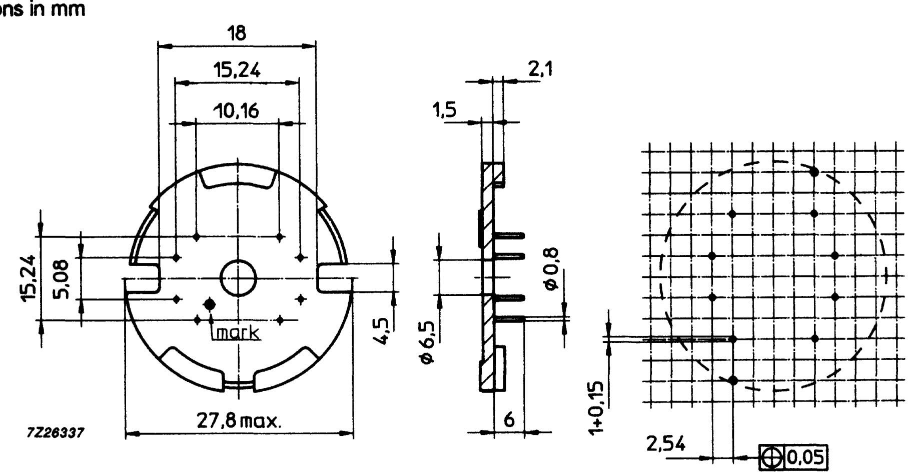


Fig.5 P26/16 tag plate.

P cores and accessories P26/16

Dimensions in mm

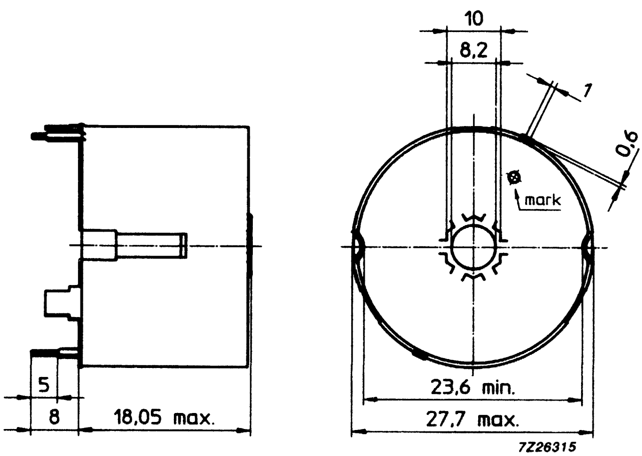


Fig.6 P26/16 container.

Dimensions in mm

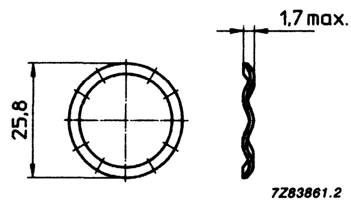


Fig.7 P26/16 spring.

Dimensions in mm

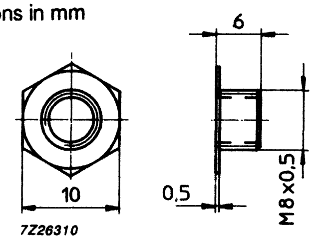


Fig.9 P26/16 bush.

Dimensions in mm

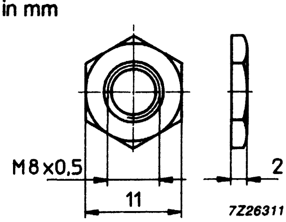


Fig.8 P26/16 nut.

P cores and accessories P30/19

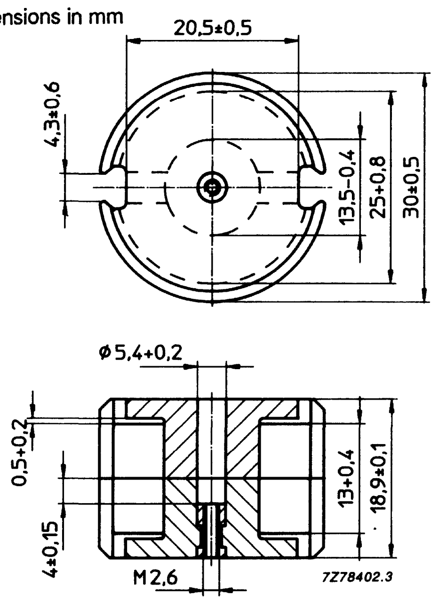


Fig.1 P30/19 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.330	mm^{-1}
V_e	effective volume	6190	mm^3
l_e	effective length	45.2	mm
A_e	effective area	137	mm^2
A_{min}	minimum area	115	mm^2
	mass of set	≈ 34	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
3H1	250 ± 3%	≈ 66	≈ 700	4322 022 3126	4322 022 1126
	315 ± 3%	≈ 83	≈ 550	4322 022 3124	4322 022 1124
	400 ± 3%	≈ 105	≈ 400	4322 022 3128	4322 022 1128
	630 ± 3%	≈ 165	≈ 250	4322 022 3130	4322 022 1130
	1000 ± 3%	≈ 263	≈ 140	4322 022 3131	4322 022 1131
	1600 ± 5%	≈ 420	≈ 80	−	4322 022 1132
	7050 ± 25%	≈ 1850	≈ 0	−	4322 022 1120

* clamping force 250 ± 50 N

P cores and accessories P30/19

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	250 ± 3%	≈ 66	≈ 700	4322 022 1184
	315 ± 3%	≈ 83	≈ 550	4322 022 1185
	400 ± 3%	≈ 105	≈ 400	4322 022 1186
	630 ± 3%	≈ 165	≈ 250	4322 022 1187
	7050 ± 25%	≈ 1850	≈ 0	4322 022 1182
3C85	250 ± 3%	≈ 66	≈ 700	4322 022 1164
	315 ± 3%	≈ 83	≈ 550	4322 022 1165
	400 ± 3%	≈ 105	≈ 400	4322 022 1166
	630 ± 3%	≈ 165	≈ 250	4322 022 1167
	6300 ± 25%	≈ 1650	≈ 0	4322 022 1160
3F3	250 ± 3%	≈ 66	≈ 700	4322 022 1151
	315 ± 3%	≈ 83	≈ 550	4322 022 1152
	400 ± 3%	≈ 105	≈ 400	4322 022 1153
	630 ± 3%	≈ 165	≈ 250	4322 022 1154
	5750 ± 25%	≈ 1500	≈ 0	4322 022 1148

* clamping force 250 ± 50 N

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	10300 ± 25%	≈ 2700	4322 022 1191
3E4	15100 + 40/- 30%	≈ 3950	4322 022 1190

* clamping force 250 ± 50 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥ 315	≤ 1.75	–	–
3C85	≥ 315	≤ 1.00	≤ 1.20	–
3F3	≥ 315	–	≤ 0.70	≤ 1.20

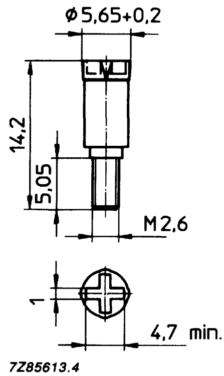


Fig.2 P30/19 inductance adjuster.

INDUCTANCE ADJUSTERS – GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3832	red
4322 021 3834	yellow
4322 021 3838	white
4322 021 3839	grey
4322 021 3941	brown

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1	250	4322 021 3832	10	4322 021 3834	16	4322 021 3838	20
	400	4322 021 3832	7	4322 021 3941	16	–	
	630	4322 021 3834	6	4322 021 3941	10	4322 021 3839	21
	1000	4322 021 3838	5	4322 021 3839	13	–	
	1600	–		4322 021 3839	8	–	
	2500	–		4322 021 3839	5	–	

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

Dimensions in mm

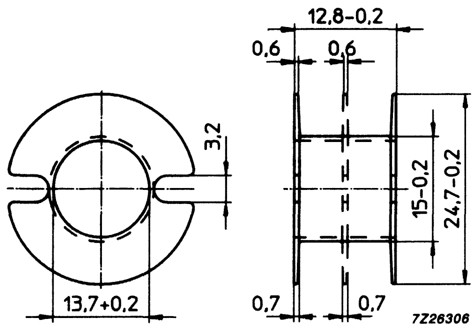


Fig.3 P30/19 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	55	11	62	4322 021 3036
2	2 x 26	2 x 5.1	62	4322 021 3037
3	3 x 16	3 x 3.2	62	4322 021 3038

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS	
Tag plate (9 pins)	4	4322 021 3048	**Material:**	phenolformaldehyde (PF), glass reinforced
			Flammability:	in accordance with UL94V-0
			Maximum operating temperature:	180 °C
			Pins:	CuSn, SnPb plated
Container	5	4322 021 3056	**Material:**	nickel plated brass
			Earth pins:	presoldered
Spring	6	4322 021 3067	**Material:**	NiCr steel
			Spring force:	≈ 250 N when mounted
Nut	7	4322 021 3071	**Material:**	nickel plated brass
Bush	8	4322 021 3072	**Material:**	nickel plated brass

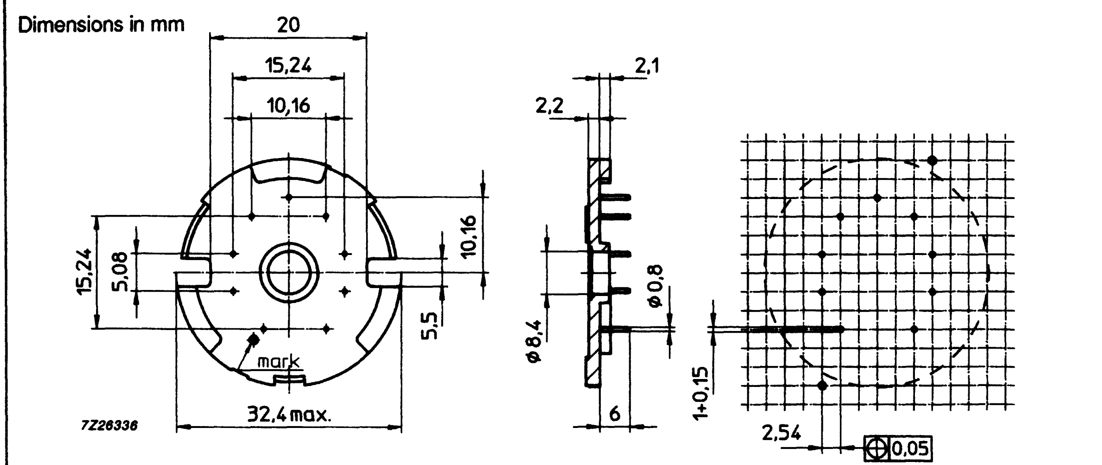


Fig.4 P30/19 tag plate.

Dimensions in mm

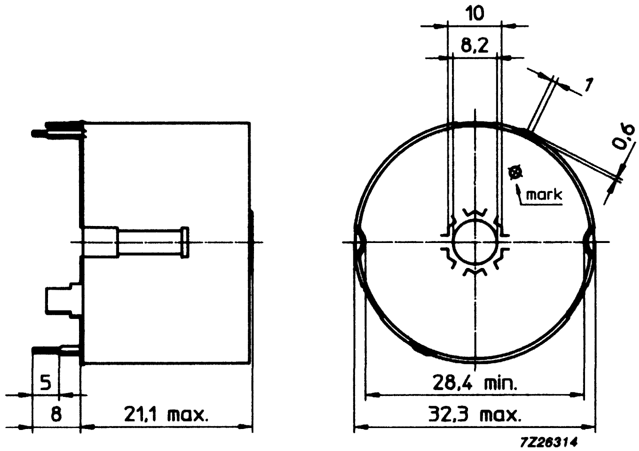


Fig.5 P30/19 container.

Dimensions in mm

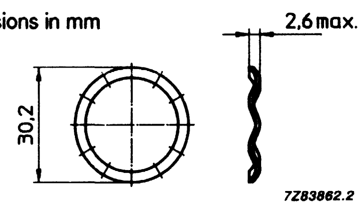


Fig.6 P30/19 spring.

Dimensions in mm

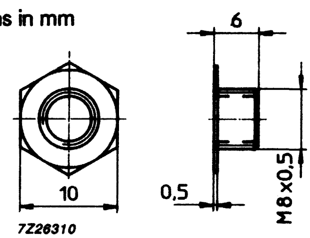


Fig.7 P30/19 nut.

Dimensions in mm

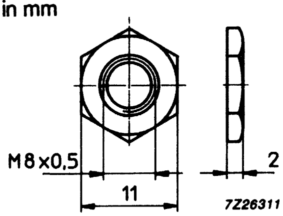


Fig.8 P30/19 bush.

P cores and accessories P36/22

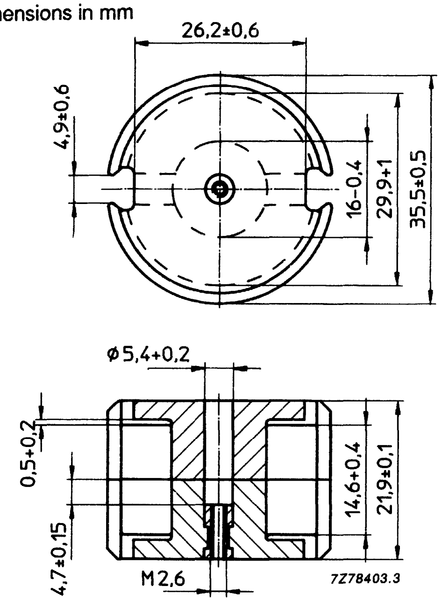


Fig.1 P36/22 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.264	mm^{-1}
V_e	effective volume	10700	mm^3
l_e	effective length	53.2	mm
A_e	effective area	202	mm^2
A_{min}	minimum area	172	mm^2
	mass of set	≈ 54	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
3H1	400 ± 3%	≈ 84	≈ 640	4322 022 3328	4322 022 1328
	630 ± 3%	≈ 132	≈ 380	4322 022 3330	4322 022 1330
	1000 ± 3%	≈ 210	≈ 200	4322 022 3331	4322 022 1331
	1600 ± 5%	≈ 336	≈ 110	4322 022 3332	4322 022 1332
	9000 ± 25%	≈ 1890	≈ 0	−	4322 022 1320

* clamping force 350 ± 50 N

P cores and accessories P36/22

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3B8	250 ± 3%	≈ 53	≈ 1100	4322 022 1381
	315 ± 3%	≈ 66	≈ 800	4322 022 1382
	400 ± 3%	≈ 84	≈ 600	4322 022 1383
	630 ± 3%	≈ 132	≈ 400	4322 022 1384
	9000 ± 25%	≈ 1890	≈ 0	4322 022 1378
3C85	250 ± 3%	≈ 53	≈ 1100	4322 022 1364
	315 ± 3%	≈ 66	≈ 800	4322 022 1365
	400 ± 3%	≈ 84	≈ 600	4322 022 1366
	630 ± 3%	≈ 132	≈ 400	4322 022 1367
	8000 ± 25%	≈ 1680	≈ 0	4322 022 1360
3F3	250 ± 3%	≈ 53	≈ 1100	4322 022 1351
	315 ± 3%	≈ 66	≈ 800	4322 022 1352
	400 ± 3%	≈ 84	≈ 600	4322 022 1353
	630 ± 3%	≈ 132	≈ 400	4322 022 1354
	7350 ± 25%	≈ 1540	≈ 0	4322 022 1350

* clamping force 350 ± 50 N

CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L* (nH)	μ_e	ORDERING CODE
3E1	13300 ± 25%	≈ 2800	4322 022 1396
3E4	19300 + 40/- 30%	≈ 4040	4322 022 1397

* clamping force 350 ± 50 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3B8	≥ 315	≤ 3.0	–	-
3C85	≥ 315	≤ 1.70	≤ 2.00	-
3F3	≥ 315	–	≤ 1.20	≤ 2.0

P cores and accessories P36/22

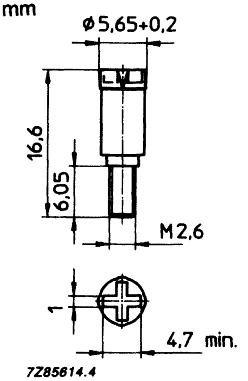


Fig.2 P36/22 inductance adjuster.

INDUCTANCE ADJUSTERS – GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3924	yellow
4322 021 3928	white
4322 021 3929	grey

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1	100	–		4322 021 3924	17	4322 021 3928	28
	160	–		4322 021 3924	15	4322 021 3928	24
	250	–		4322 021 3924	11	4322 021 3928	18
	400	4322 021 3924	8	4322 021 3941	14	–	
	630	4322 021 3924	5	4322 021 3941	9	–	
	1000	4322 021 3928	5	4322 021 3929	20	–	
	1250	–		4322 021 3929	17	–	
	1600	–		4322 021 3929	12	–	
	2500	–		4322 021 3929	8	–	

P cores and accessories P36/22

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

Dimensions in mm

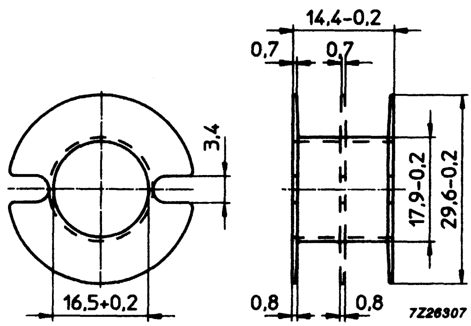


Fig.3 P36/22 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	75	12.5	74	4322 021 3039
2	2 x 35	2 x 5.8	74	4322 021 3040
3	3 x 22	3 x 3.6	74	4322 021 3041

P cores and accessories P36/22

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS	
Tag plate (10 pins)	4	4322 021 3049	**Material:** **Flammability:** **Maximum operating temperature:** **Pins:**	phenolformaldehyde (PF), glass reinforced in accordance with UL94V-0 180 °C CuSn, SnPb plated
Container	5	4322 021 3057	**Material:** **Earth pins:**	nickel plated brass presoldered
Spring	6	4322 021 3068	**Material:** **Spring force:**	NiCr steel ≈ 350 N when mounted
Nut	7	4322 021 3071	**Material:**	nickel plated brass
Bush	8	4322 021 3072	**Material:**	nickel plated brass

Dimensions in mm

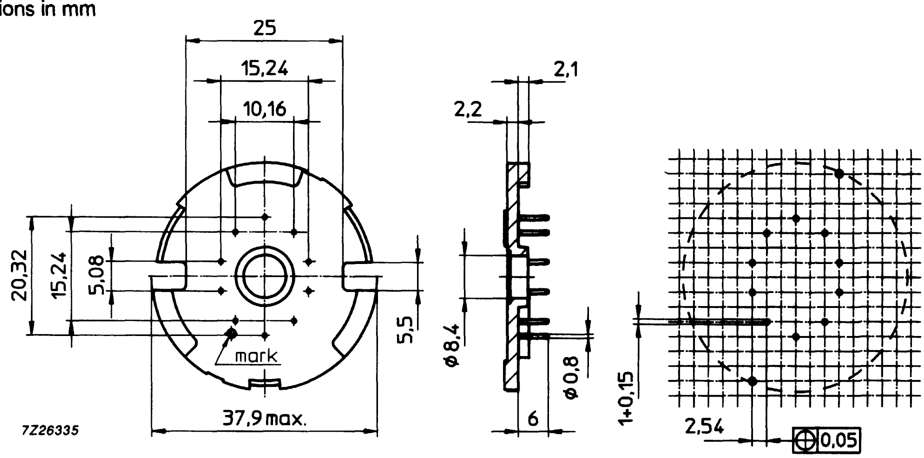


Fig.4 P36/22 tag plate.

P cores and accessories P36/22

Dimensions in mm

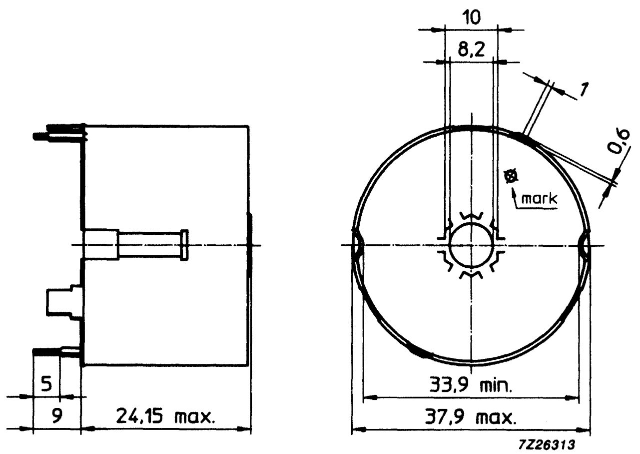


Fig.5 P36/22 container.

Dimensions in mm

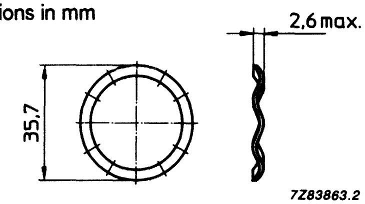


Fig.6 P36/22 spring.

Dimensions in mm

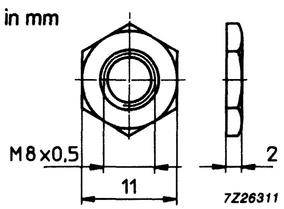


Fig.7 P36/22 nut.

Dimensions in mm

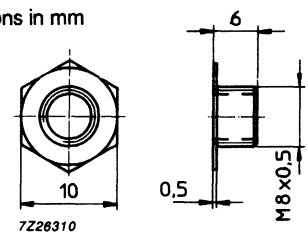


Fig.8 P36/22 bush.

P cores and accessories P42/29

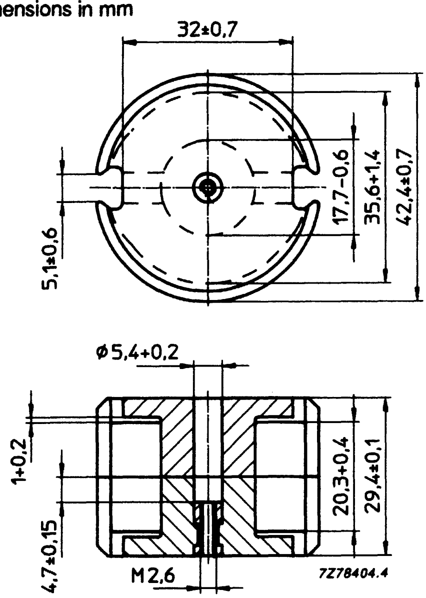


Fig.1 P42/29 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.259	mm^{-1}
V_e	effective volume	18200	mm^3
l_e	effective length	68.6	mm
A_e	effective area	265	mm^2
A_{min}	minimum area	214	mm^2
	mass of set	≈ 104	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
3H1	315 ± 3%	≈ 65	≈ 1100	4322 022 3527	4322 022 1527
	400 ± 3%	≈ 81	≈ 830	4322 022 3528	4322 022 1528
	630 ± 3%	≈ 130	≈ 450	4322 022 3530	4322 022 1530
	1000 ± 3%	≈ 205	≈ 270	4322 022 3531	4322 022 1531
	1600 ± 5%	≈ 325	≈ 150	4322 022 3532	4322 022 1532
	9500 ± 25%	≈ 1930	≈ 0	–	4322 022 1520

* clamping force 550 ± 100 N

P cores and accessories P42/29

CORE SETS FOR GENERAL PURPOSE TRANSFORMERS AND POWER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (µm)	ORDERING CODE
3C85	315 ± 3%	≈ 65	≈ 1100	4322 022 1593
	400 ± 3%	≈ 81	≈ 800	4322 022 1594
	630 ± 3%	≈ 130	≈ 500	4322 022 1595
	8500 ± 25%	≈ 1750	≈ 0	4322 022 1590
3F3	315 ± 3%	≈ 65	≈ 1100	4322 022 1583
	400 ± 3%	≈ 81	≈ 800	4322 022 1584
	630 ± 3%	≈ 130	≈ 500	4322 022 1585
	7700 ± 25%	≈ 1600	≈ 0	4322 022 1580

* clamping force 550 ± 100 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 315	≤ 2.90	≤ 3.40	–
3F3	≥ 315	–	≤ 2.0	≤ 3.50

P cores and accessories P42/29

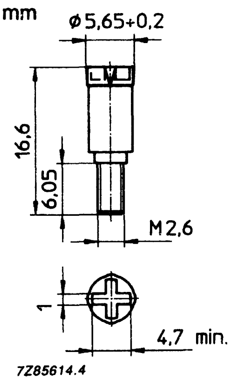


Fig.2 P42/29 inductance adjuster.

INDUCTANCE ADJUSTERS - GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3924	yellow
4322 021 3928	white
4322 021 3929	grey

Material of head and thread: Polypropylene (PP), glass fibre reinforced

Maximum operating temperature: 100 °C

INDUCTANCE ADJUSTER SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1	100	–		4322 021 3924	14	4322 021 3928	23
	250	–		4322 021 3924	10	4322 021 3928	16
	400	4322 021 3924	7	4322 021 3928	11	–	
	630	–		4322 021 3928	7	4322 021 3929	28
	1000	–		4322 021 3929	18	–	
	1600	–		4322 021 3929	11	–	

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced

Maximum operating temperature: 130 °C

Flammability: in accordance with UL94V-2

Dimensions in mm

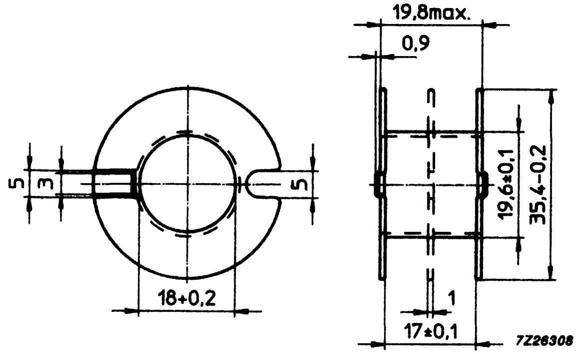


Fig.3 P42/29 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	140	17.7	86	4322 021 3042
2	2 x 63	2 x 8	86	4322 021 3043

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS	
Tag plate	4	4322 021 3050	**Material:** **Flammability:** **Maximum operating temperature:** **Pins:**	phenolformaldehyde (PF), glass reinforced in accordance with UL94V-0 180 °C CuSn, SnPb plated
Container	5	4322 021 3058	**Material:** **Earth pins:**	nickel plated brass presoldered
Spring	6	4322 021 3069	**Material:** **Spring force:**	NiCr steel ≈ 550 N when mounted
Nut	7	4322 021 3071	**Material:**	nickel plated brass
Bush	8	4322 021 3072	**Material:**	nickel plated brass

Dimensions in mm

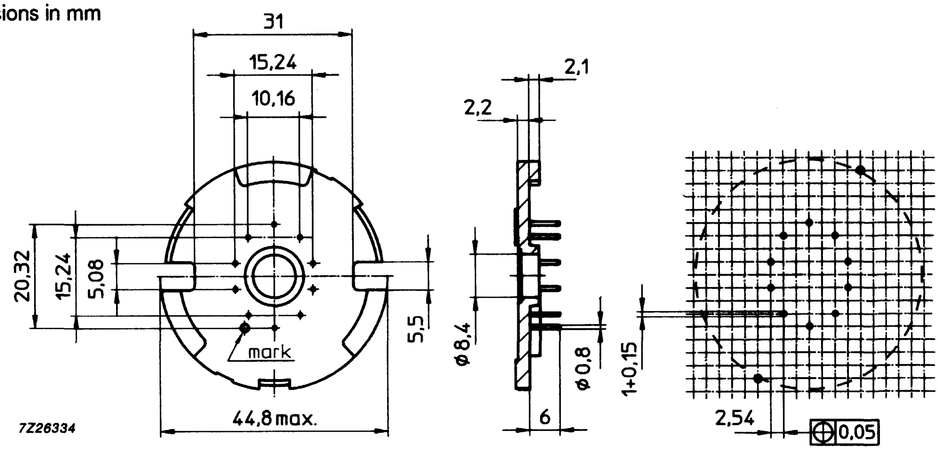


Fig.4 P42/29 tag plate.

Dimensions in mm

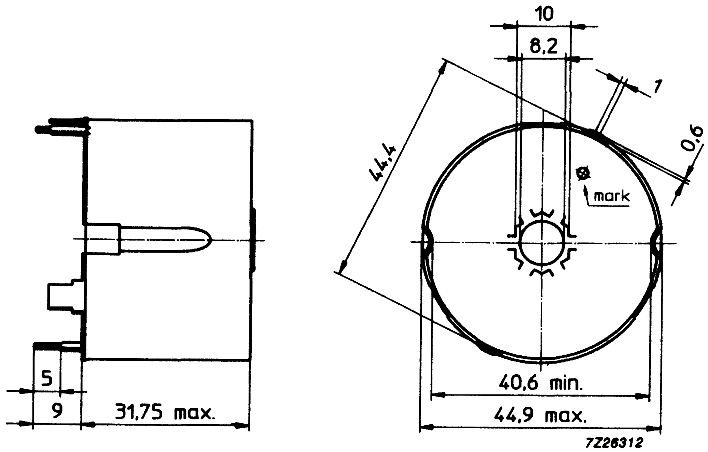


Fig.5 P42/29 container.

Dimensions in mm

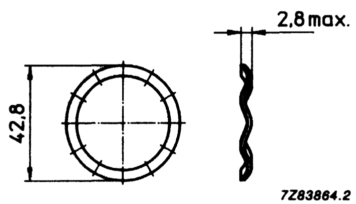


Fig.6 P42/29 spring.

Dimensions in mm

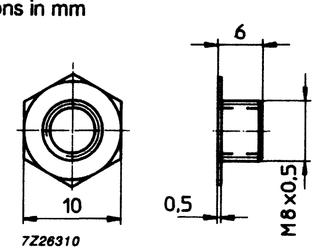


Fig.8 P42/29 bush.

Dimensions in mm

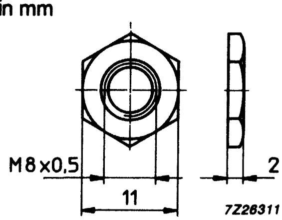


Fig.7 P42/29 nut.

P cores and accessories | P66/56

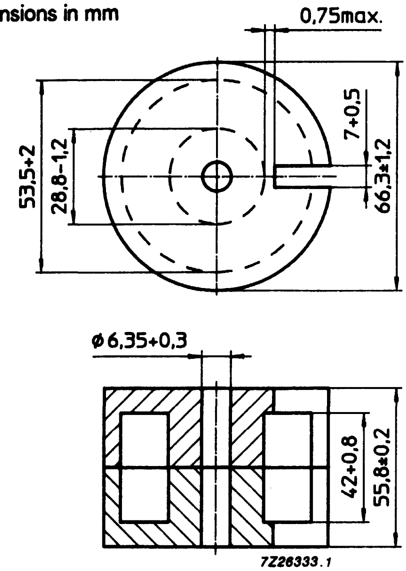


Fig.1 P66/56 core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.172	mm^{-1}
V_e	effective volume	88300	mm^3
l_e	effective length	123.0	mm
A_e	effective area	717.0	mm^2
A_{min}	minimum area	591	mm^2
	mass of set	≈ 550	g

CORE SETS

GRADE	A_L* (nH)	μ_e	AIRGAP (µm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
3E1	≥ 14000	≈ 2500	≈ 0	–	4322 022 1700

* clamping force 1000 ± 300 N

P cores and accessories P66/56

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

Dimensions in mm

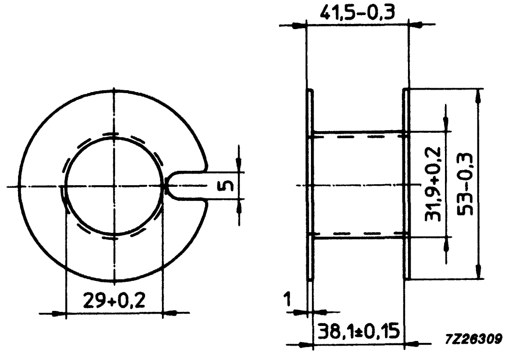


Fig.2 P66/56 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	AVERAGE WINDING LENGTH (mm)	ORDERING CODE
1	400	37.9	130	4322 021 3132

PH cores and accessories PH 5.6/3.6

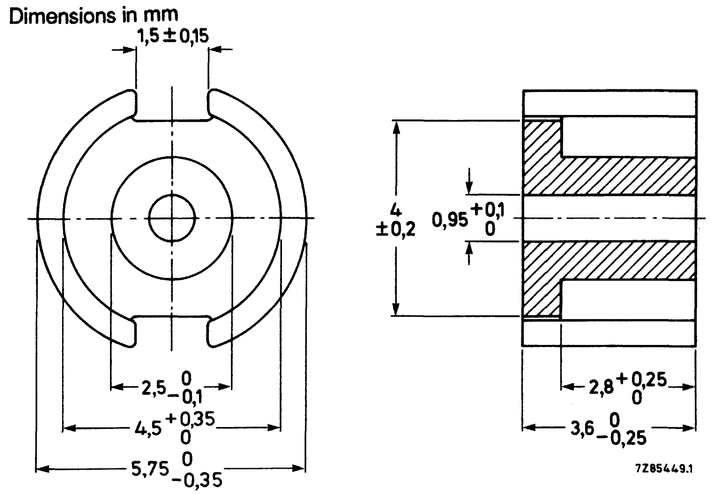


Fig.1 PH5.6/3.6 core half.

CORE HALVES

GRADE	ORDERING CODE
3D3	4322 020 5421

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

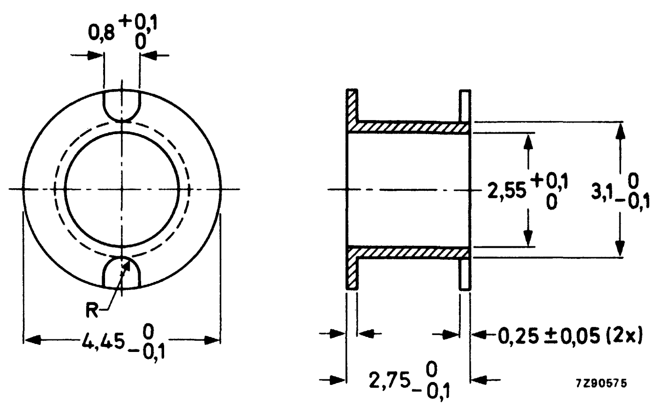


Fig.2 PH5.6/3.6 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	WINDING WIDTH (mm)	AVERAGE LENGTH OF TURN (mm)	ORDERING CODE
1	1.9	2.05	11.7	4322 021 3354

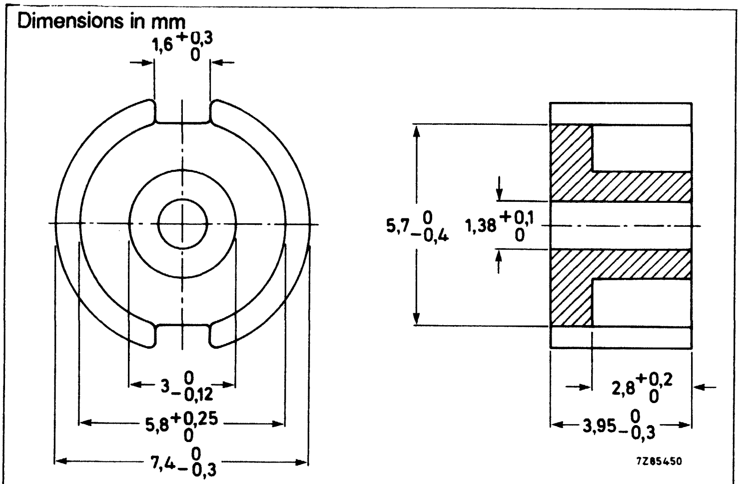


Fig.1 PH7.4/3.9 core half.

CORE HALVES

GRADE	ORDERING CODE
3D3	4322 020 5451

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

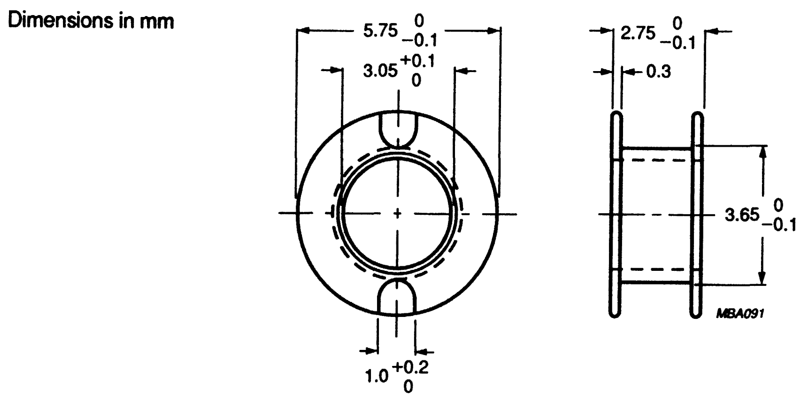


Fig.2 PH7.4/3.9 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	AVERAGE LENGTH OF TURN (mm)	ORDERING CODE
1	2.2	2.0	14.6	4322 021 3299

Dimensions in mm

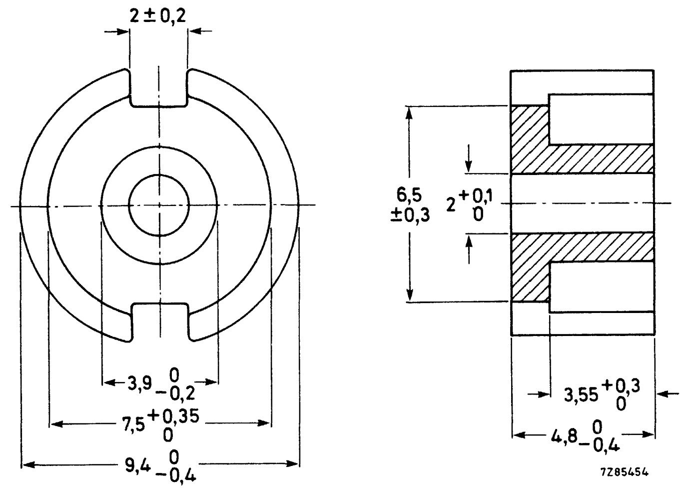


Fig.1 PH9.4/4.8 core half.

CORE HALVES

GRADE	ORDERING CODE
3D3	4322 020 5471

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

Dimensions in mm

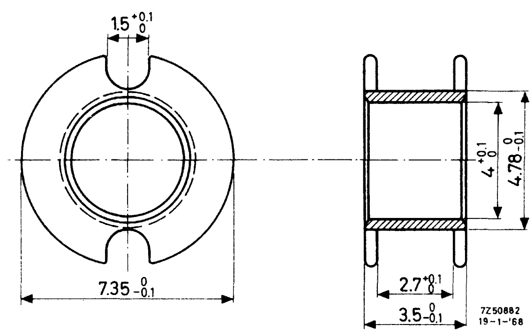


Fig.2 PH9.4/4.8 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm²)	WINDING WIDTH (mm)	AVERAGE LENGTH OF TURN (mm)	ORDERING CODE
1	3.4	2.7	19	4322 021 3170

PH cores and accessories PH 14/7.5

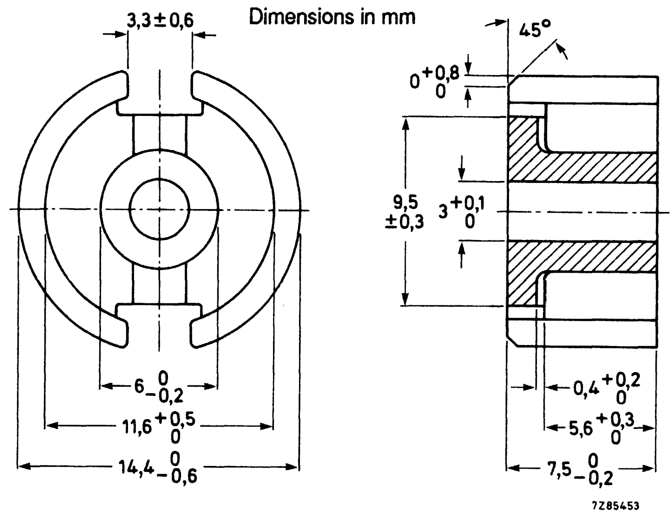


Fig.1 PH14/7.5 core half.

CORE HALVES

GRADE	ORDERING CODE
3H1	4322 020 5480

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

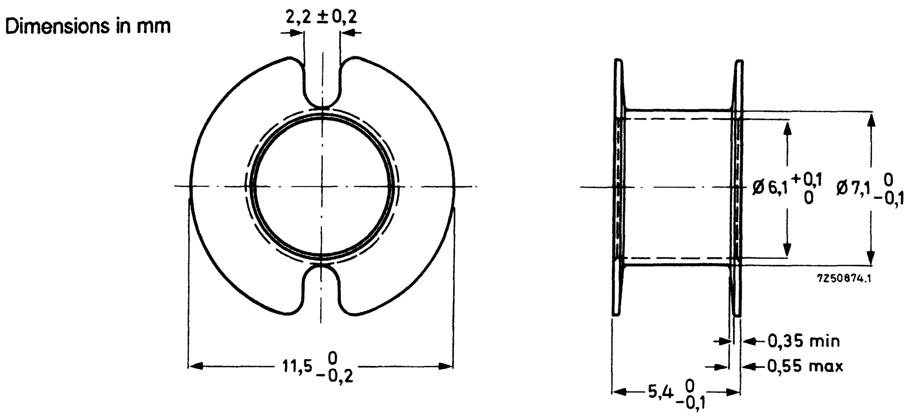


Fig.2 PH14/7.5 coil former.

WINDING DATA

NUMBER OF SECTIONS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	AVERAGE LENGTH OF TURN (mm)	ORDERING CODE
1	9.7	4.2	29	4322 021 3025

PH cores and accessories PH 26/9.2

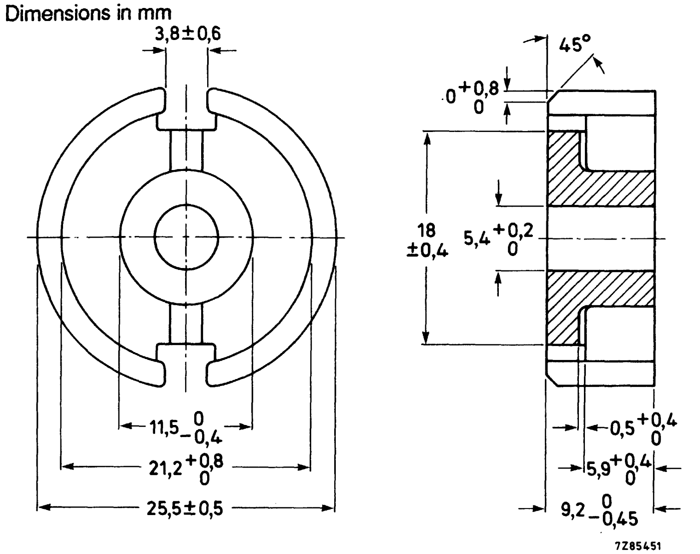


Fig.1 PH26/9.2 core half.

CORE HALVES

GRADE	ORDERING CODE
3H1	4322 020 5490

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

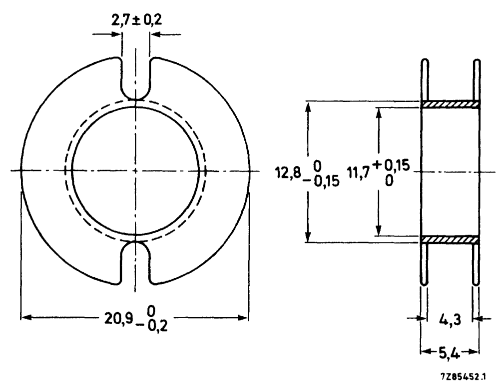


Fig.2 PH26/9.2 coil former.

WINDING DATA

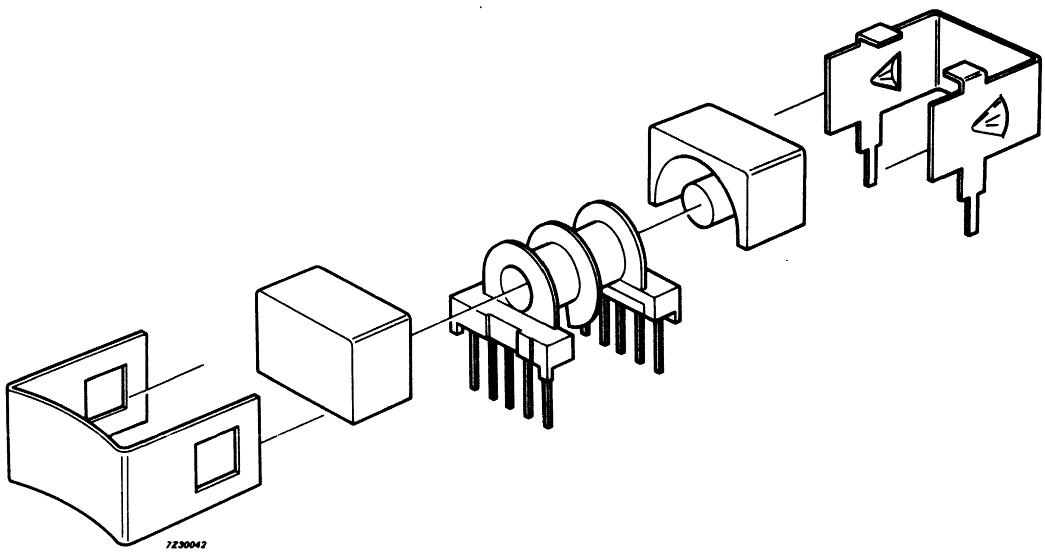
NUMBER OF SECTIONS	WINDING AREA (mm²)	WINDING WIDTH (mm)	AVERAGE LENGTH OF TURN (mm)	ORDERING CODE
1	22	4.3	14.6	4322 021 3370

EP cores and accessories

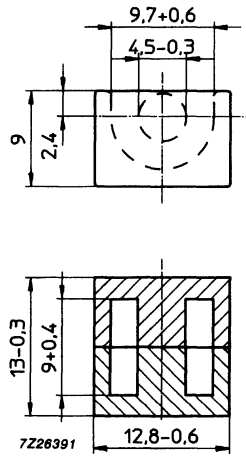
Philips Components

Data sheet	
status	Product specification
date of issue	August 1990

EP13
EP cores and accessories



EP cores and accessories EP13



Dimensions in mm

Fig.1 EP core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(1/A)$	core factor (C1)	1.24	mm^{-1}
V_e	effective volume	472	mm^3
l_e	effective length	24.2	mm
A_e	effective area	19.5	mm^2
A_{min}	minimum area	14.9	mm^2
	mass of core set	≈ 5	g

CORE SETS FOR GENERAL PURPOSE AND POWER APPLICATION

GRADE	AIRGAP (μm)	A_L (nH)	μ_e	ORDERING CODE
3C85	130	160 ± 3%	≈ 160	4322 025 1041
	75	250 ± 3%	≈ 250	4322 025 1006
	50	315 ± 3%	≈ 310	4332 025 1007
	≈ 0	1475 ± 25%	≈ 1460	4322 025 1014
3F3	125	160	≈ 160	4332 025 1094
	70	250	≈ 250	4332 025 1096
	50	315	≈ 310	4322 025 1097
	≈ 0	1325 ± 25%	≈ 1310	4322 025 1090

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mt) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	PV (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 315	≤ 0.08	≤ 0.09	-
3F3	≥ 315	≤ 0.06	≤ 0.05	≤ 0.1

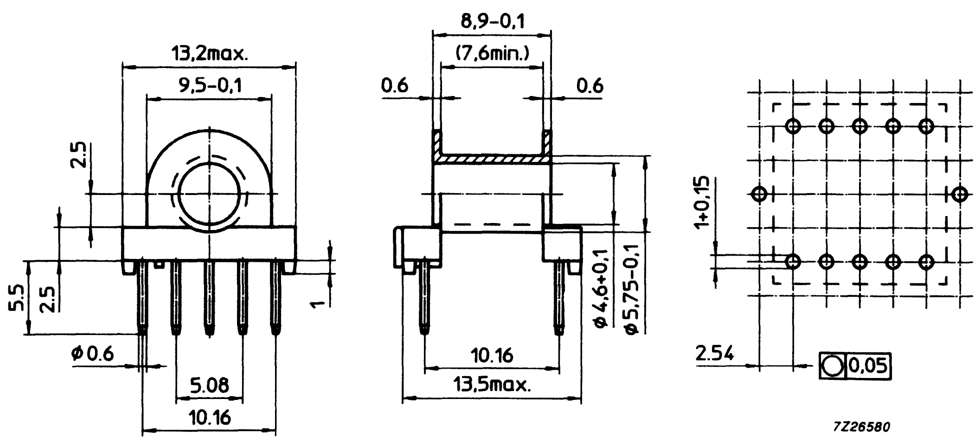
CORE SETS OF HIGH PERMEABILITY GRADES

GRADE	A_L	μ_e	ORDERING CODE
3E1	2600 ± 25%	≈ 2560	4322 025 1033
3E25	4400 + 40%/- 30%	≈ 4340	4322 025 1080
3E5	5500 + 40%/- 30% *	≈ 6900	4322 025 1077

* 7000 + 40%/- 30% at $\hat{B}$ = 18 mT

COIL FORMER DATA

Coil former material: phenolformaldehyde (PF) glass reinforced flame retardent in accordance to UL94-VO
Pin material: CuSn - Ni flash, SnPb plated
Maximum operating temperature: 180 °C
Resistance to soldering heat: 430 °C, 2 s
Solderability: IEC68-2-20, Part 2, Test TA, Method 1



Dimensions in mm

Fig.2 Coil former.

WINDING DATA

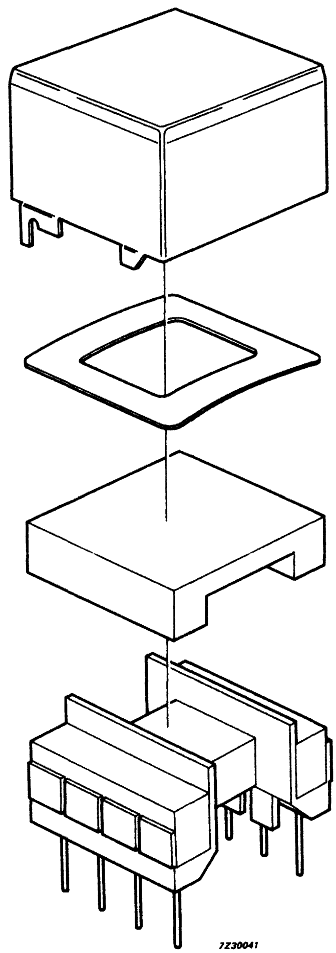
NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	AVERAGE LENGTH (mm)	ORDERING CODE
1	10	13.8	8.7	23.8	4322 021 3503

H cores

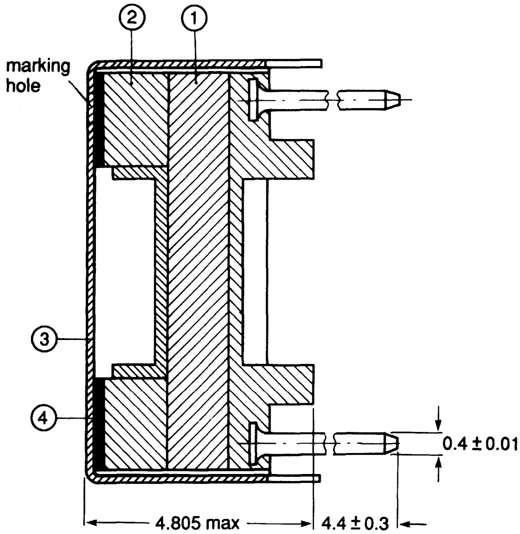
Philips Components

Data sheet	
status	Product specification
date of issue	August 1990

H7 to H22
H cores



H cores H7



Dimensions in mm

Fig.1 Core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	5.4	mm^{-1}
V_e	effective volume	57	mm^3
l_e	effective length	17.5	mm
A_e	effective area	3.3	mm^2
	mass of set	≈ 0.8	g

SETS

GRADE	A_L*	μ_e	ORDERING CODE FOR COMPLETE SET
3E25	≥ 700	≥ 3000	4322 020 3302

* clamping force 1.5 N, $\hat{B}$ = 1 mT

A complete H7 set consists of:

1. H-shaped core with coil former attached to it.
2. "Window"-core to close the magnetic circuit.
3. Container made of nickel plated brass.
4. Phosphor bronze spring.

COIL FORMER DATA

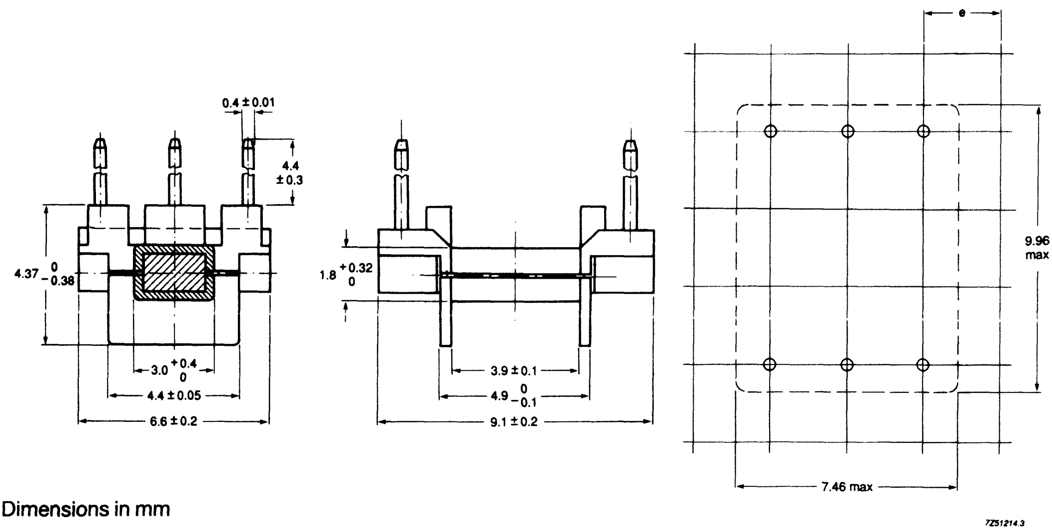
Coil former material: phenolformaldehyde (PF), glass reinforced flame retardent in accordance to UL94-V0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 130 °C

Resistance to soldering heat: 280 °C, 6 s
400 °C, 2 s

Solderability: IEC68-2-20, Part 2, Test TA, Method 1



Dimensions in mm

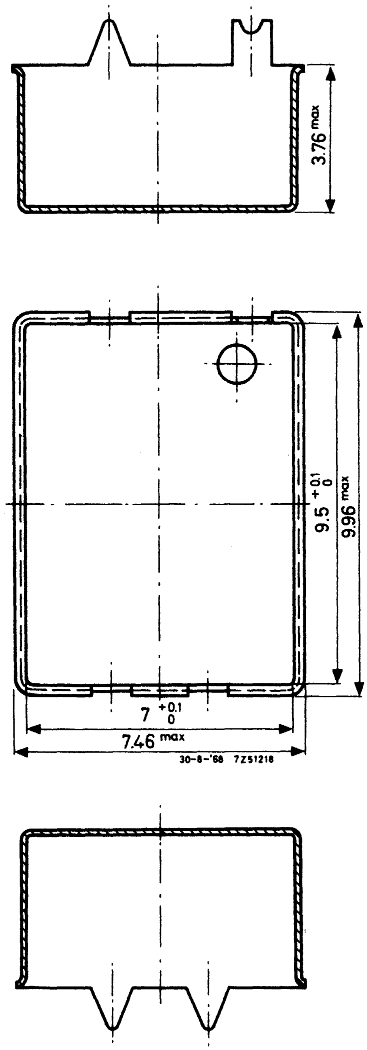
Fig.2 Coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	AVERAGE LENGTH OF TURN (mm)
1	6	3.1	3.8	13.4

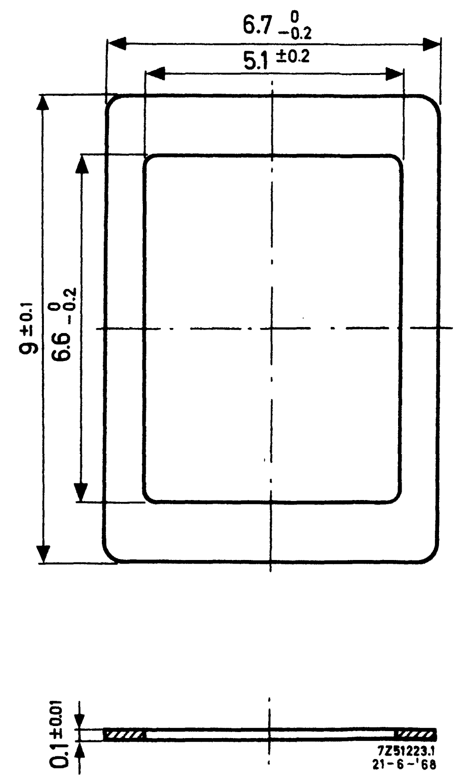
MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
container	3	4322 021 2018	material: nickel plated brass
spring	4	4322 021 2040	material: nickel plated phosphor bronze



Dimensions in mm

Fig. 3 Container.



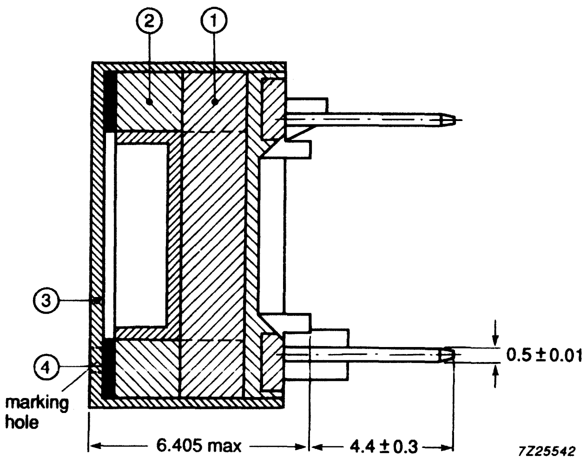
Dimensions in mm

Fig.4 Spring.

H cores H10

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	3.0	mm^{-1}
V_e	effective volume	170	mm^3
l_e	effective length	22.5	mm
A_e	effective area	7.5	mm^2
	mass of set	≈ 2	g



Dimensions in mm

Fig.1 Core set.

SETS

GRADE	A_L*	μ_e	ORDERING CODE FOR COMPLETE SET
3E25	≥ 1600	≥ 3800	4322 020 3304
3E25	≥ 1600	≥ 3800	4322 020 3306**

* clamping force 1.5 N, $\hat{B}$ = 1 mT
** improved resistance to soldering heat.

A complete H10 set consists of:

1. H-shaped core with coil former attached to it.
2. "Window"-core to close the magnetic circuit.
3. Container made of nickel plated brass.
4. Phosphor bronze spring.

COIL FORMER DATA

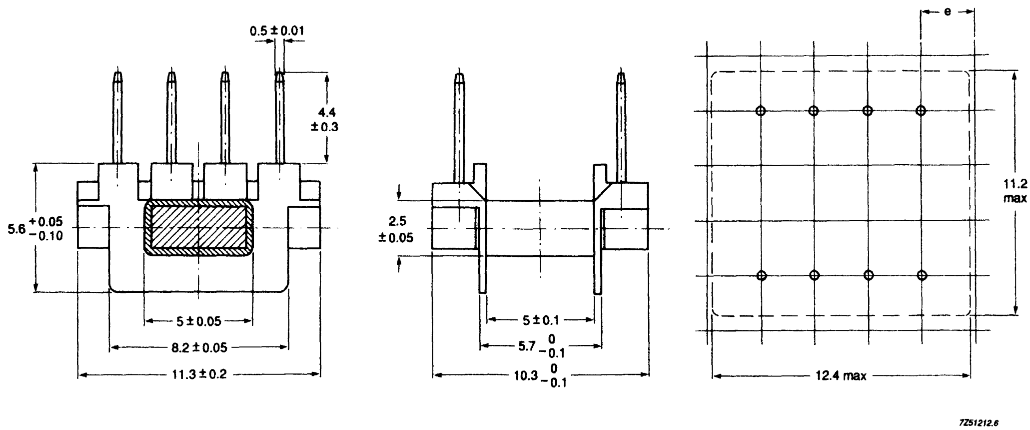
Coil former material: polyamide 6.6, glass reinforced

Pin material: CuSn, SnPb plated

Maximum operating temperature: 80 °C

Resistance to soldering heat: 280 °C, 6 s; 400 °C, 2 s

Solderability: IEC68-2-20, Part 2, Test TA, Method 1



Dimensions in mm

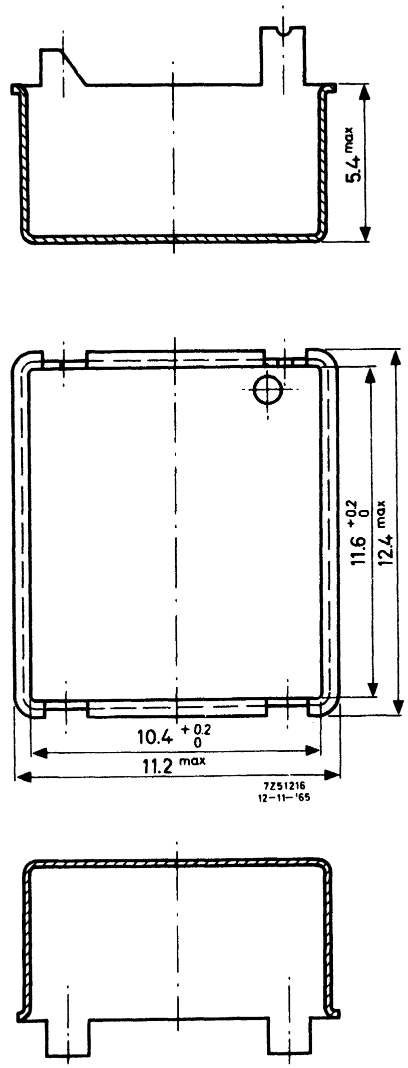
Fig.2 Coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	AVERAGE LENGTH OF TURN (mm)
1	8	7.6	4.9	21.7

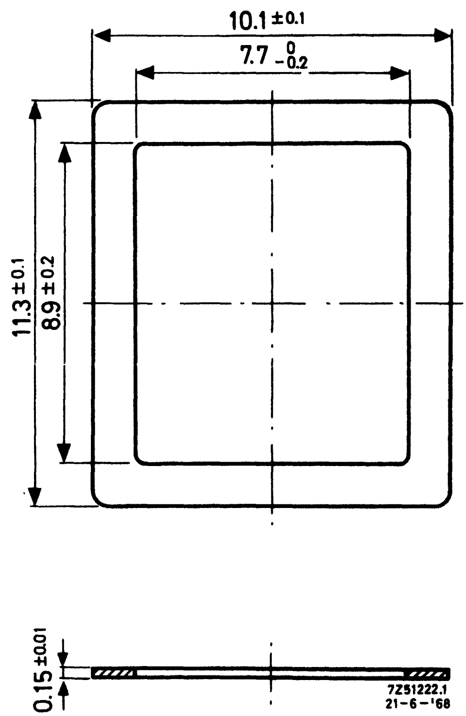
MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
container	3	4322 021 2002	material: nickel plated brass
spring	4	4322 021 2039	material: nickel plated phosphor bronze



Dimensions in mm

Fig. 3 Container.

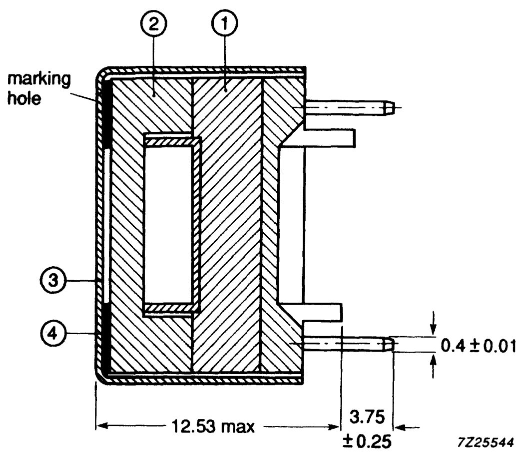


Dimensions in mm

Fig.4 Spring.

H cores

H16



Dimensions in mm

Fig.1 Core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	1.02	mm^{-1}
V_e	effective volume	1240	mm^3
l_e	effective length	35.7	mm
A_e	effective area	34.9	mm^2
	mass of set	≈ 9.5	g

SETS

GRADE	A_L*	μ_e	ORDERING CODE FOR COMPLETE SET
3E25	≥ 4500	≥ 3650	4322 020 3303

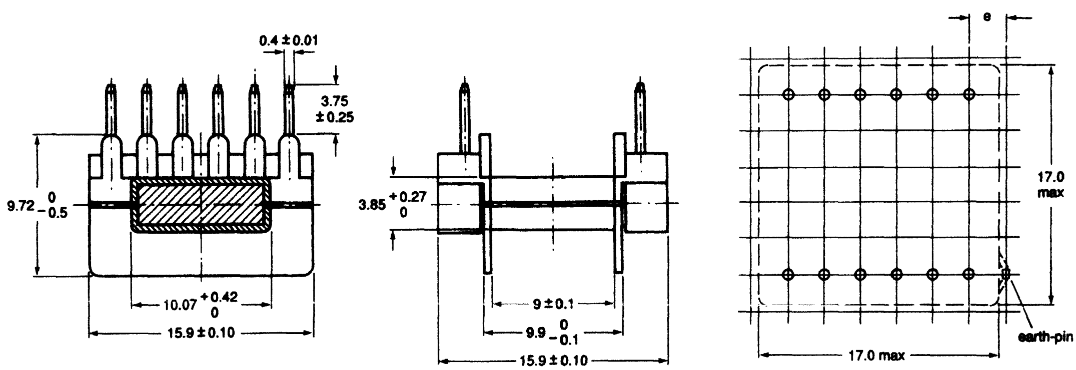
* clamping force 1.5 N, $\hat{B}$ = 1 mT

A complete H16 set consists of:

1. H-shaped core with coil former attached to it.
2. U-shaped core to close the magnetic circuit.
3. Container made of nickel plated brass.
4. Phosphor bronze spring.

COIL FORMER DATA

Coil former material:	polyester glass reinforced
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	130 °C
Resistance to soldering heat:	280 °C, 6 s 400 °C, 2 s
Solderability:	IEC68-2-20, Part 2, Test TA, Method 1



Dimensions in mm

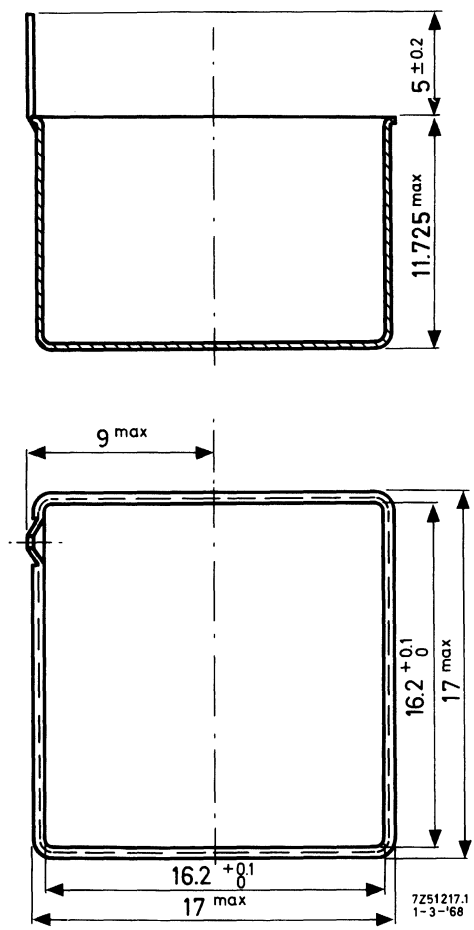
Fig.2 Coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	AVERAGE LENGTH OF TURN (mm)
1	12	21	8.9	39.6

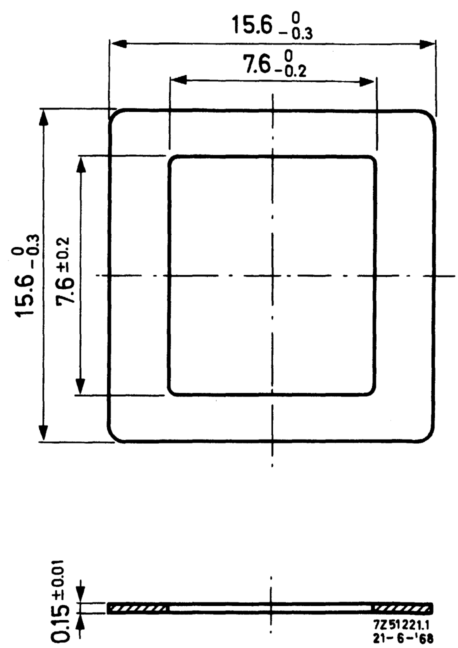
MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
container	3	4322 021 2018	material: nickel plated brass
spring	4	4322 021 2040	material: nickel plated phosphor bronze



Dimensions in mm

Fig. 3 Container.



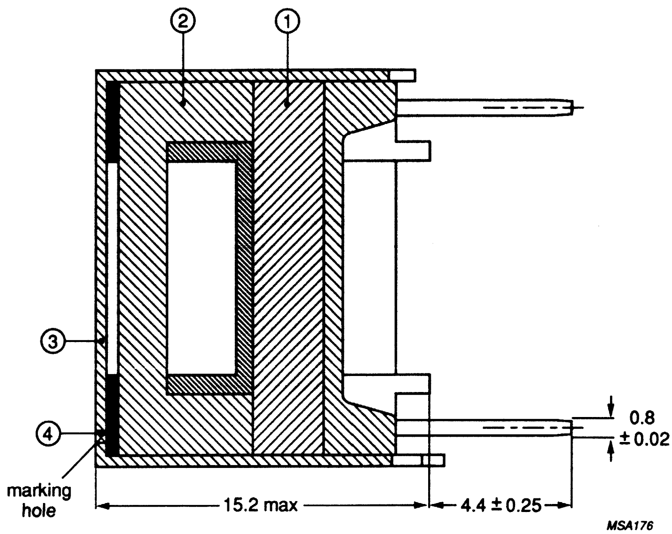
Dimensions in mm

Fig.4 Spring.

H cores H20

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.88	mm^{-1}
V_e	effective volume	1930	mm^3
l_e	effective length	41.2	mm
A_e	effective area	47	mm^2
	mass of set	≈ 15	g



Dimensions in mm

Fig.1 Core set.

SETS

GRADE	A_L*	μ_e	ORDERING CODE FOR COMPLETE SET
3E25	≥ 5500	≥ 3850	4322 020 3300

* clamping force 1.5 N, $\hat{B}$ = 1 mT

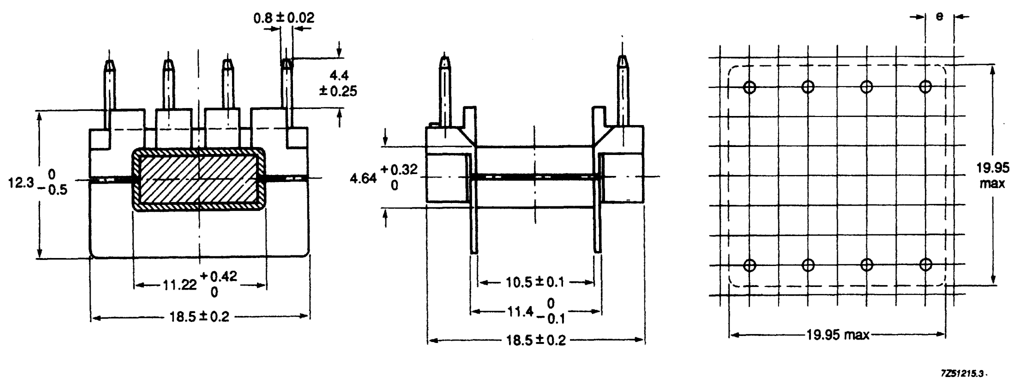
A complete H20 set consists of:

1. H-shaped core with coil former attached to it.
2. U-shaped core to close the magnetic circuit.
3. Container made of nickel plated brass.
4. Phosphor bronze spring.

H cores H20

COIL FORMER DATA

Coil former material:	polyester glass reinforced
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	130 °C
Resistance to soldering heat:	280 °C, 6 s 400 °C, 2 s
Solderability:	IEC68-2-20, Part 2, Test TA, Method 1



Dimensions in mm

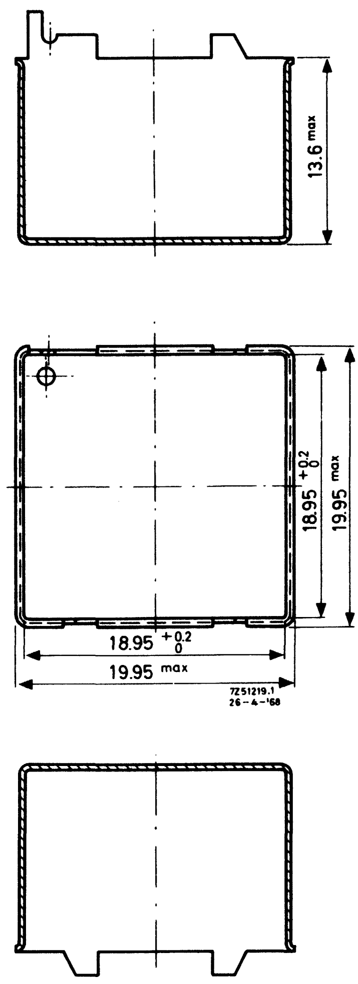
Fig.2 Coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	AVERAGE LENGTH OF TURN (mm)
1	8	35	10.4	44

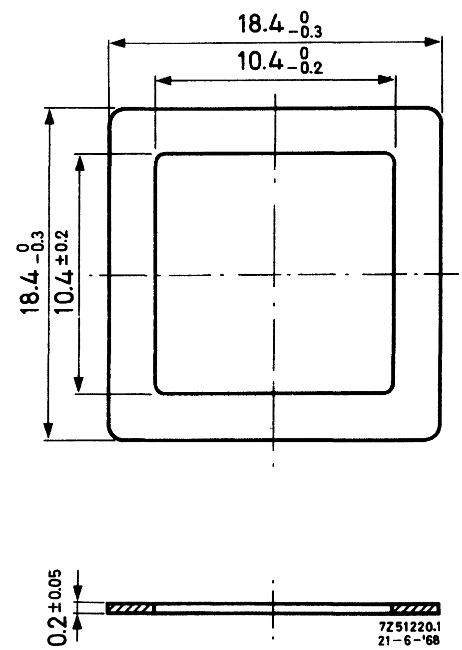
MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
container	3	4322 021 2000	material: nickel plated brass
spring	4	4322 021 2041	material: nickel plated phosphor bronze



Dimensions in mm

Fig. 3 Container.



Dimensions in mm

Fig.4 Spring.

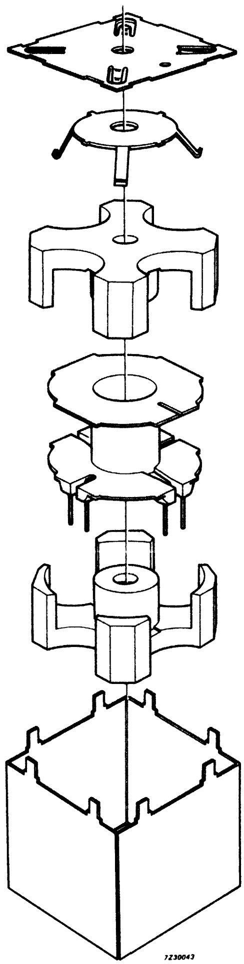
X cores and accessories

Philips Components

Data sheet	
status	Product specification
date of issue	August 1990

X22 to X35

X cores and accessories



X cores and accessories

X22

Dimensions in mm

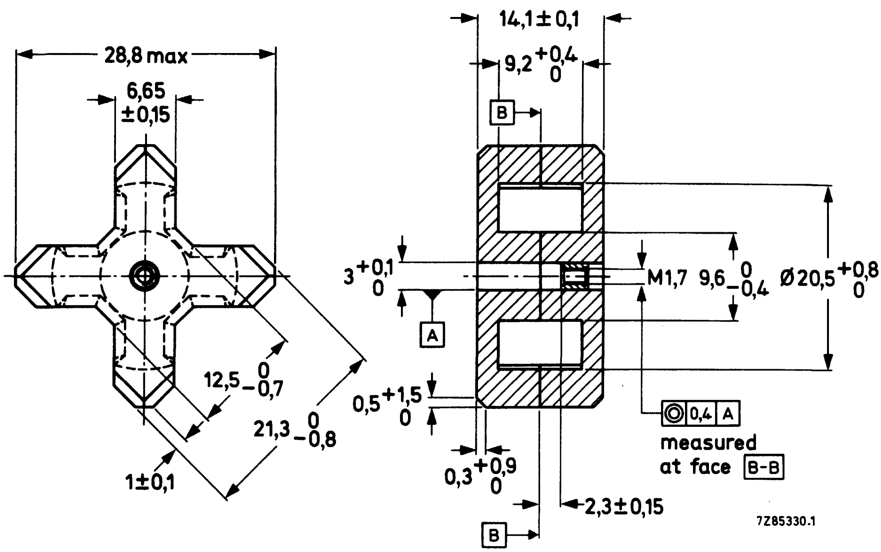


Fig.1 Core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	0.575	mm^{-1}
V_e	effective volume	2510	mm^3
l_e	effective length	38	mm
A_e	effective area	66	mm^2
A_{min}	minimum area	62.1	mm^2
	mass of set	≈ 12	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (µm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
3H1	400 ± 3%	≈ 180	≈ 200	4322 022 6528	-
	630 ± 3%	≈ 290	≈ 120	4322 022 6530	-
	1000 ± 10%	≈ 460	≈ 60	4322 022 6531	-
	3900 ± 25%	≈ 1760	≈ 0	-	4322 022 4520
4C6	220 ± 25%	≈ 100	≈ 0	-	4322 022 4580
3D3	1500 ± 25%	≈ 680	≈ 0	-	4322 022 4540
3B8	3900 ± 25%	≈ 1760	≈ 0	-	4322 022 4560

* clamping force 100 ± 30 N

X cores and accessories X22

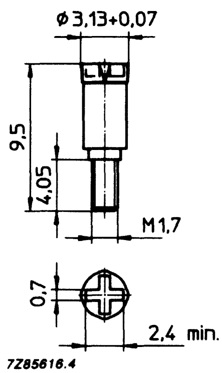


Fig.2 Inductance adjuster.

INDUCTANCE ADJUSTERS - GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3860	black
4322 021 3861	brown
4322 021 3867	violet
4322 021 3868	white
4322 021 3869	grey

INDUCTANCE ADJUSTERS - SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1	160	-		4322 021 3868	20	-	
	250	4322 021 3868	13	4322 021 3867	15	4322 021 3861	21
	400	4322 021 3868	8	4322 021 3861	13	4322 021 3860	20
	630	4322 021 3861	8	4322 021 3860	13	4322 021 3869	17

COIL FORMER DATA

Coil former material: glass reinforced phenolic resin flame retardent in accordance with UL94-V0
Pin material: CuSn – Ni flash, SnPb plated
Maximum operating temperature: 180 °C
Resistance to soldering heat: 430 °C, 2s
Solderability: IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn: 49 mm

Dimensions in mm

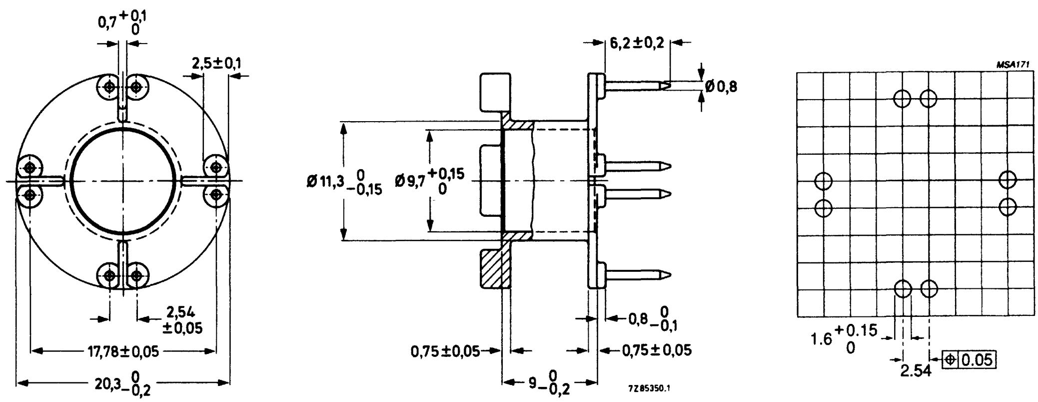


Fig.3 Coil former.

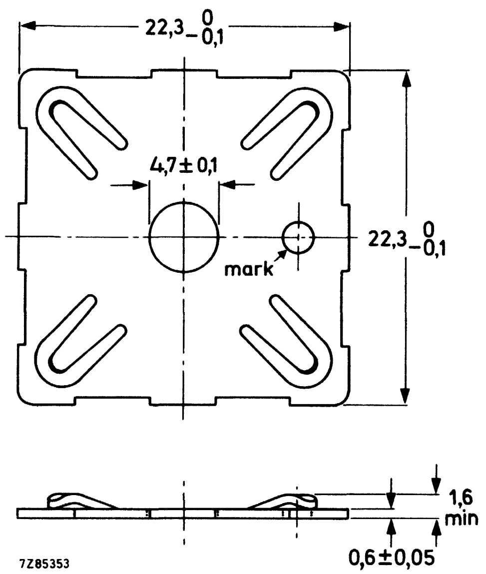
WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITION	WINDING AREA (mm²)	WINDING WIDTH (mm²)	ORDERING CODE
1	8	all	33.9	7.2	4322 021 3287

X cores and accessories | X22

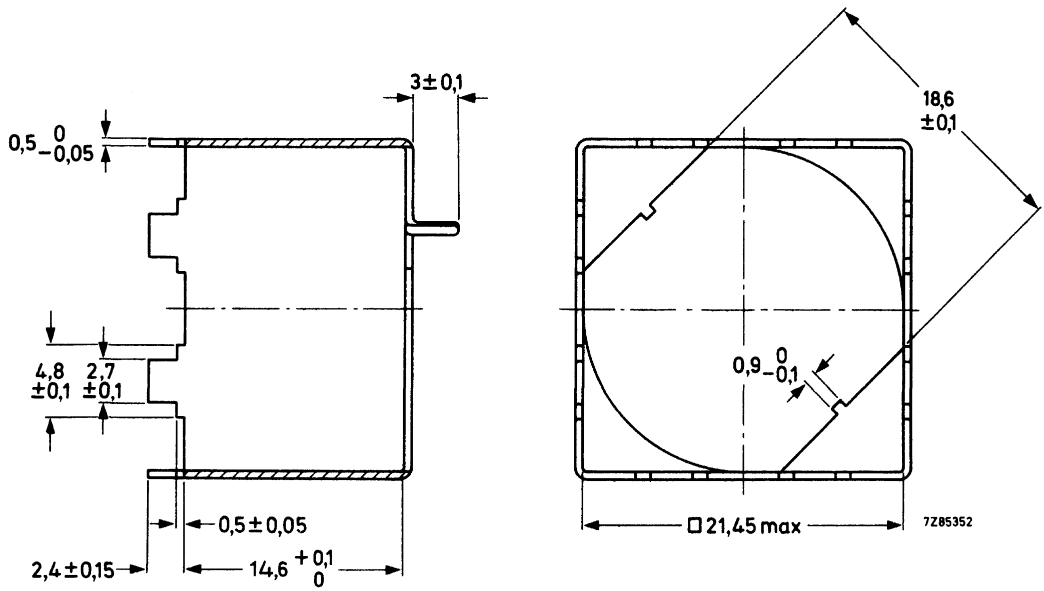
MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
cover	4	4322 021 3023	material: phosphor bronze, nickel plated
container	5	4322 021 3004	material: brass, nickel plated



Dimensions in mm

Fig.4 Cover.



Dimensions in mm

Fig.5 Container.

X cores and accessories X30

Dimensions in mm

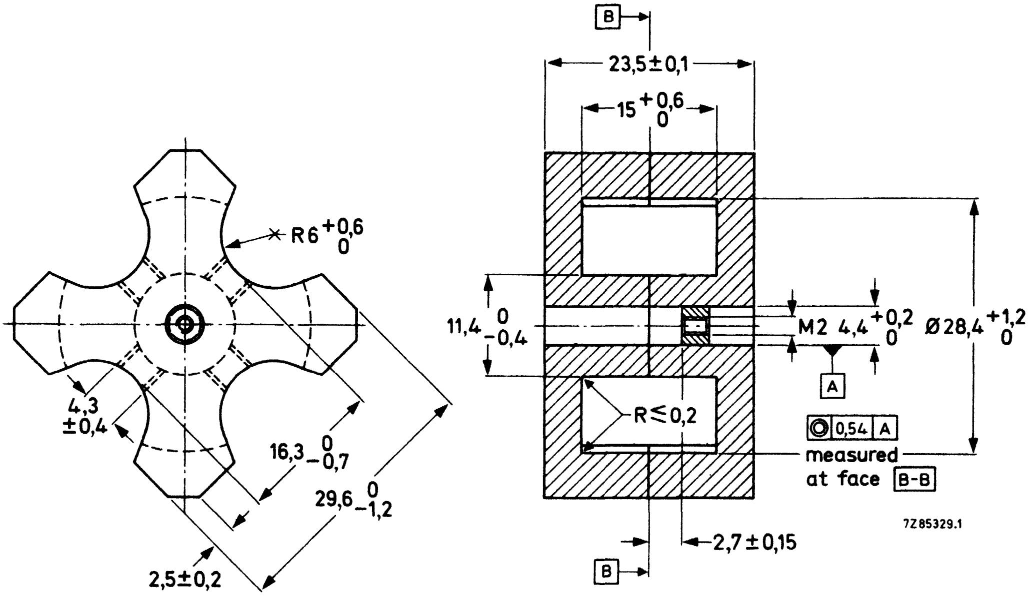


Fig.1 Core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.490	mm^{-1}
V_e	effective volume	6360	mm^3
l_e	effective length	55.8	mm
A_e	effective area	114	mm^2
A_{min}	minimum area	82.6	mm^2
	mass of set	≈ 38	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
3H1	400 ± 3%	≈ 150	≈ 250	4322 022 3928	4322 022 1928
	630 ± 3%	≈ 250	≈ 170	4322 022 3930	4322 022 1930
	1000 ± 10%	≈ 400	≈ 100	4322 022 3931	4322 022 1931
	1600 ± 10%	≈ 625	≈ 50	4322 022 3932	4322 022 1932
	4900 ± 25%	≈ 1960	≈ 0	-	4322 025 1300
3B8	4900 ± 25%	≈ 1960	≈ 0	-	4322 025 1320

* clamping force 200 ± 50 N

X cores and accessories X30

Dimensions in mm

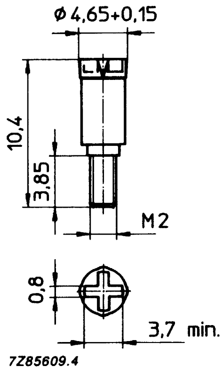


Fig.2 Inductance adjuster.

INDUCTANCE ADJUSTERS - GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3840	black
4322 021 3841	brown
4322 021 3843	orange
4322 021 3849	grey

INDUCTANCE ADJUSTERS - SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1	315	4322 021 3843	7	4322 021 3849	18	4322 021 3841	20
	400	4322 021 3843	6	4322 021 3849	14	4322 021 3841	16
	630	-		4322 021 3841	10	4322 021 3840	19
	1000	4322 021 3841	6	4322 021 3840	9	-	
	1600	-		4322 021 3840	5	-	

X cores and accessories

X30

COIL FORMER DATA

Coil former material: glass reinforced phenolic resin flame retardent in accordance with UL94-V0
Pin material: CuSn – Ni flash, SnPb plated
Maximum operating temperature: 180 °C
Resistance to soldering heat: 430 °C, 2s
Solderability: IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn: 65 mm

Dimensions in mm

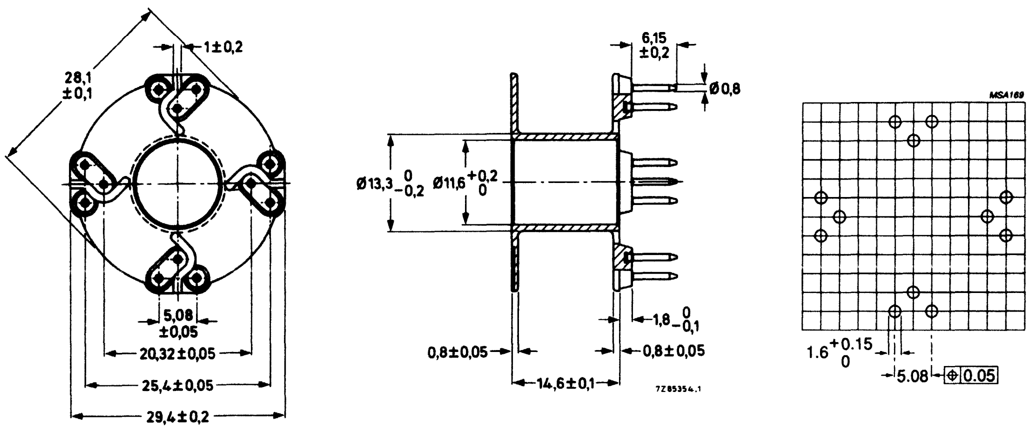


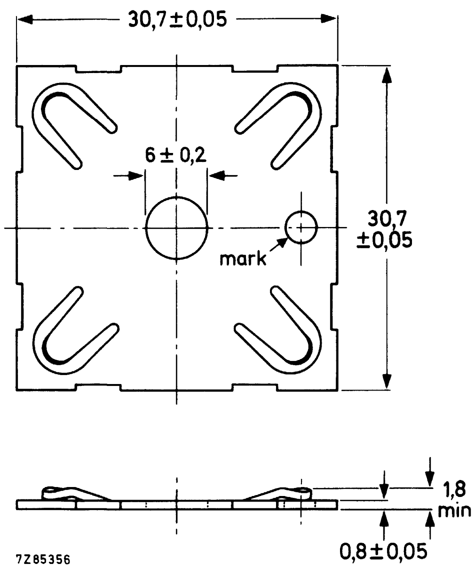
Fig.3 Coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITION	WINDING AREA (mm^2)	WINDING WIDTH (mm^2)	ORDERING CODE
1	12	all	97	12.8	4322 021 3342

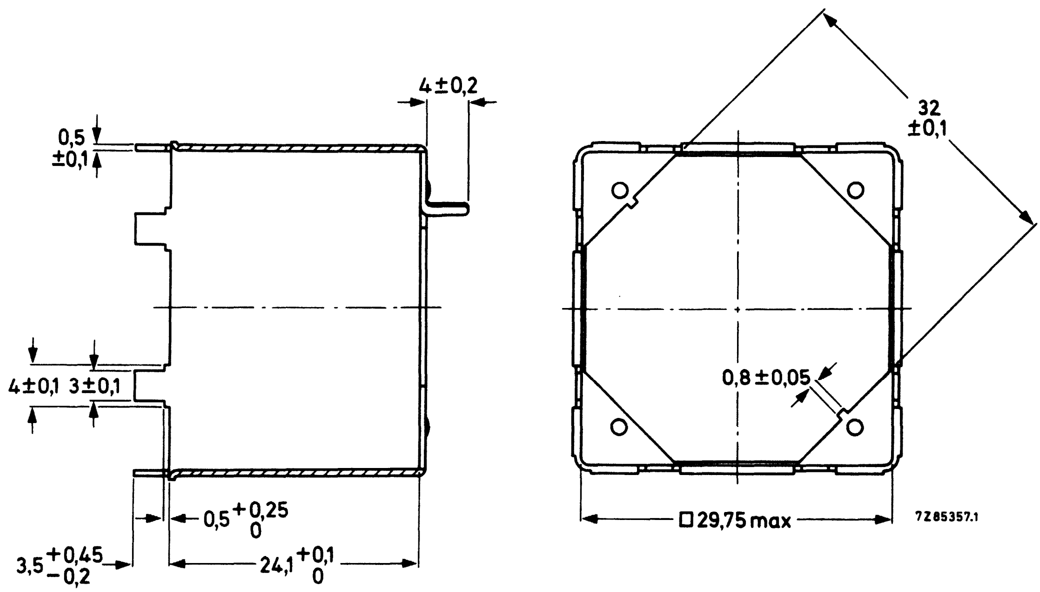
MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
cover	4	4322 021 3115	material: phosphor bronze, nickel plated
container	5	4322 021 3117	material: brass, nickel plated
container	6	4322 021 3362	material: brass, nickel plated
spring	7	4322 021 3021	material: phosphor bronze



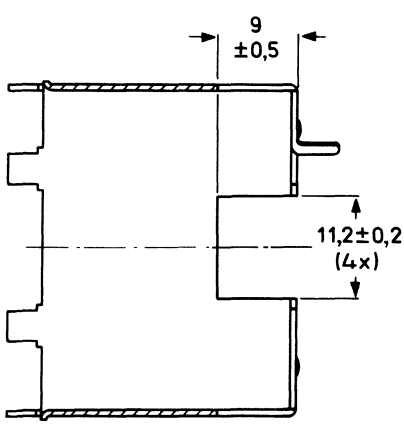
Dimensions in mm

Fig.4 Cover.



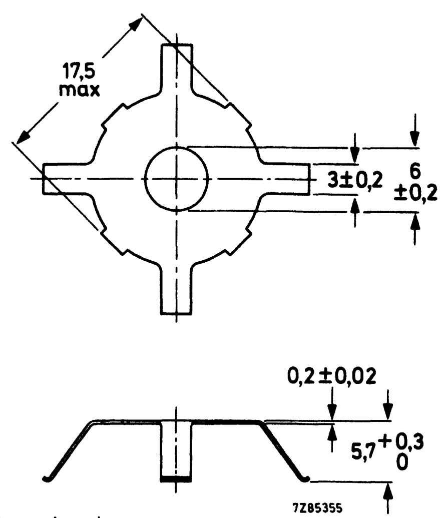
Dimensions in mm

Fig.5 Container.



Dimensions in mm

Fig.6 Container.



Dimensions in mm

Fig.7 Spring.

X cores and accessories

X35

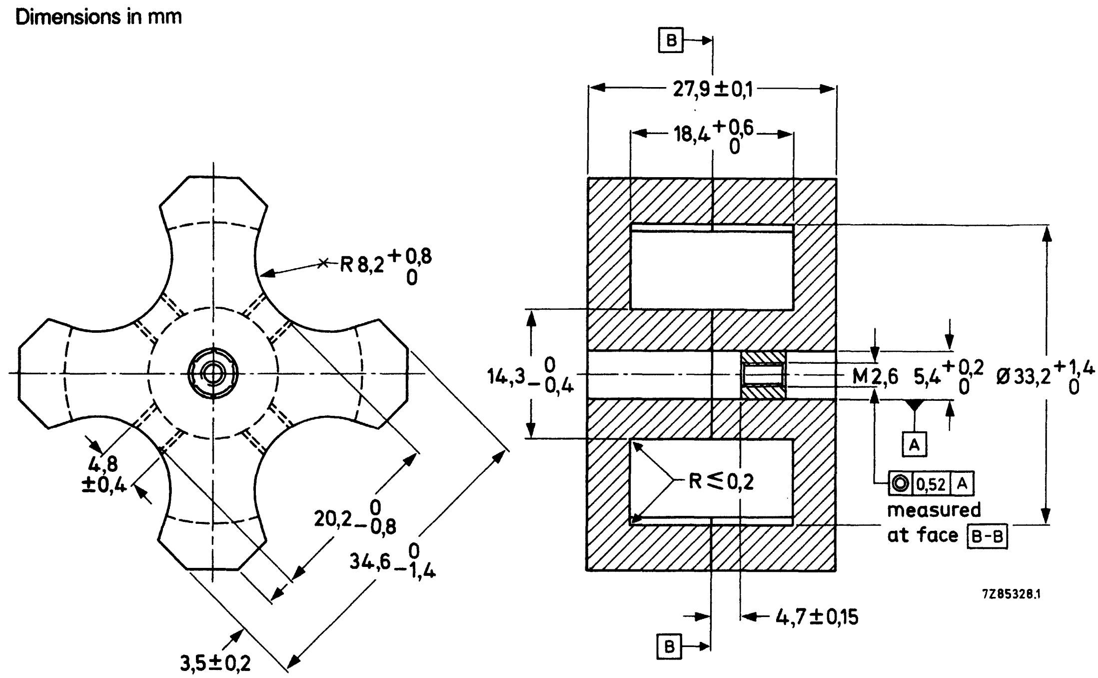


Fig.1 Core set.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.410	mm^{-1}
V_e	effective volume	11000	mm^3
l_e	effective length	67.3	mm
A_e	effective area	164	mm^2
A_{min}	minimum area	132	mm^2
	mass of set	≈ 58	g

CORE SETS FOR FILTER APPLICATIONS

GRADE	A_L* (nH)	μ_e	AIRGAP (µm)	ORDERING CODE (WITH NUT)	ORDERING CODE (WITHOUT NUT)
3H1	400 ± 3%	≈ 130	≈ 500	4322 022 7328	4322 022 5328
	630 ± 3%	≈ 200	≈ 300	4322 022 7330	4322 022 5330
	1000 ± 3%	≈ 325	≈ 150	4322 022 7331	4322 022 5331
	1600 ± 5%	≈ 500	≈ 80	4322 022 7332	4322 022 5332
	6050 ± 25%	≈ 2000	≈ 0	-	4322 022 5320
3B8	6050 ± 25%	≈ 2000	≈ 0	-	4322 022 5300

X cores and accessories X35

Dimensions in mm

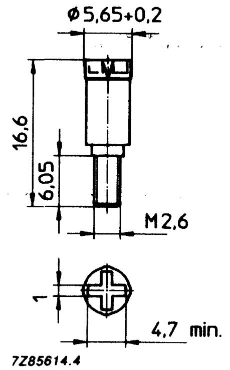


Fig.2 Inductance adjuster.

INDUCTANCE ADJUSTERS - GENERAL DATA

ORDERING CODE	COLOUR
4322 021 3924	yellow
4322 021 3928	white
4322 021 3929	grey

INDUCTANCE ADJUSTERS - SELECTION CHART

GRADE	A_L	LOW ADJUSTMENT	%	MEDIUM ADJUSTMENT	%	HIGH ADJUSTMENT	%
3H1	315	4322 021 3924	8	4322 021 3938	15	-	
	400	4322 021 3924	8	4322 021 3928	12	-	
	630	-		4322 021 3928	7	4322 021 3929	27
	1000	-		4322 021 3929	17	-	
	1600	-		4322 021 3929	9	-	

COIL FORMER DATA

Coil former material: glass reinforced phenolic resin flame retardent in accordance with UL94-V0
Pin material: CuSn – Ni flash, SnPb plated
Maximum operating temperature: 180 °C
Resistance to soldering heat: 430 °C, 2s
Solderability: IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn: 77 mm

Dimensions in mm

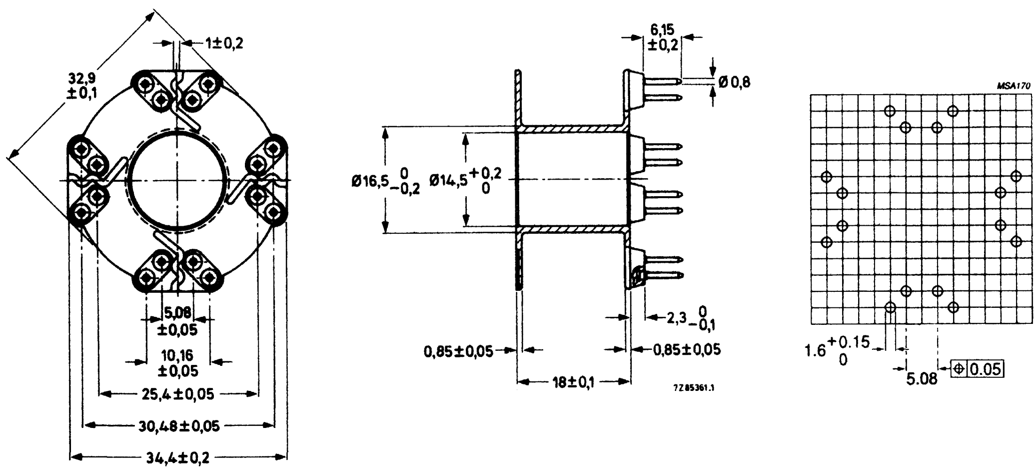


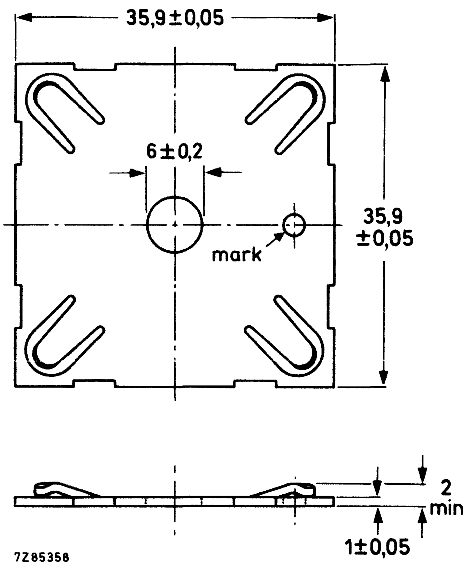
Fig.3 Coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITION	WINDING AREA (mm²)	WINDING WIDTH (mm²)	ORDERING CODE
1	16	all	135	16.1	4322 021 3343

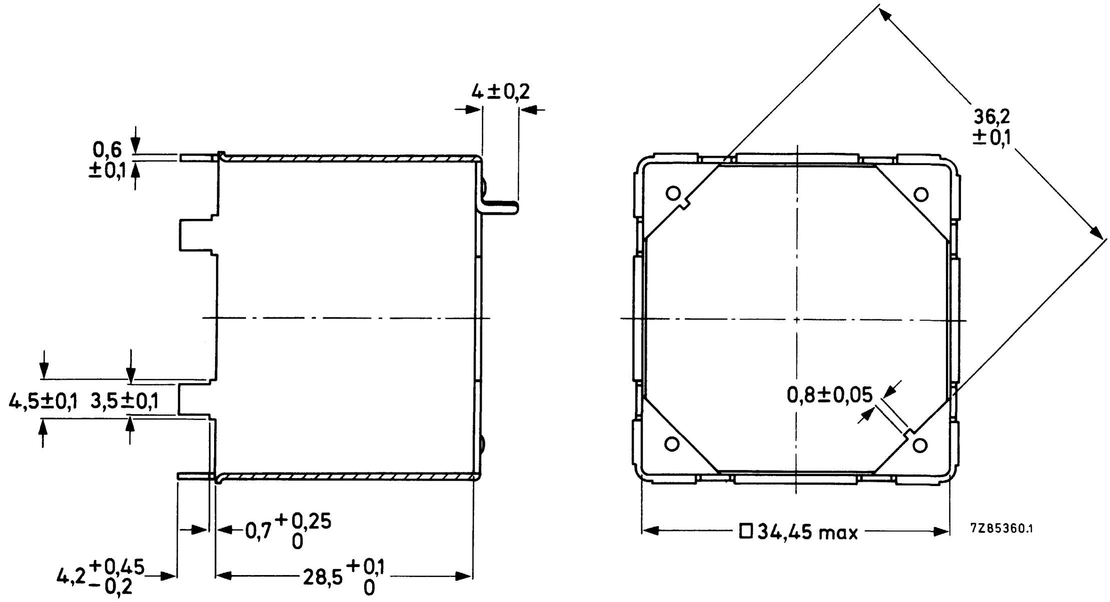
MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
cover	4	4322 021 3116	material: phosphor bronze, nickel plated
container	5	4322 021 3118	material: brass, nickel plated
container	6	4322 021 3363	material: brass, nickel plated
spring	7	4322 021 3022	material: phosphor bronze



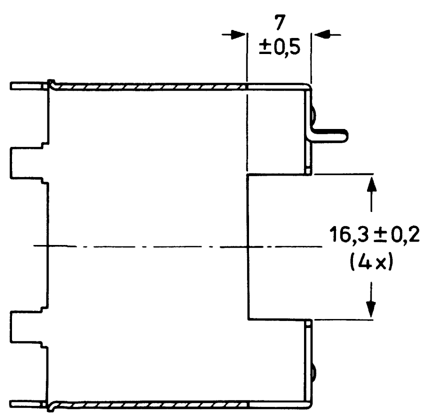
Dimensions in mm

Fig.4 Cover.



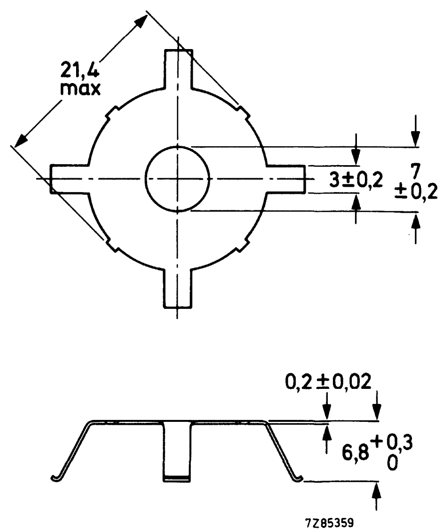
Dimensions in mm

Fig.5 Container.



Dimensions in mm

Fig.6 Container.



Dimensions in mm

Fig.7 Spring.

E cores and accessories
EF cores and accessories

Philips Components

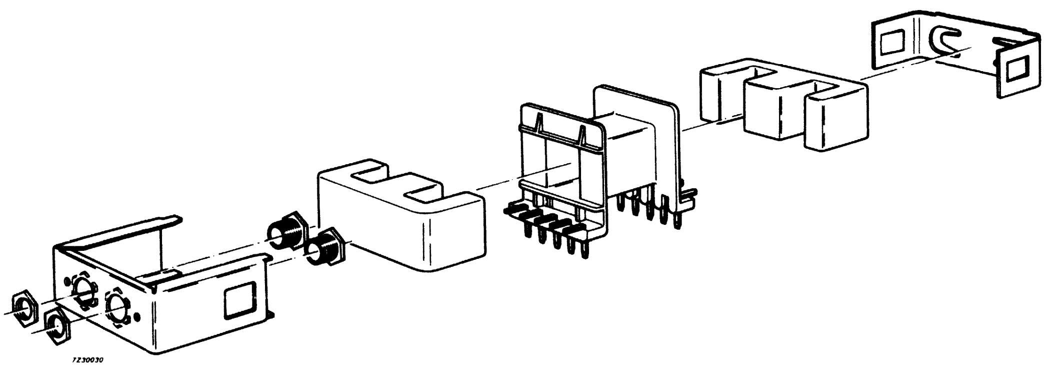
Data sheet	
status	Product specification
date of issue	August 1990

E20/10/5 to E65/32/27

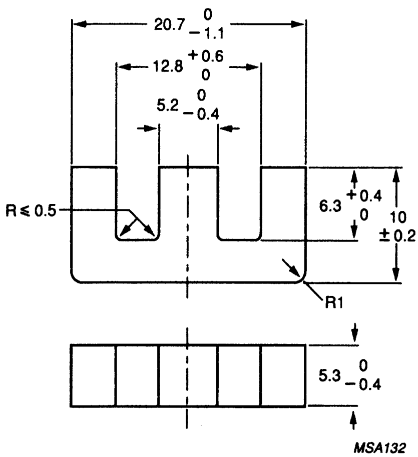
E cores and accessories

EF12.6/7/4 to EF32/16/9

EF cores and accessories



E cores and accessories E20/10/5



Dimensions in mm

Fig.1 E20/10/5 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	1.37	mm^{-1}
V_e	effective volume	1340	mm^3
l_e	effective length	42.8	mm
A_e	effective area	31.2	mm^2
A_{min}	minimum area	25.5	mm^2
	mass of core half	≈ 4	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	1300 ± 25%	≈ 1430	4312 020 3407
	50	≈ 460	≈ 510	4312 020 3536
	150	≈ 210	≈ 230	4312 020 3537
	500	≈ 85	≈ 100	4312 020 4538
3C85	≈ 0	1300 ± 25%	≈ 1430	4312 020 4539
	50	≈ 460	≈ 510	4312 020 4540
	150	≈ 210	≈ 230	4312 020 4541
	500	≈ 85	≈ 100	4312 020 4542
3F3	≈ 0	1150 ± 25%	≈ 1270	4312 020 4552
	50	≈ 450	≈ 510	4312 020 4578
	150	≈ 210	≈ 230	4312 020 4579
	500	≈ 85	≈ 100	4312 020 4580
3C11	≈ 0	2600 ± 25%	≈ 2850	4312 020 3597

* measured in combination with an ungapped core half, clamping force 20 ± 10 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 0.50	-	-
3C85	≥ 320	≤ 0.25	≤ 0.27	-
3F3	≥ 320	-	≤ 0.15	≤ 0.25

COIL FORMER DATA

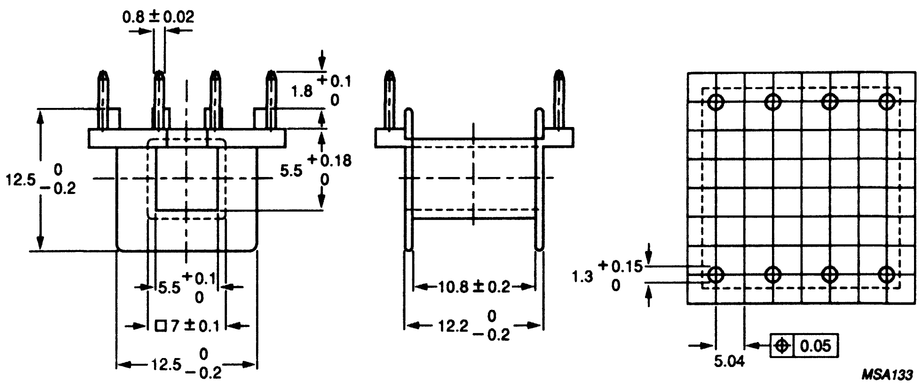
Coil former material: phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 180 °C

Resistance to soldering heat: 430 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1



Dimensions in mm

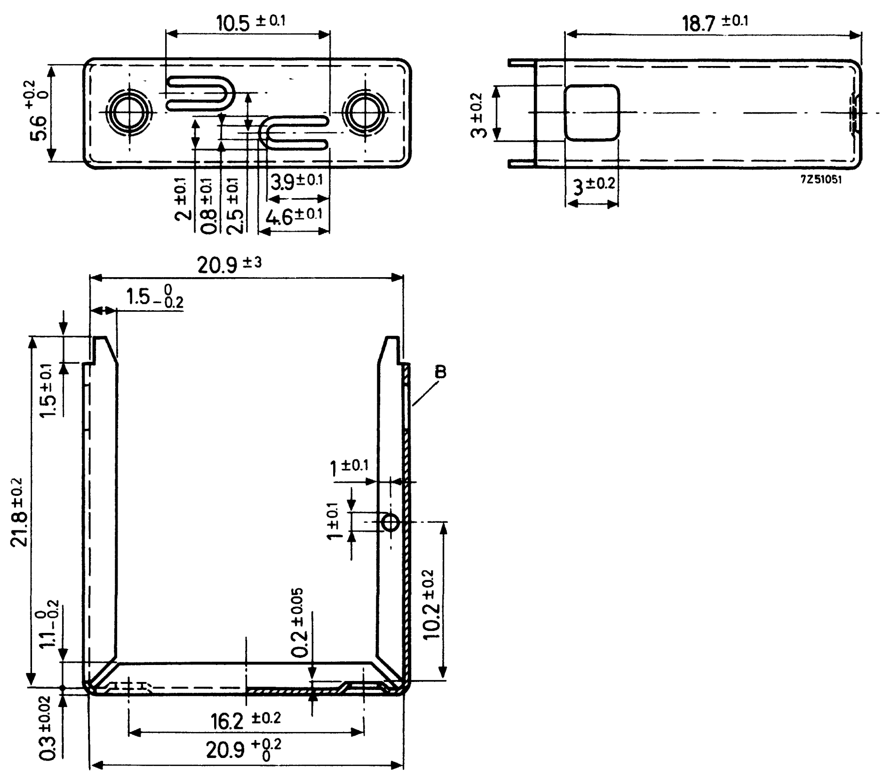
Fig.2 E20/10/5 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	8	27	10.6	38	4322 021 2024

MOUNTING PARTS

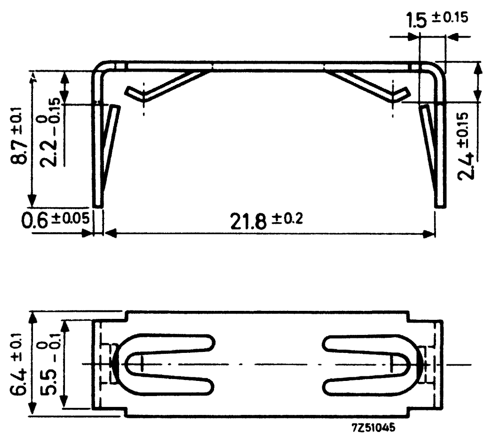
ITEM	FIG. NO.	ORDERING CODE	REMARKS
clasp	3	4322 021 2016	material: brass, tin plated
spring	4	4322 021 2022	material: phosphor bronze, tin plated



Dimensions in mm

Fig.3 Clasp.

E cores and accessories E20/10/5

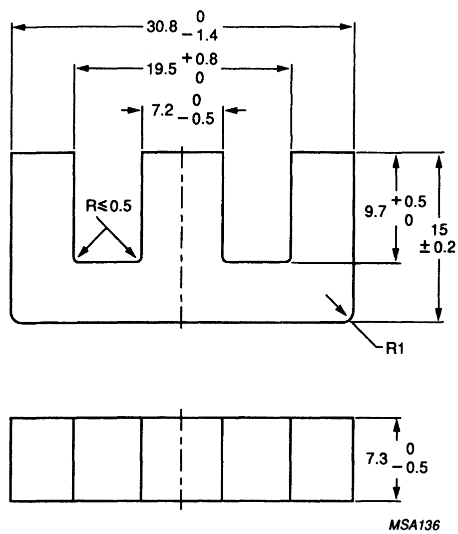


Dimensions in mm

Fig.4 Spring.

E cores and accessories

E30/15/7



Dimensions in mm

Fig.1 E30/15/7 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	1.12	mm^{-1}
V_e	effective volume	4000	mm^3
l_e	effective length	67.0	mm
A_e	effective area	60.0	mm^2
A_{min}	minimum area	49.0	mm^2
	mass of core half	≈ 11	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	1900 ± 25%	≈ 1700	4312 020 3455
	100	≈ 480	≈ 430	4312 020 3533
	200	≈ 300	≈ 260	4312 020 3534
	500	≈ 150	≈ 140	4312 020 3480
	800	≈ 110	≈ 100	4312 020 3535
3C85	≈ 0	1900 ± 25%	≈ 1700	4312 020 4543
	100	≈ 480	≈ 430	4312 020 4544
	200	≈ 300	≈ 260	4312 020 4545
	500	≈ 150	≈ 140	4312 020 4546
	800	≈ 110	≈ 100	4312 020 4547
3F3	≈ 0	1600 ± 25%	≈ 1400	4312 020 4553
	100	≈ 470	≈ 420	4312 020 4564
	200	≈ 300	≈ 270	4312 020 4568
	500	≈ 150	≈ 140	4312 020 4577
	800	≈ 110	≈ 100	4312 020 4581
3C11	≈ 0	3300 ± 25%	≈ 2930	4312 020 4647

* measured in combination with an ungapped core half, clamping force 20 ± 10 N

E cores and accessories E30/15/7

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	Pv (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	Pv (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	Pv (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 0.90	-	-
3C85	≥ 320	≤ 0.65	≤ 0.75	-
3F3	≥ 320	-	≤ 0.45	≤ 0.75

COIL FORMER DATA

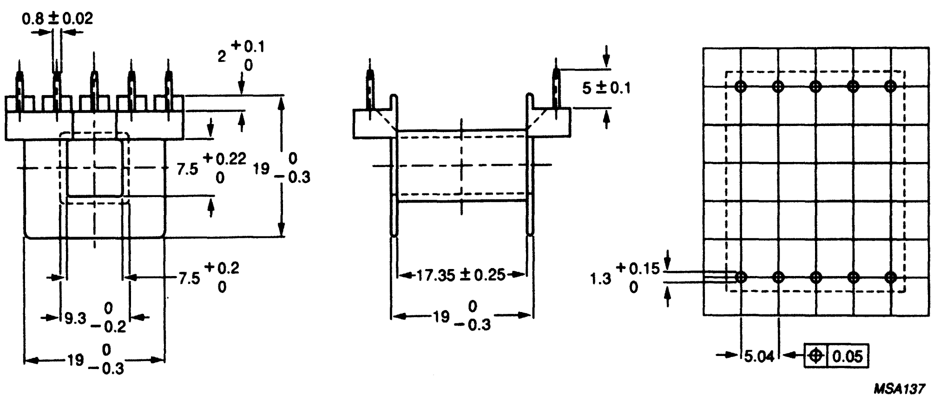
Coil former material: phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 180 °C

Resistance to soldering heat: 430 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1



Dimensions in mm

Fig.2 E30/15/7 coil former with pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	10	80	17.1	56	4322 021 2025

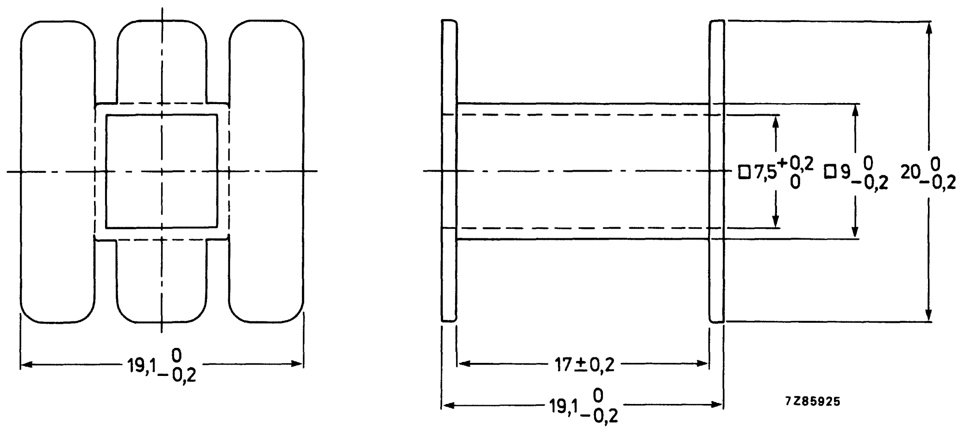
E cores and accessories

E30/15/7

COIL FORMER DATA

Coil former material: polyamide (PA6.6), glass reinforced, flame retardent in accordance with UL94V-HB

Maximum operating temperature: 130 °C



Dimensions in mm

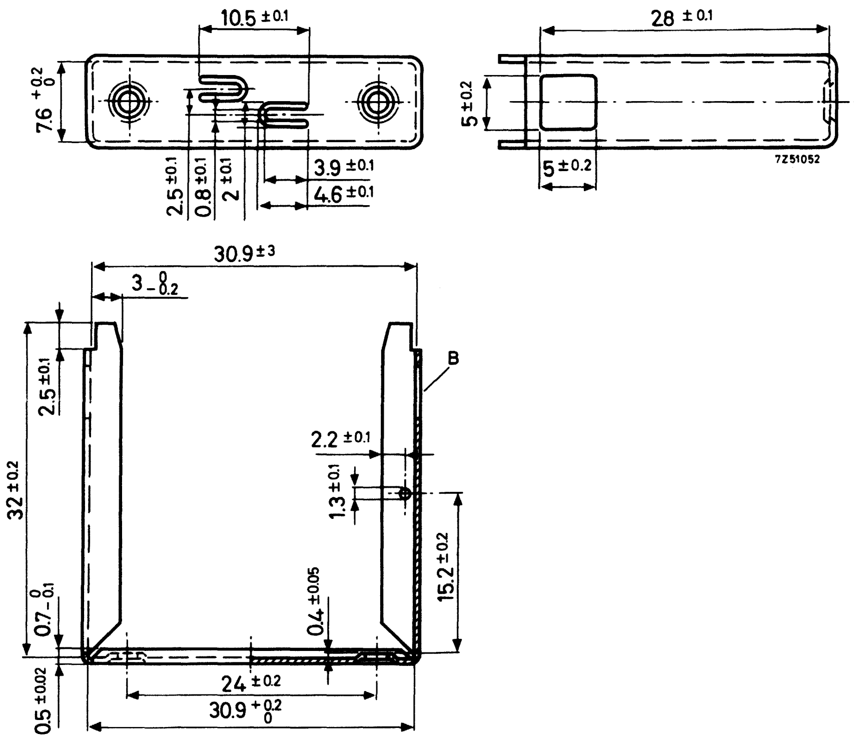
Fig.3 E30/15/7 coil former without pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	0	80	16.8	56	4312 021 2855

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
clasp	4	4322 021 2017	material: CrNi steel
spring	5	4322 021 2023	material: CrNi steel



Dimensions in mm

Fig.4 Clasp.

Dimensions in mm

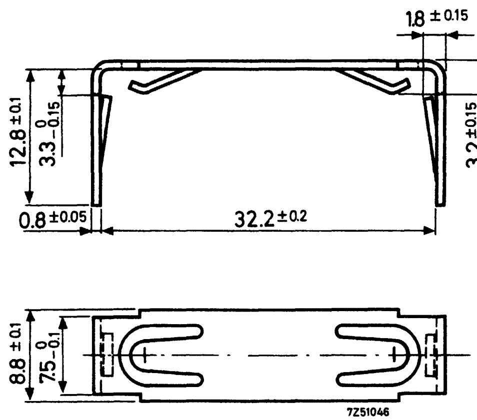
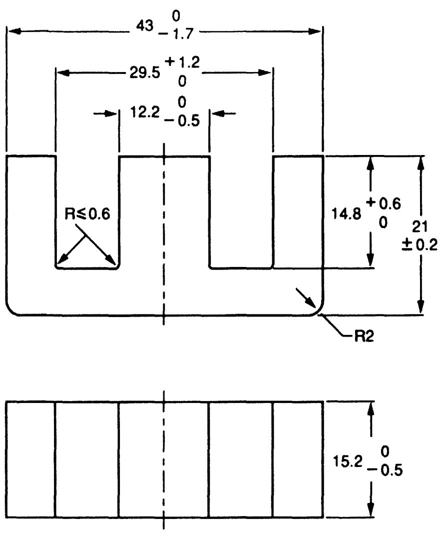


Fig.5 Spring.

E cores and accessories E42/21/15



Dimensions in mm

Fig.1 E42/21/15 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	0.534	mm^{-1}
V_e	effective volume	17600	mm^3
l_e	effective length	97.0	mm
A_e	effective area	182	mm^2
A_{min}	minimum area	175	mm^2
	mass of core half	≈ 44	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	3900 ± 25%	≈ 1660	4312 020 3411
	100	≈ 1400	≈ 600	4312 020 3529
	200	≈ 900	≈ 380	4312 020 3530
	500	≈ 490	≈ 210	4312 020 3480
	800	≈ 330	≈ 140	4312 020 3496
3C85	≈ 0	3900 ± 25%	≈ 1660	4312 020 3564
	100	≈ 1400	≈ 600	4312 020 4548
	200	≈ 900	≈ 380	4312 020 3581
	500	≈ 490	≈ 210	4312 020 4549
	800	≈ 330	≈ 140	4312 020 4600
3F3	≈ 0	3600 ± 25%	≈ 1530	4312 020 4550
	100	≈ 1350	≈ 580	4312 020 4582
	200	≈ 900	≈ 380	4312 020 4583
	500	≈ 490	≈ 210	4312 020 4584
	800	≈ 330	≈ 140	4312 020 4585
3C11	≈ 0	8000 ± 25%	≈ 3400	4312 020 3598

* measured in combination with an ungapped core half, clamping force 40 ± 20 N

E cores and accessories E42/21/15

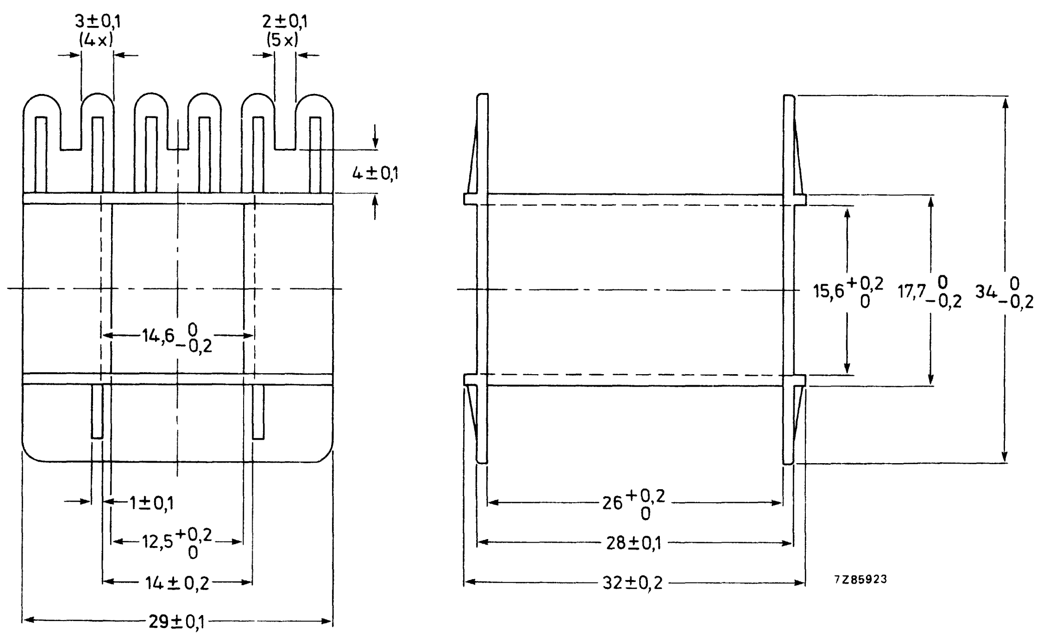
PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	Pv (W) at f = 25 kHz; B̂ = 200 mT; T = 100 °C	Pv (W) at f = 100 kHz; B̂ = 100 mT; T = 100 °C	Pv (W) at f = 400 kHz; B̂ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 4.0	-	-
3C85	≥ 320	≤ 2.8	≤ 3.2	-
3F3	≥ 320	-	≤ 2.0	≤ 3.8

COIL FORMER DATA

Coil former material: pclyamide (PA6.6), glass reinforced, flame retardent in accordance with UL94V-HB

Maximum operating temperature: 130 °C



Dimensions in mm

Fig.2 E42/21/15 coil former, no pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm²)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	0	178	26	93	4312 021 2862

E cores and accessories | E42/21/15

COIL FORMER DATA

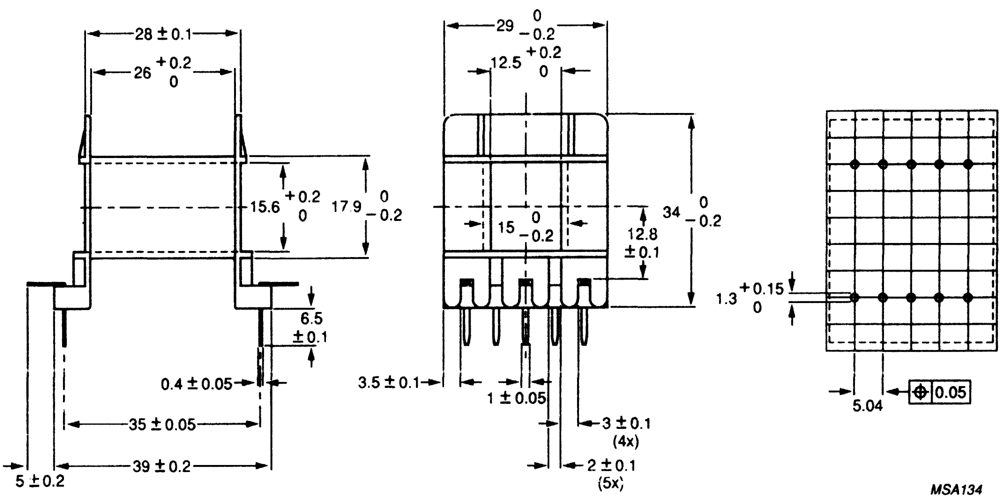
Coil former material: polyamide (PA6.6), glass reinforced, flame retardent in accordance with UL94V-HB

Pin material: CuSn, SnPb plated

Maximum operating temperature: 180 °C

Resistance to soldering heat: 430 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1



Dimensions in mm

Fig.3 E42/21/15 coil former, 10 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	10	178	26	93	4322 021 3183

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
clasp	4	4322 021 3191	material: CrNi steel
spring	5	4322 021 3192	material: CrNi steel
bush	6	4322 021 3072	material: nickel plated brass
nut	7	4322 021 3071	material: nickel plated brass

E cores and accessories

Dimensions in mm

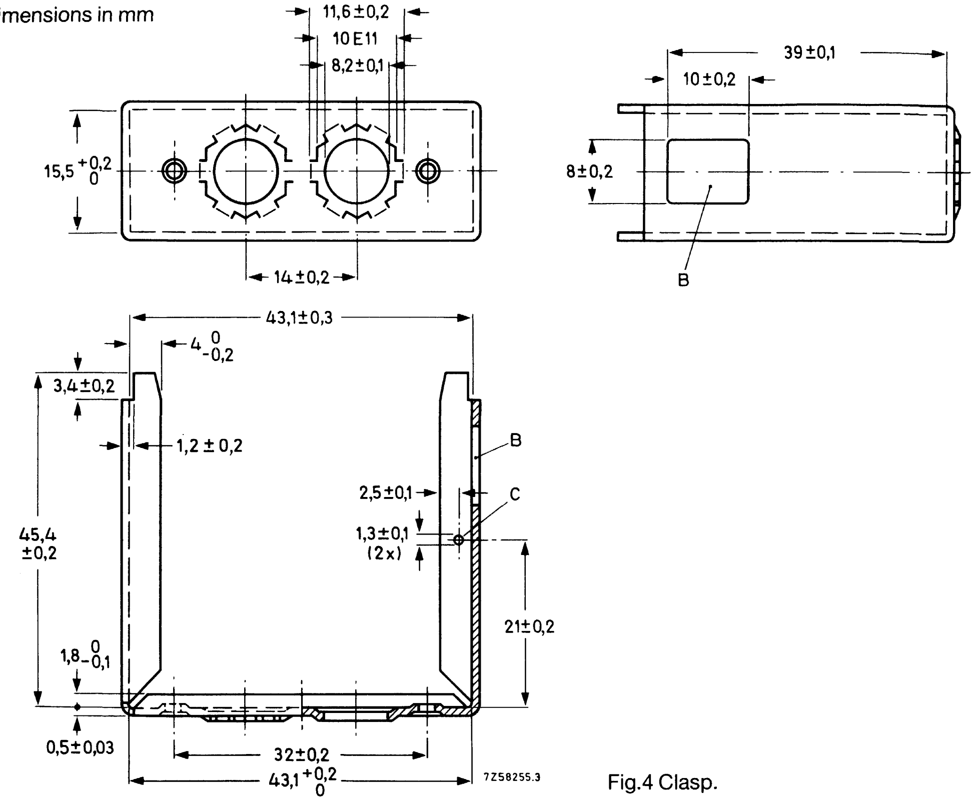


Fig.4 Clasp.

Dimensions in mm

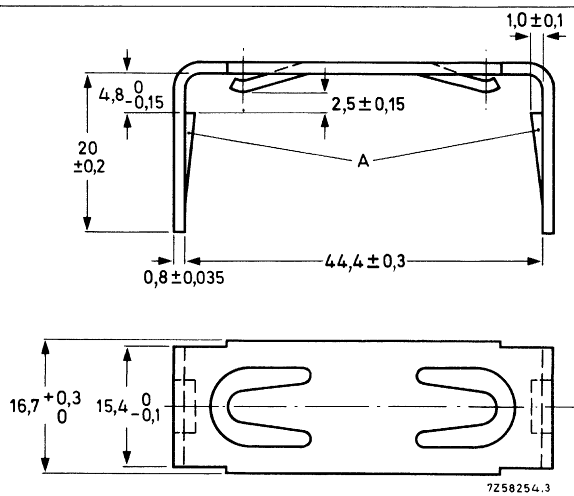


Fig.5 Spring.

Dimensions in mm

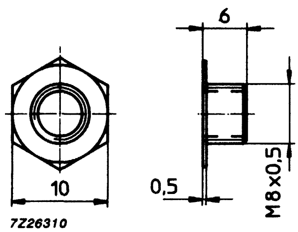


Fig.6 Bush.

Dimensions in mm

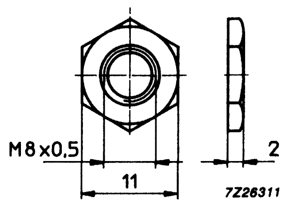


Fig.7 Nut.

Dimensions in mm

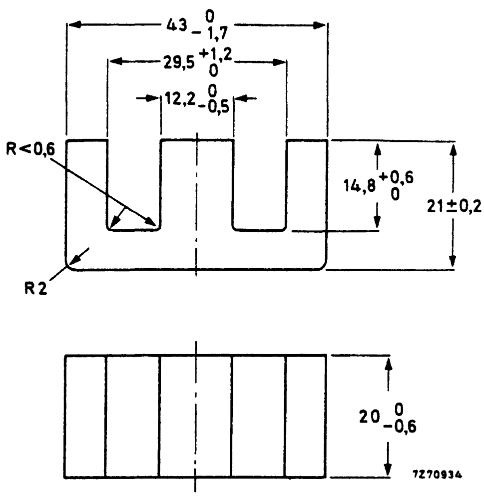


Fig.1 E42/21/20 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.415	mm^{-1}
V_e	effective volume	23100	mm^3
l_e	effective length	98.0	mm
A_e	effective area	236	mm^2
A_{min}	minimum area	236	mm^2
	mass of core half	≈ 56	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	5000 ± 25%	≈ 1650	4312 020 3412
	100	≈ 1900	≈ 630	4312 020 3523
	200	≈ 1200	≈ 400	4312 020 3524
	500	≈ 650	≈ 210	4312 020 3525
	800	≈ 440	≈ 145	4312 020 3426
3C85	≈ 0	5000 ± 25%	≈ 1650	4312 020 3565
	100	≈ 1900	≈ 630	4312 020 4601
	200	≈ 1200	≈ 400	4312 020 4602
	500	≈ 650	≈ 210	4312 020 4603
	800	≈ 440	≈ 145	4312 020 4604
3F3	≈ 0	4600 ± 25%	≈ 1500	4312 020 4551
	100	≈ 1800	≈ 600	4312 020 4586
	200	≈ 1200	≈ 400	4312 020 4587
	500	≈ 650	≈ 210	4312 020 4588
	800	≈ 440	≈ 145	4312 020 4589

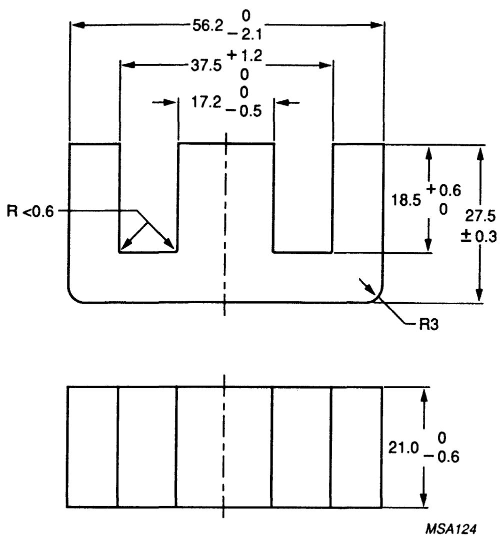
* measured in combination with an ungapped core half, clamping force 40 ± 20 N

E cores and accessories E42/21/20

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	Pv (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	Pv (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	Pv (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 5.2	-	-
3C85	≥ 320	≤ 3.6	≤ 4.2	-
3F3	≥ 320	-	≤ 2.6	≤ 5.1

E cores and accessories E55/28/21



Dimensions in mm

Fig.1 E55/28/21 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	0.348	mm^{-1}
V_e	effective volume	43700	mm^3
l_e	effective length	123	mm
A_e	effective area	354	mm^2
A_{min}	minimum area	349	mm^2
	mass of core half	≈ 115	g

CORE HALVES

GRADE	AIRGAP (µm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	6300 ± 25%	≈ 1750	4312 020 3410
	150	≈ 2100	≈ 580	4312 020 3518
	450	≈ 940	≈ 260	4312 020 3521
	1200	≈ 430	≈ 120	4312 020 3492
3C85	≈0	5000 ±25%	≈ 1650	4312 020 3591
	150	≈ 1900	≈ 630	4312 020 4605
	450	≈ 1200	≈ 400	4312 020 4606
	1200	≈ 650	≈ 210	4312 020 4607
3F3	≈ 0	5700 ± 25%	≈ 1580	4312 020 4590
	150	≈ 2000	≈ 550	4312 020 4591
	450	≈ 940	≈ 260	4312 020 4592
	1200	≈ 430	≈ 120	4312 020 4593
3C11	≈ 0	12800 ± 25%	≈ 3500	4312 020 4504

* measured in combination with an ungapped core half, clamping force 40 ± 20 N

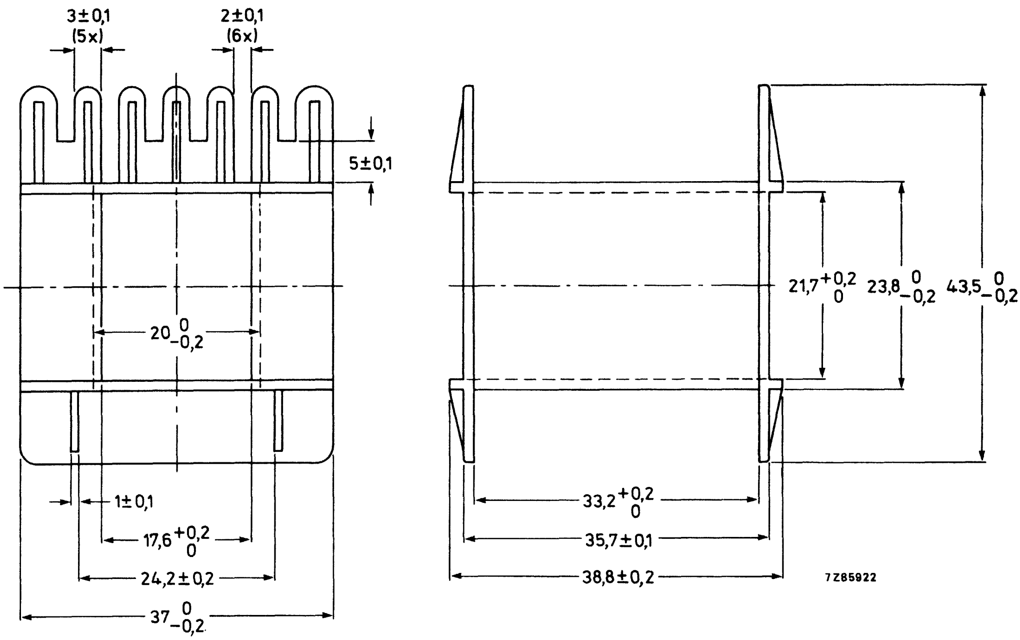
PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	Pv (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	Pv (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	Pv (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 10.0	-	-
3C85	≥ 320	≤ 6.7	≤ 7.8	-
3F3	≥ 320	-	≤ 4.8	≤ 10.4

COIL FORMER DATA

Coil former material: polyamide (PA6.6), glass reinforced, flame retardent in accordance with UL94V-HB

Maximum operating temperature: 130 °C



Dimensions in mm

Fig.2 E55/28/21 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm²)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	0	250	33.2	116	4312 021 2871

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
clasp	3	4312 021 2609	material: steel, zinc plated
spring	4	4312 021 2613	material: steel, zinc plated

Dimensions in mm

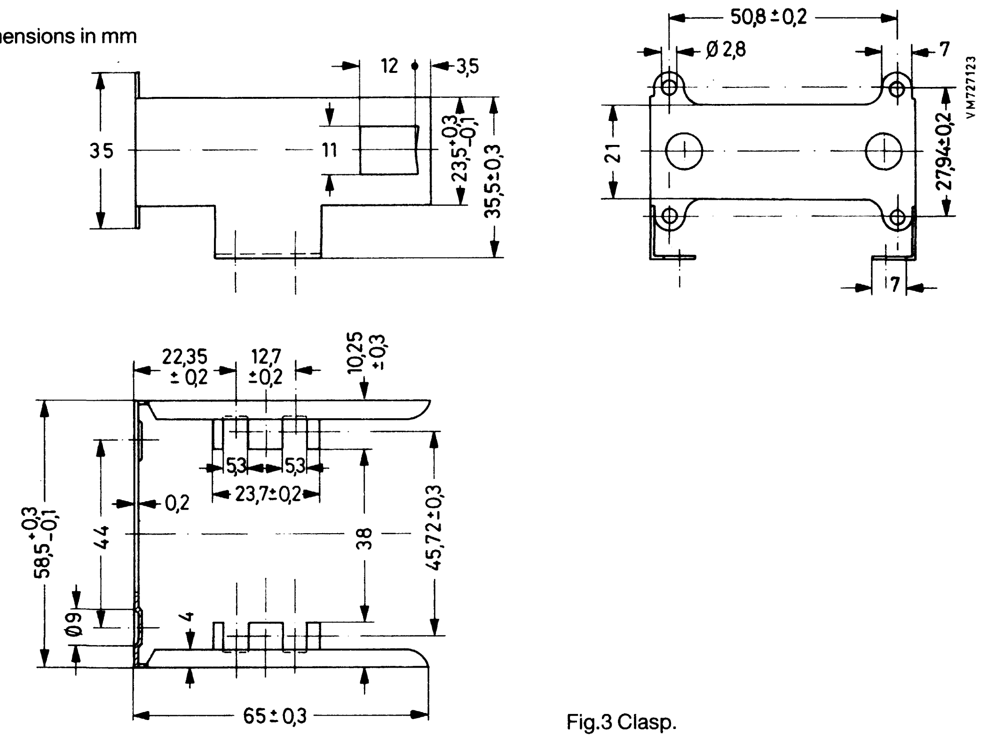


Fig.3 Clasp.

Dimensions in mm

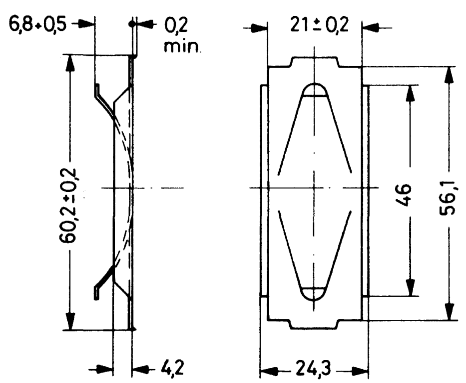
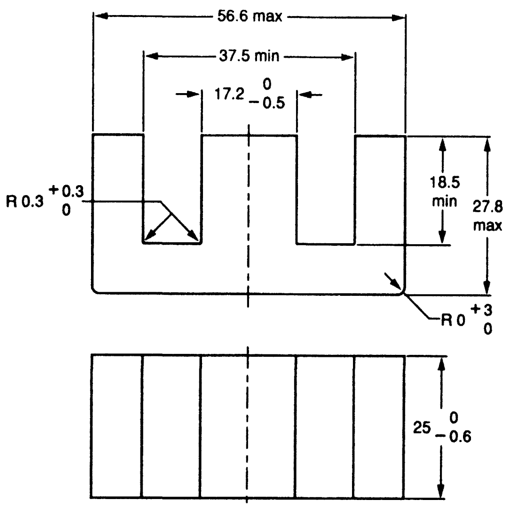


Fig.4 Spring.

E cores and accessories | E55/28/25



Dimensions in mm

Fig.1 E55/28/25 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.293	mm^{-1}
V_e	effective volume	52000	mm^3
l_e	effective length	123	mm
A_e	effective area	420	mm^2
A_{min}	minimum area	420	mm^2
	mass of core half	≈ 130	g

CORE HALVES

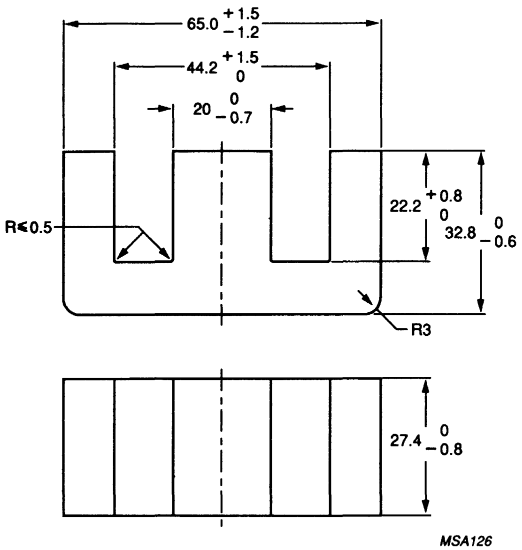
GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	7400 ± 25%	≈ 1700	4312 020 4515
	500	≈ 950	≈ 220	4312 020 4608
	1500	≈ 410	≈ 100	4312 020 4609
	2500	≈ 280	≈ 70	4312 020 4503
3C85	≈ 0	7400 ± 25%	≈ 1700	4312 020 3592
	500	≈ 220	≈ 220	4312 020 4610
	1500	≈ 100	≈ 100	4312 020 4611

* measured in combination with an ungapped core half, clamping force 40 ± 20 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 11.5	-	-
3C85	≥ 320	≤ 8.0	≤ 9.4	-

E cores and accessories E65/32/27



Dimensions in mm

Fig.1 E65/32/27 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.275	mm^{-1}
V_e	effective volume	78200	mm^3
l_e	effective length	147	mm
A_e	effective area	532	mm^2
A_{min}	minimum area	538	mm^2
	mass of core half	≈ 200	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	8400 ± 25%	≈ 1850	4312 020 3438
	150	≈ 2900	≈ 630	4312 020 3512
	450	≈ 1300	≈ 280	4312 020 3515
	1250	≈ 600	≈ 130	4312 020 3587
3C85	≈ 0	8400 ± 25%	≈ 1850	4312 020 4612
	150	≈ 2900	≈ 630	4312 020 4613
	450	≈ 1300	≈ 280	4312 020 4614
	1250	≈ 600	≈ 130	4312 020 4615
3F3	≈ 0	7300 ± 25%	≈ 1600	4312 020 4594
	150	≈ 2800	≈ 610	4312 020 4595
	450	≈ 1300	≈ 280	4312 020 4596
	1250	≈ 600	≈ 130	4312 020 4597
3C11	≈ 0	16700 ± 25%	≈ 3650	4312 020 4505

* measured in combination with an ungapped core half, clamping force 60 ± 20 N

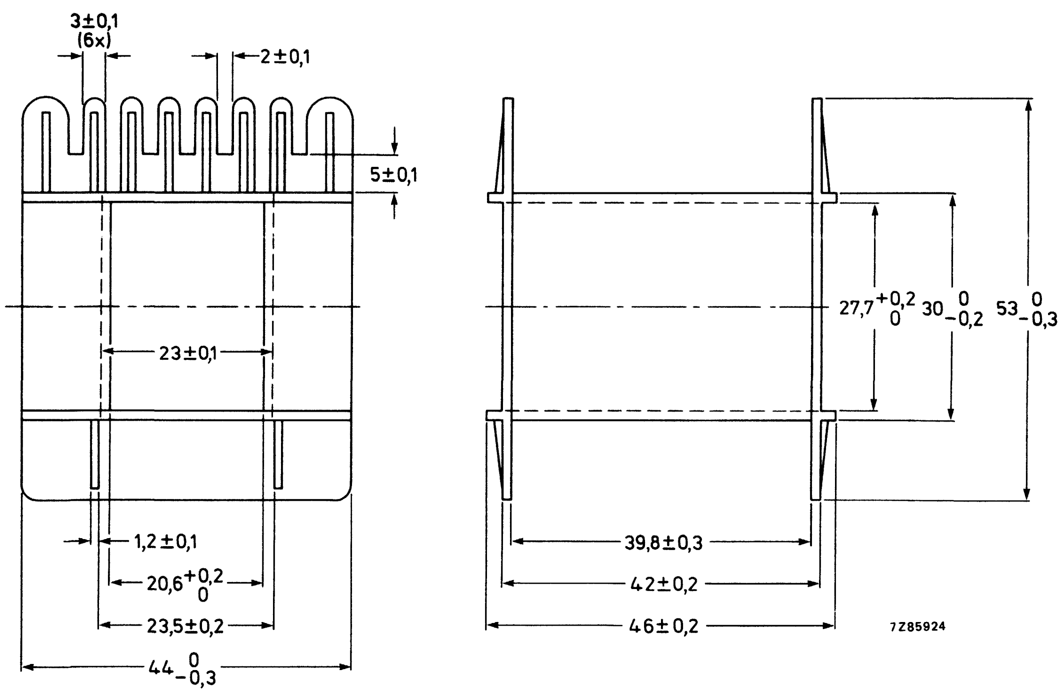
PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 17.0	-	-
3C85	≥ 320	≤ 12.0	≤ 14.0	-
3F3	≥ 320	-	≤ 8.8	≤ 21.5

COIL FORMER DATA

Coil former material: polyamide (PA6.6), glass reinforced, flame retardent in accordance with UL94V-HB

Maximum operating temperature: 130 °C



Dimensions in mm

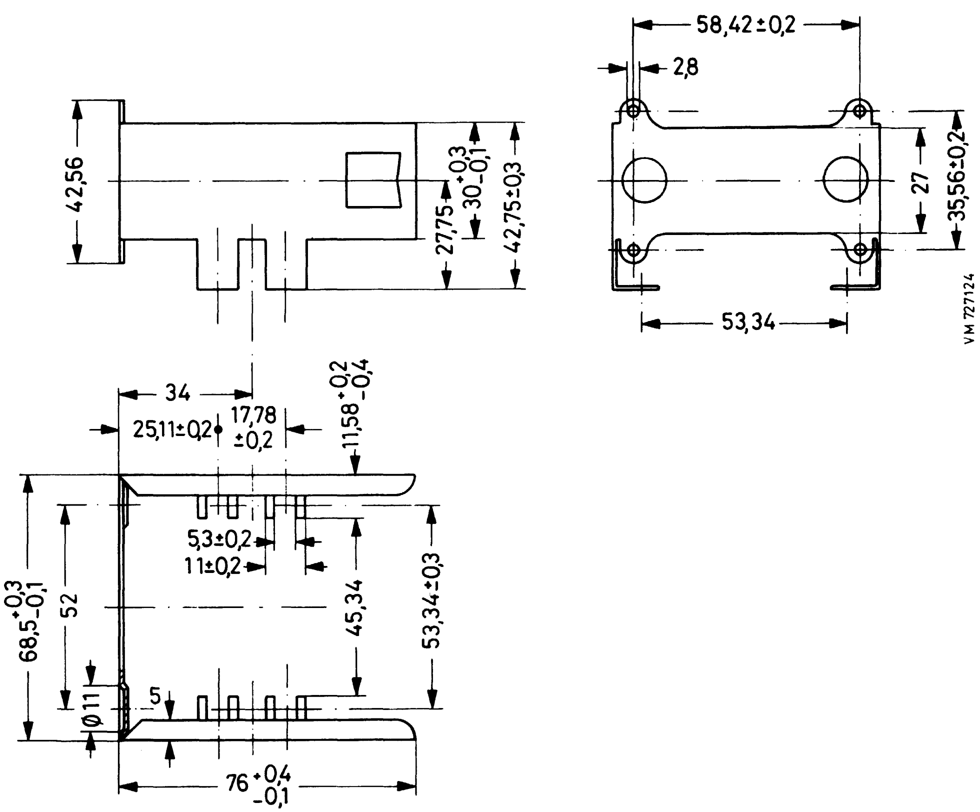
Fig.2 E65/32/27 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	0	394	39.5	150	4322 021 2872

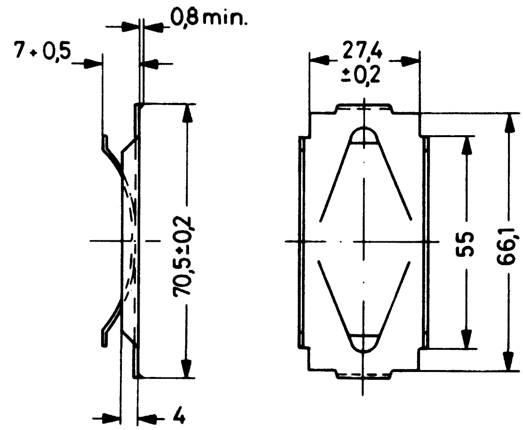
MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
clasp	3	4312 021 2611	material: steel, zinc plated
spring	4	4312 021 2614	material: steel, zinc plated



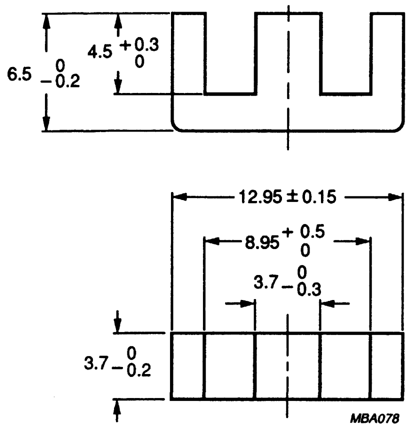
Dimensions in mm

Fig.3 Clasp.



Dimensions in mm

Fig.4 Spring.



Dimensions in mm

Fig.1 EF12.6/7/4 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	2.27	mm^{-1}
V_e	effective volume	384	mm^3
l_e	effective length	29.6	mm
A_e	effective area	13.0	mm^2
	mass of core half	≈ 0.9	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	900 ± 25%	≈ 1600	4312 020 3447
	50	≈ 250	≈ 450	4312 020 4616
	150	≈ 110	≈ 200	4312 020 4508
	500	≈ 45	≈ 80	4312 020 4509
3C85	≈ 0	900 ± 25%	≈ 1600	4312 020 4510
	50	≈ 250	≈ 450	4312 020 4511
	150	≈ 110	≈ 200	4312 020 4512
	500	≈ 45	≈ 80	4312 020 4513
3F3	≈ 0	700 ± 25%	≈ 1300	4312 020 4556
	50	≈ 245	≈ 440	4312 020 4557
	150	≈ 110	≈ 200	4312 020 4558
	500	≈ 45	≈ 80	4312 020 4559
3C11	≈ 0	1200 ± 25%	≈ 2200	4312 020 4514

* measured in combination with an ungapped core half, clamping force 15 ± 5 N

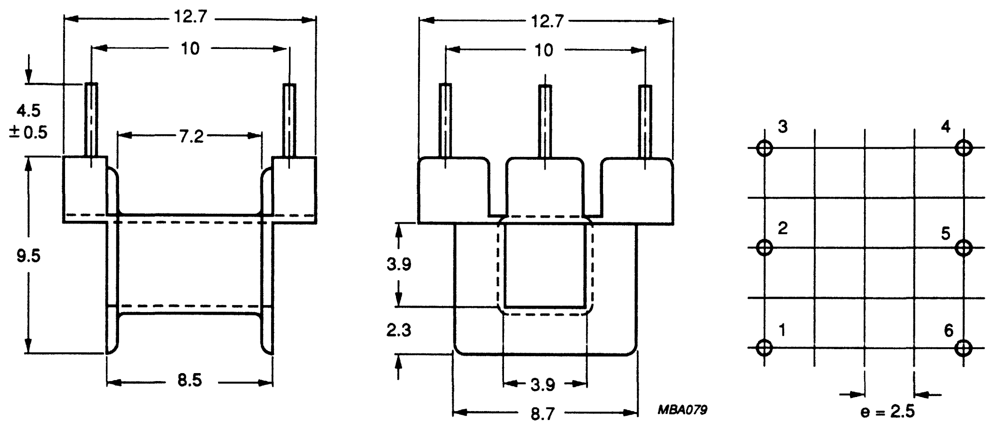
PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 0.1	-	-
3C85	≥ 320	≤ 0.06	≤ 0.07	-
3F3	≥ 320	-	≤ 0.05	≤ 0.07

EF cores and accessories | EF12.6/7/4

COIL FORMER DATA

Coil former material:	polyamide (PA6.6), glass reinforced, flame retardent in accordance with UL94V-HB
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	130 °C
Resistance to soldering heat:	350 °C, 2 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	24 mm



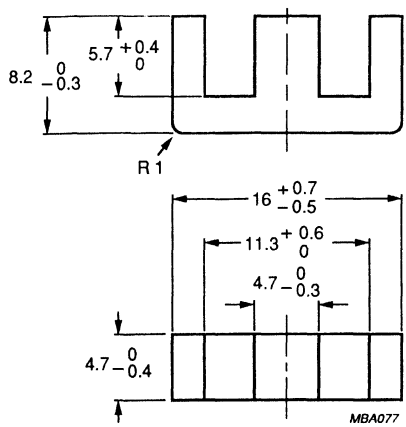
Dimensions in mm

Fig.2 EF12.6/7/4 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	6	all	11.6	7.2	4312 021 2620

EF cores and accessories EF16/8/5



Dimensions in mm

Fig.1 EF16/8/5 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	1.87	mm^{-1}
V_e	effective volume	754	mm^3
l_e	effective length	37.6	mm
A_e	effective area	20.1	mm^2
	mass of core half	≈ 2.3	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	1000 ± 25%	≈ 1500	4312 020 3555
	50	≈ 350	≈ 520	4312 020 4516
	150	≈ 165	≈ 240	4312 020 4517
	500	≈ 70	≈ 100	4312 020 4518
3C85	≈ 0	1000 ± 25%	≈ 1500	4312 020 4519
	50	≈ 350	≈ 520	4312 020 4520
	150	≈ 165	≈ 240	4312 020 4521
	500	≈ 70	≈ 105	4312 020 4522
3F3	≈ 0	900 ± 25%	≈ 1300	4312 020 4560
	50	≈ 340	≈ 500	4312 020 4561
	150	≈ 165	≈ 240	4312 020 4562
	500	≈ 70	≈ 100	4312 020 4563
3C11	≈ 0	1800 ± 25%	≈ 2700	4312 020 4523

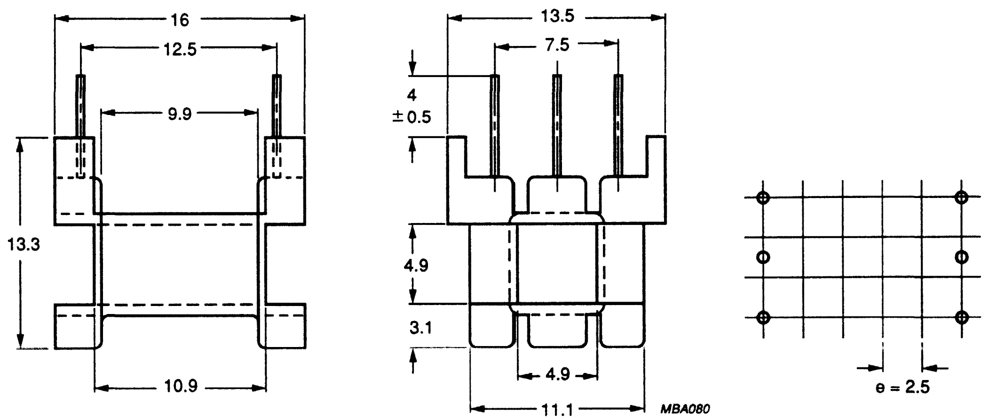
* measured in combination with an ungapped core half, clamping force 20 ± 10 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 0.20	-	-
3C85	≥ 320	≤ 0.12	≤ 0.14	-
3F3	≥ 320	-	≤ 0.10	≤ 0.15

COIL FORMER DATA

Coil former material:	polyamide (PA6.6), glass reinforced, flame retardent in accordance with UL94V-HB
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	130 °C
Resistance to soldering heat:	350 °C, 2 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	24 mm



Dimensions in mm

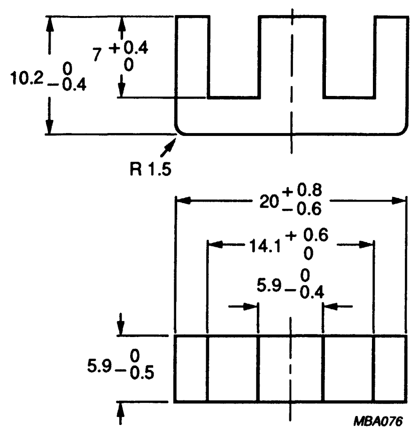
Fig.2 EF16/8/5 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	6	all	21.6	9.9	4312 021 2623

EF cores and accessories

EF20/10/6



Dimensions in mm

Fig.1 EF20/10/6 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	1.34	mm^{-1}
V_e	effective volume	1500	mm^3
l_e	effective length	44.9	mm
A_e	effective area	33.5	mm^2
	mass of core half	≈ 3.7	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C8	≈ 0	1350 ± 25%	≈ 1450	4312 020 3504
	50	≈ 540	≈ 580	4312 020 3550
	150	≈ 250	≈ 270	4312 020 3551
	500	≈ 100	≈ 110	4312 020 4524
3C85	≈ 0	1350 ± 25%	≈ 1450	4312 020 4525
	50	≈ 540	≈ 580	4312 020 4526
	150	≈ 250	≈ 270	4312 020 4527
	500	≈ 100	≈ 110	4312 020 4528
3F3	≈ 0	1200 ± 25%	≈ 1300	4312 020 4554
	50	≈ 520	≈ 550	4312 020 4565
	150	≈ 250	≈ 270	4312 020 4566
	500	≈ 100	≈ 110	4312 020 4567
3C11	≈ 0	2600 ± 25%	≈ 2770	4312 020 3556

* measured in combination with an ungapped core half, clamping force 20 ± 10 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 0.40	-	-
3C85	≥ 320	≤ 0.24	≤ 0.27	-
3F3	≥ 320	-	≤ 0.20	≤ 0.30

EF cores and accessories EF20/10/6

COIL FORMER DATA

Coil former material: polyamide (PA6.6), glass reinforced, flame retardent in accordance with UL94V-HB

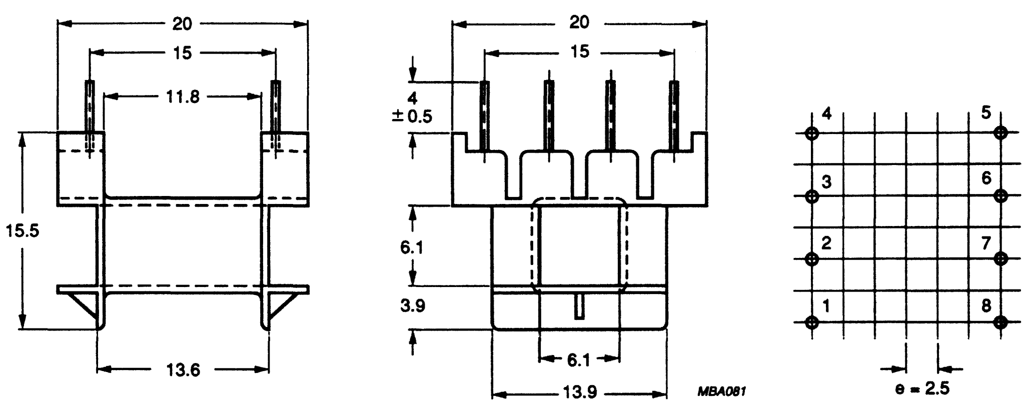
Pin material: CuSn, SnPb plated

Maximum operating temperature: 130 °C

Resistance to soldering heat: 350 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Average length of turn: 39 mm



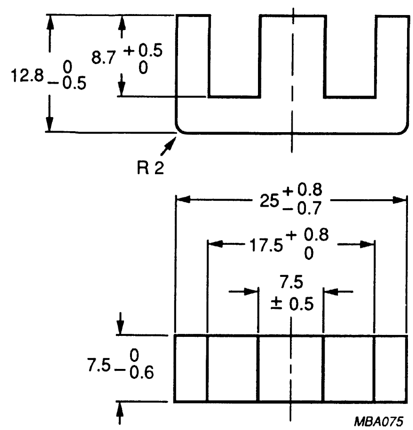
Dimensions in mm

Fig.2 EF20/10/6 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	8	all	35	11.8	4312 021 2621

EF cores and accessories EF25/13/7



Dimensions in mm

Fig.1 EF25/13/7 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	1.09	mm^{-1}
V_e	effective volume	3020	mm^3
I_e	effective length	57.5	mm
A_e	effective area	52.5	mm^2
	mass of core half	≈ 8	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	2000 ± 25%	≈ 1750	4312 020 3402
	50	≈ 900	≈ 780	4312 020 3545
	150	≈ 410	≈ 360	4312 020 3546
	500	≈ 165	≈ 150	4312 020 4501
3C85	≈ 0	2000 ± 25%	≈ 1750	4312 020 4529
	50	≈ 900	≈ 780	4312 020 4530
	150	≈ 410	≈ 360	4312 020 4531
	500	≈ 165	≈ 150	4312 020 4532
3F3	≈ 0	1600 ± 25%	≈ 1400	4312 020 4555
	50	≈ 865	≈ 750	4312 020 4569
	150	≈ 400	≈ 350	4312 020 4570
	500	≈ 165	≈ 150	4312 020 4571
3C11	≈ 0	3100 ± 25%	≈ 2700	4312 020 4648

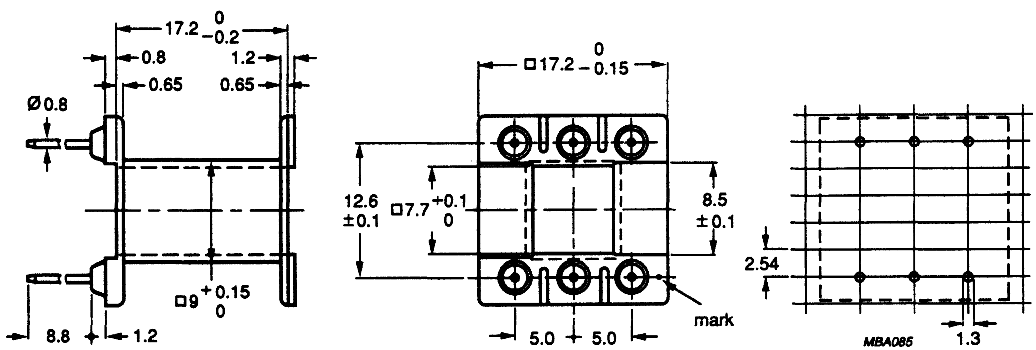
* measured in combination with an ungapped core half, clamping force 20 ± 10 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 0.8	-	-
3C85	≥ 320	≤ 0.47	≤ 0.55	-
3F3	≥ 320	-	≤ 0.35	≤ 0.60

COIL FORMER DATA

Coil former material: polybutyleneterephtalate (PBT), glass reinforced, flame retardent in accordance with UL94V-0
Pin material: CuSn, SnPb plated
Maximum operating temperature: 130 °C
Resistance to soldering heat: 400 °C, 2 s
Solderabilty: IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn: 49 mm



Dimensions in mm

Fig.2 EF25/13/7 coil former, vertical mounting.

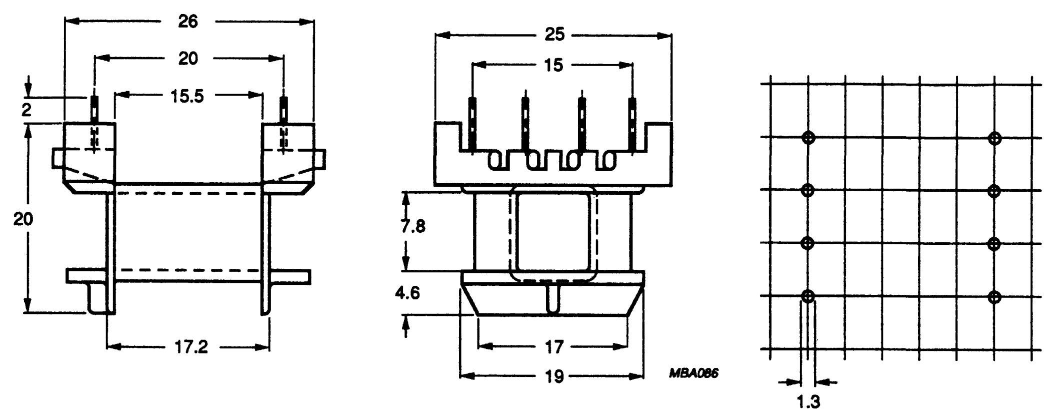
WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	6	all	56	15.7	4312 021 2625

EF cores and accessories EF25/13/7

COIL FORMER DATA

Coil former material:	polybutyleneterephtalate (PBT), glass reinforced, flame retardent in accordance with UL94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	130 °C
Resistance to soldering heat:	400 °C, 2 s
Solderabilty:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	49 mm



Dimensions in mm

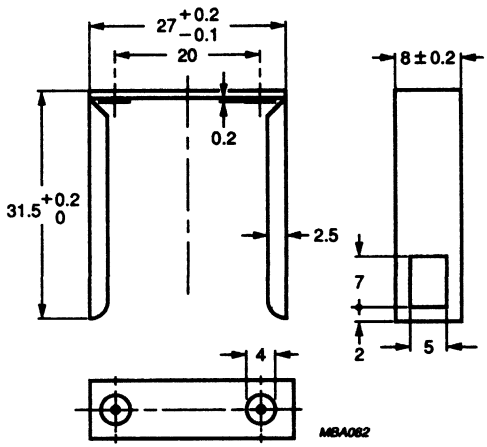
Fig.3 EF25/13/7 coil former, horizontal mounting.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	8	all	56	15.7	4312 021 2626

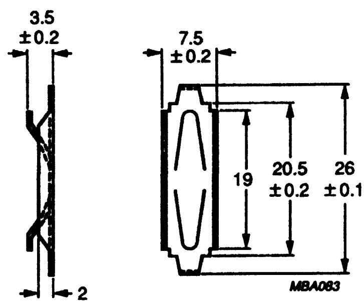
MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
Clasp	4	4312 021 2612	material: steel, Ni plated
Spring	5	4312 021 2619	material: stainless steel



Dimensions in mm

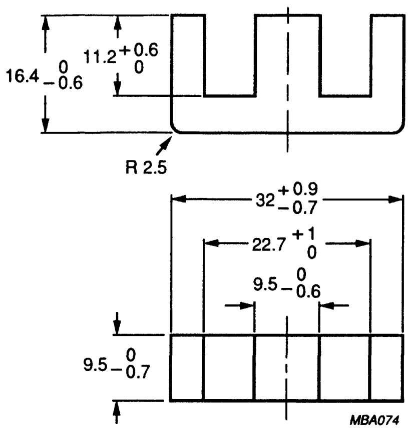
Fig.4 Clasp.



Dimensions in mm

Fig.5 Spring.

EF cores and accessories — EF32/16/9



Dimensions in mm

Fig.1 EF32/16/9 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.894	mm^{-1}
V_e	effective volume	6180	mm^3
l_e	effective length	74	mm
A_e	effective area	83	mm^2
	mass of core half	≈ 17	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	2200 ± 25%	≈ 1560	4312 020 3540
	100	≈ 730	≈ 520	4312 020 3541
	200	≈ 460	≈ 320	4312 020 3542
	500	≈ 240	≈ 170	4312 020 3543
	800	≈ 170	≈ 120	4312 020 3544
3C85	≈ 0	2200 ± 25%	≈ 1560	4312 020 4533
	100	≈ 730	≈ 520	4312 020 4534
	200	≈ 460	≈ 320	4312 020 4535
	500	≈ 240	≈ 170	4312 020 4536
	800	≈ 170	≈ 120	4312 020 4537
3F3	≈ 0	2000 ± 25%	≈ 1400	4312 020 4572
	100	≈ 710	≈ 500	4312 020 4573
	200	≈ 450	≈ 320	4312 020 4574
	500	≈ 240	≈ 170	4312 020 4575
	800	≈ 170	≈ 120	4312 020 4576
3C11	≈ 0	4000 ± 25%	≈ 2850	4312 020 4649

* measured in combination with an ungapped core half, clamping force 30 ± 15 N

EF cores and accessories EF32/16/9

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 1.60	-	-
3C85	≥ 320	≤ 0.95	≤ 1.10	-
3F3	≥ 320	-	≤ 0.70	≤ 1.20

COIL FORMER DATA

Coil former material: polyamide (PA6.6), glass reinforced, flame retardent in accordance with UL94V-HB

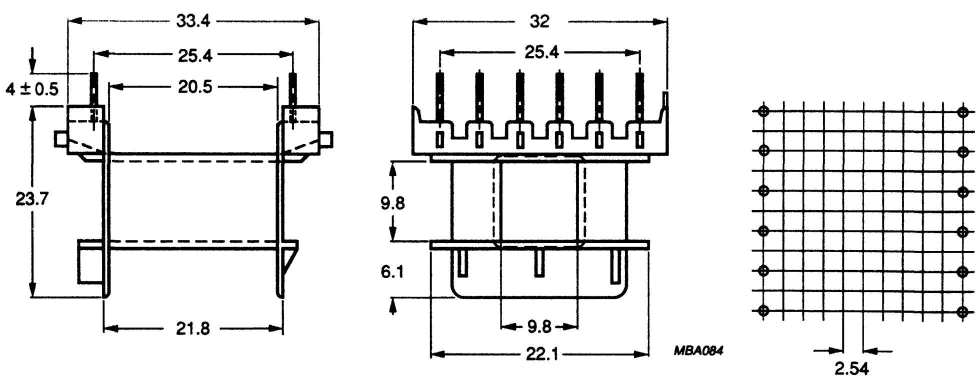
Pin material: CuSn, SnPb plated

Maximum operating temperature: 130 °C

Resistance to soldering heat: 350 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Average length of turn: 60 mm



Dimensions in mm

Fig.2 EF32/16/9 coil former.

WINDING DATA

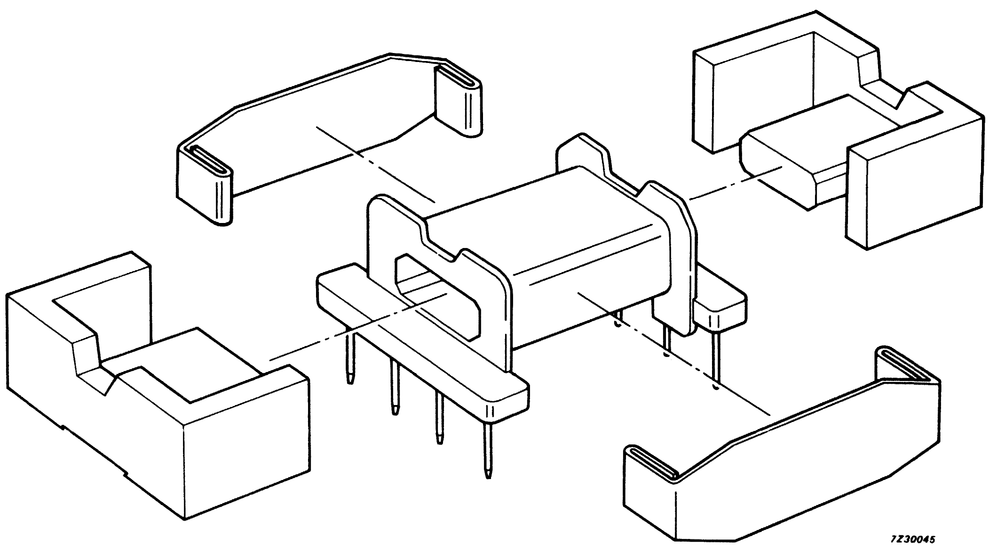
NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	12	all	97	20.5	4312 021 2622

EFD cores and accessories

Data sheet	
status	Product specification
date of issue	August 1990

EFD15/8/5 to EFD30/15/9

EFD cores and accessories



EFD cores and accessories

EFD15/8/5

Dimensions in mm

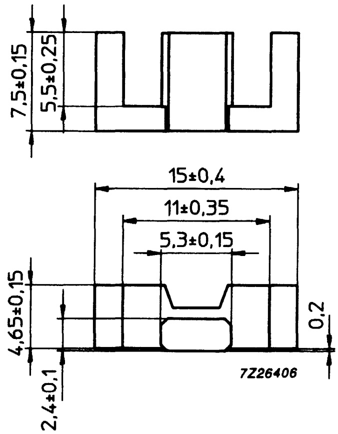


Fig.1 EFD15/8/5 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	2.27	mm^{-1}
V_e	effective volume	510	mm^3
l_e	effective length	34.0	mm
A_e	effective area	15.0	mm^2
A_{min}	minimum area	12.2	mm^2
	mass of set	≈ 2.8	g

CORE HALVES

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3F3	100 ± 10%	≈ 180	≈ 170	4312 020 4101
	160 ± 15%	≈ 290	≈ 100	4312 020 4102
	250 ± 20%	≈ 450	≈ 60	4312 020 4103
	700 ± 25%	≈ 1250	≈ 0	4312 020 4100

* measured in combination with an ungapped core half, clamping force 20 ± 5 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	$\hat{B}$ (mT) at $\hat{H}$ = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3F3	≥ 315	–	≤ 0.06	≤ 0.10

COIL FORMER DATA

Coil former material: phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 180 °C

Resistance to soldering heat: 430 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Average length of turn: 26.3 mm

Dimensions in mm

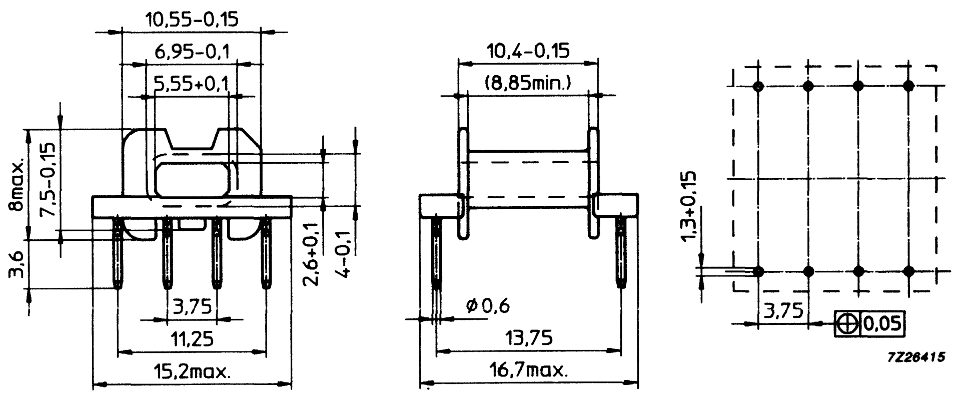


Fig.2 EFD15/8/5 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	ORDERING CODE
1	8	all	14.8	8.85	4322 021 3520

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	3	4322 021 3514	clamping force ≈ 10 N each

Dimensions in mm

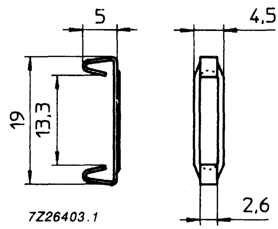


Fig.3 Mounting clip.

EFD cores and accessories | EFD20/10/7

Dimensions in mm

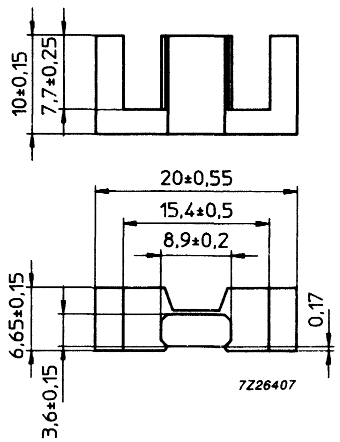


Fig.1 EFD20/10/7 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	1.52	mm^{-1}
V_e	effective volume	1460	mm^3
l_e	effective length	47.0	mm
A_e	effective area	29.0	mm^2
A_{min}	minimum area	31.0	mm^2
	mass of set	≈ 7	g

CORE HALVES

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ODERING CODE
3F3	100 ± 10%	≈ 120	≈ 350	4312 020 4109
	160 ± 10%	≈ 200	≈ 200	4312 020 4110
	250 ± 15%	≈ 300	≈ 150	4312 020 4111
	1150 ± 25%	≈ 1400	≈ 0	4312 020 4108

* measured in combination with an ungapped core half, clamping force 40 ± 10 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	$\hat{B}$ (mT) at $\hat{H}$ = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3F3	≥ 315	–	≤ 0.17	≤ 0.28

EFD cores and accessories EFD20/10/7

COIL FORMER DATA

Coil former material:	phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	180 °C
Resistance to soldering heat:	430 °C, 2 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	36.5 mm

Dimensions in mm

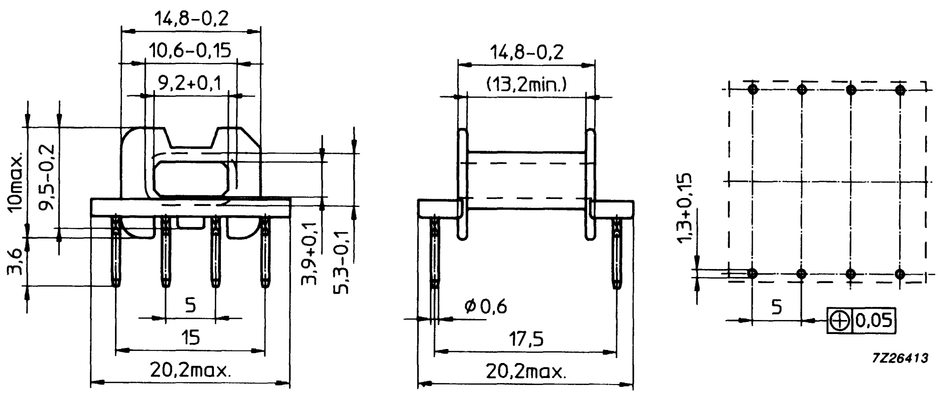


Fig.2 EFD20/10/7 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	ORDERING CODE
1	8	all	26.4	13.2	4322 021 3522

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	3	4322 021 3515	clamping force ≈ 20 N each

Dimensions in mm

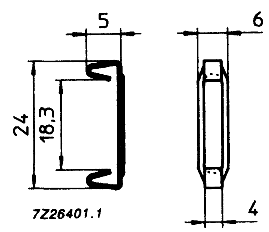


Fig.3 Mounting clip.

Dimensions in mm

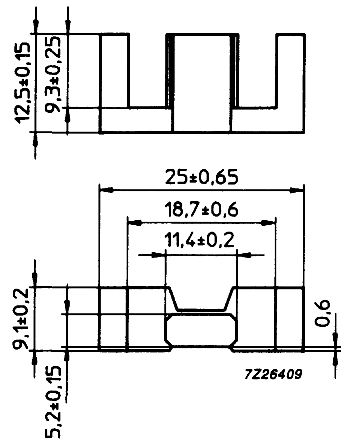


Fig.1 EFD25/13/9 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	1.00	mm^{-1}
V_e	effective volume	3300	mm^3
l_e	effective length	57.0	mm
A_e	effective area	58.0	mm^2
A_{min}	minimum area	57.0	mm^2
	mass of set	≈ 16	g

CORE HALVES

GRADE	A_L* (nH)	μ_e	AIRGAP (µm)	ORDERING CODE
3C85	160 ± 10%	≈ 100	≈ 600	4312 020 4121
	250 ± 10%	≈ 200	≈ 300	4312 020 4122
	315 ± 10%	≈ 250	≈ 200	4312 020 4123
	2000 ± 25%	≈ 1600	≈ 0	4312 020 4120
3F3	160 ± 10%	≈ 100	≈ 600	4312 020 4117
	250 ± 10%	≈ 200	≈ 300	4312 020 4118
	315 ± 10%	≈ 250	≈ 200	4312 020 4119
	1800 ± 25%	≈ 1450	≈ 0	4312 020 4116

* measured in combination with an ungapped core half, clamping force 70 ± 15 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	$\hat{B}$ (mT) at $\hat{H}$ = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 315	≤ 0.52	≤ 0.60	-
3F3	≥ 315	–	≤ 0.38	≤ 0.64

EFD cores and accessories | EFD25/13/9

COIL FORMER DATA

Coil former material: phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0
Pin material: CuSn, SnPb plated
Maximum operating temperature: 180 °C
Resistance to soldering heat: 430 °C, 2 s
Solderability: IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn: 46.4 mm

Dimensions in mm

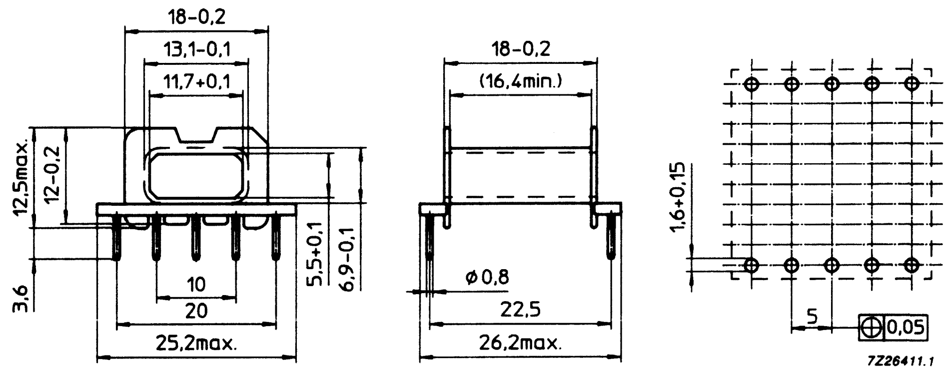


Fig.2 EFD25/13/9 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	ORDERING CODE
1	10	all	40.2	16.4	4322 021 3524

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	3	4322 021 3516	clamping force ≈ 35 N each

Dimensions in mm

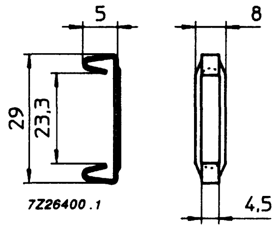


Fig.3 Mounting clip.

EFD cores and accessories EFD30/15/9

Dimensions in mm

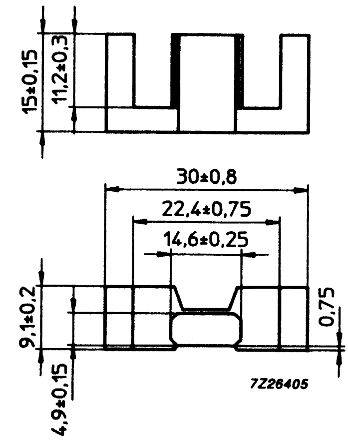


Fig.1 EFD30/15/9 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.98	mm^{-1}
V_e	effective volume	4700	mm^3
l_e	effective length	68.0	mm
A_e	effective area	69.0	mm^2
A_{min}	minimum area	69.0	mm^2
	mass of set	≈ 24	g

CORE HALVES

GRADE	A_L* (nH)	μ_e	AIRGAP (μm)	ORDERING CODE
3C85	160 ± 10%	≈ 125	≈ 500	4312 020 4129
	250 ± 10%	≈ 190	≈ 350	4312 020 4130
	315 ± 10%	≈ 250	≈ 250	4312 020 4131
	2100 ± 25%	≈ 1650	≈ 0	4312 020 4128
3F3	160 ± 10%	≈ 125	≈ 500	4312 020 4125
	250 ± 10%	≈ 190	≈ 350	4312 020 4126
	315 ± 10%	≈ 250	≈ 250	4312 020 4127
	1900 ± 25%	≈ 1500	≈ 0	4312 020 4124

* measured in combination with an ungapped core half, clamping force 90 ± 20 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	$\hat{B}$ (mT) at $\hat{H}$ = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 315	≤ 0.74	≤ 0.86	-
3F3	≥ 315	–	≤ 0.54	≤ 0.91

EFD cores and accessories EFD30/15/9

COIL FORMER DATA

Coil former material: phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 180 °C

Resistance to soldering heat: 430 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Average length of turn: 52.9 mm

Dimensions in mm

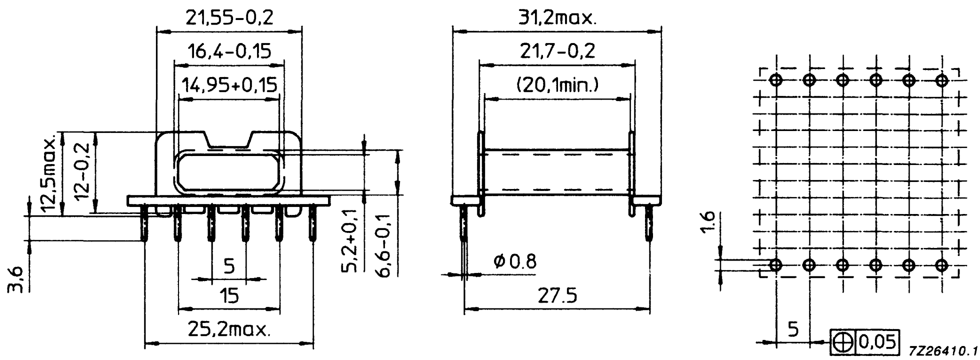


Fig.2 EFD30/15/9 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	ORDERING CODE
1	12	all	52.3	20.1	4322 021 3525

EFD cores and accessories EFD30/15/9

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	3	4322 021 3517	clamping force ≈ 45 N each

Dimensions in mm

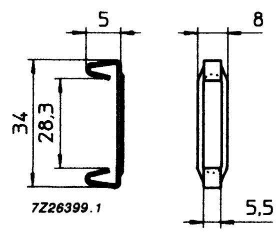
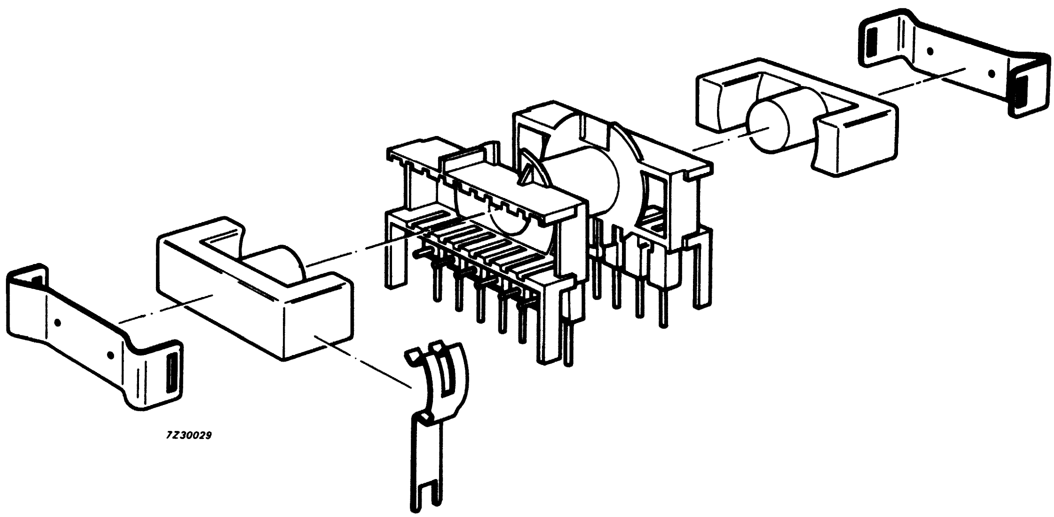


Fig.3 Mounting clip.

ETD cores and accessories

Data sheet	
status	Product specification
date of issue	August 1990

ETD29/16/10 to ETD49/25/16
ETD cores and accessories



ETD cores and accessories | ETD29/16/10

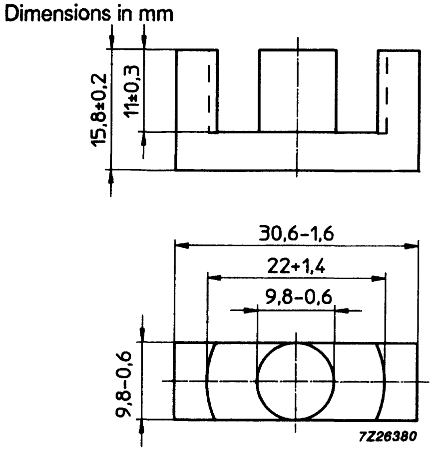


Fig.1 ETD29/16/10 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	0.947	mm^{-1}
V_e	effective volume	5470	mm^3
l_e	effective length	72	mm
A_e	effective area	76	mm^2
A_{min}	minimum area	71	mm^2
	mass of core half	≈ 14	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C85	≈ 0	2100 ± 25%	≈ 1580	4312 020 3750
	50	≈ 1000	≈ 750	4312 020 3751
	150	≈ 490	≈ 370	4312 020 3752
	350	≈ 260	≈ 200	4312 020 3754
	1000	≈ 120	≈ 90	4312 020 3769
3F3	≈ 0	1900 ± 25%	≈ 1430	4312 020 3800
	50	≈ 960	≈ 720	4312 020 3805
	150	≈ 470	≈ 350	4312 020 3806
	350	≈ 260	≈ 200	4312 020 3807
	1000	≈ 120	≈ 90	4312 020 3808
3C11	≈ 0	4200 ± 25%	≈ 3150	4312 020 3789

* measured in combination with an ungapped core half, clamping force 40 ± 20 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.8	≤ 1.0	–
3F3	≥ 320	–	≤ 0.60	≤ 1.0

COIL FORMER DATA

Coil former material: polybuteleneterephtalate (PBT), glass reinforced, flame retardent in accordance with UL94V-0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 120 °C

Resistance to soldering heat: 400 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Dimensions in mm

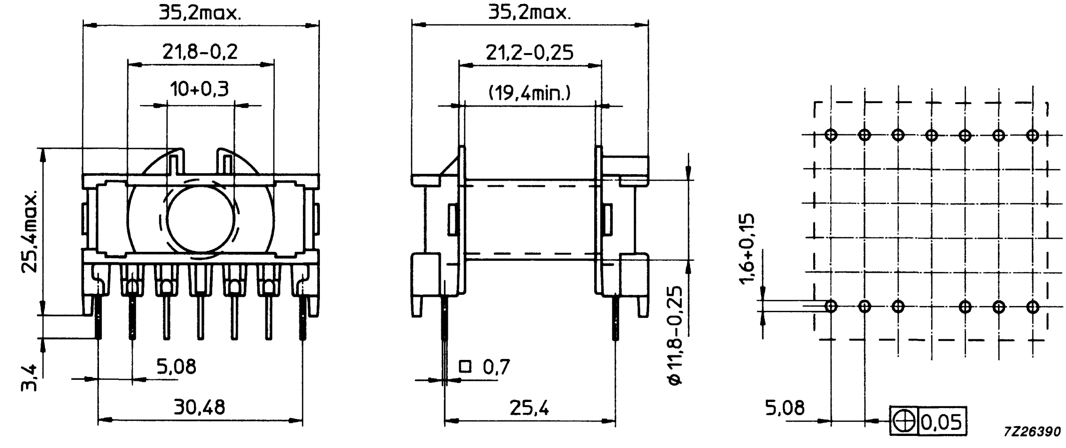


Fig.2 ETD29/16/10 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	13	90	19.4	53	4322 021 3438

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	3	4322 021 3437	stainless steel

Dimensions in mm

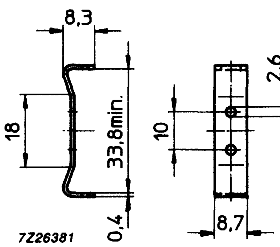


Fig.3 Mounting clip.

ETD cores and accessories ETD34/17/11

Dimensions in mm

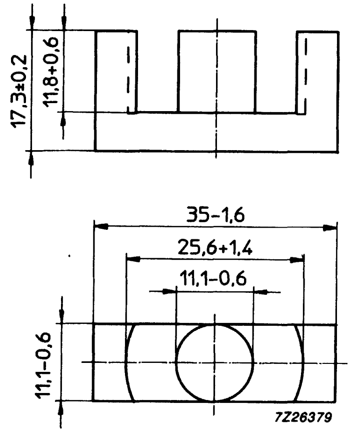


Fig.1 ETD34/17/11 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.810	mm^{-1}
V_e	effective volume	7640	mm^3
l_e	effective length	78.6	mm
A_e	effective area	97.1	mm^2
A_{min}	minimum area	91.6	mm^2
	mass of core half	≈ 20	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	2500 ± 25%	≈ 1600	4312 020 3700
	100	≈ 800	≈ 520	4312 020 3701
	200	≈ 530	≈ 340	4312 020 3702
	500	≈ 230	≈ 150	4312 020 3703
	800	≈ 170	≈ 110	4312 020 3766
3C85	≈ 0	2500 ± 25%	≈ 1600	4312 020 3720
	100	≈ 800	≈ 520	4312 020 3721
	200	≈ 530	≈ 340	4312 020 3722
	500	≈ 230	≈ 150	4312 020 3723
	800	≈ 170	≈ 110	4312 020 3724
3F3	≈ 0	2300 ± 25%	≈ 1480	4312 020 3801
	100	≈ 780	≈ 500	4312 020 3809
	200	≈ 520	≈ 330	4312 020 3810
	500	≈ 230	≈ 150	4312 020 3811
	800	≈ 170	≈ 110	4312 0 20 3812

* measured in combination with an ungapped core half, clamping force 40 ± 20 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 1.6	–	–
3C85	≥ 320	≤ 1.1	≤ 1.3	–
3F3	≥ 320	–	≤ 0.85	≤ 1.5

COIL FORMER DATA

Coil former material:	polybuteleneterephtalate (PBT), glass reinforced, flame retardent in accordance with UL94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	120 °C
Resistance to soldering heat:	400 °C, 2 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1

Dimensions in mm

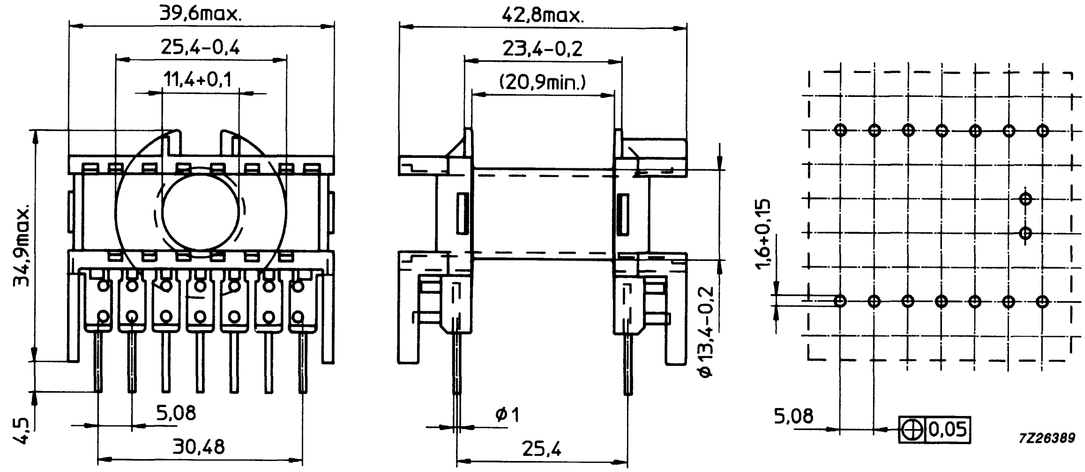


Fig.2 ETD34/17/11 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm²)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	14	123	20.9	60	4322 021 3385

ETD cores and accessories ETD34/17/11

COIL FORMER DATA

Coil former material:	polybuteleneterephtalate (PBT), glass reinforced, flame retardent in accordance with UL94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	120 °C
Resistance to soldering heat:	400 °C, 2 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1

Dimensions in mm

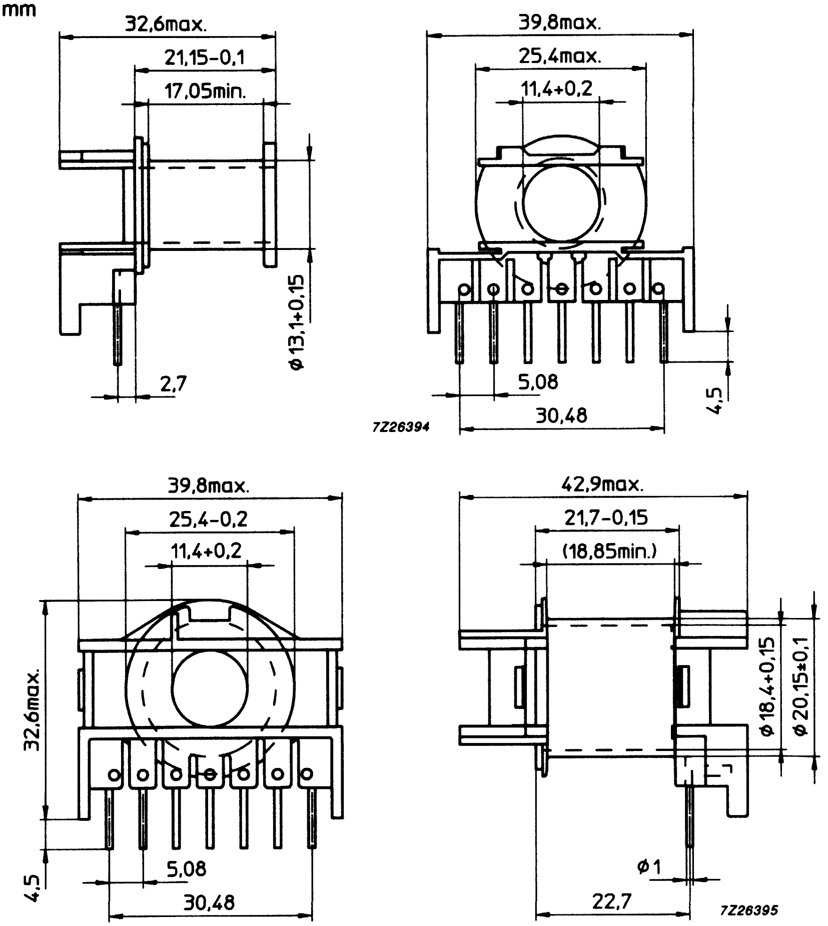
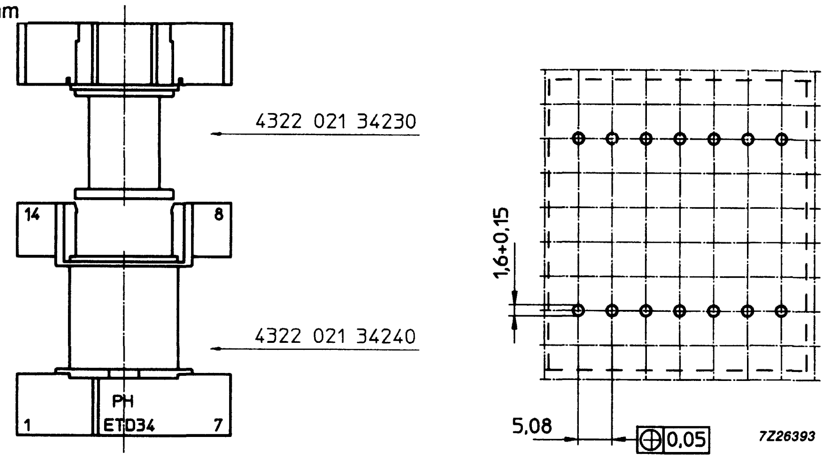


Fig.3 ETD34/17/11 coaxial coil former; for mounting grid and method of fitting, refer to Fig.4.

ETD cores and accessories

ETD34/17/11

Dimensions in mm



Note: This coil former incorporates 8 mm creepage distance between primary and secondary windings, as well as between primary and all other conductive parts (in accordance with IEC 380 safety regulations).

Fig.4 Mounting grid and method of fitment.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	7	44.5	17	49.5	4322 021 3423
1	7	49	18.9	71	4322 021 3424

ETD cores and accessories

ETD34/17/11

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	5	4322 021 3389	stainless steel
earthing clip	6	4322 021 3394	CuNiZn alloy, dip soldered

Dimensions in mm

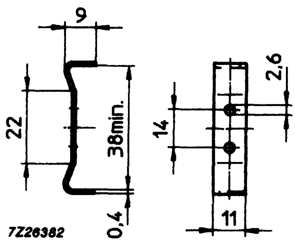


Fig.5 Mounting clip.

Dimensions in mm

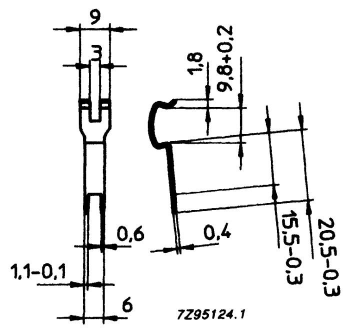


Fig.6 Earthing clip.

ETD cores and accessories

ETD39/20/13

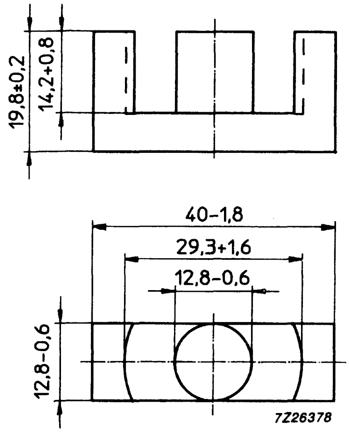


Fig.1 ETD39/20/13 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	0.737	mm^{-1}
V_e	effective volume	11500	mm^3
l_e	effective length	92.2	mm
A_e	effective area	125	mm^2
A_{min}	minimum area	123	mm^2
	mass of core half	≈ 30	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	2800 ± 25%	≈ 1650	4312 020 3705
	100	≈ 1000	≈ 590	4312 020 3706
	200	≈ 660	≈ 390	4312 020 3707
	500	≈ 340	≈ 200	4312 020 3708
	800	≈ 220	≈ 130	4312 020 3763
3C85	≈ 0	2800 ± 25%	≈ 1650	4312 020 3725
	100	≈ 1000	≈ 590	4312 020 3726
	200	≈ 660	≈ 390	4312 020 3727
	500	≈ 340	≈ 200	4312 020 3728
	800	≈ 220	≈ 130	4312 020 3729
3F3	≈ 0	2600 ± 25%	≈ 1500	4312 020 3802
	100	≈ 970	≈ 570	4312 020 3813
	200	≈ 650	≈ 380	4312 020 3814
	500	≈ 340	≈ 200	4312 020 3815
	800	≈ 220	≈ 130	4312 020 3816

* measured in combination with an ungapped core half, clamping force 50 ± 20 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 2.2	–	-
3C85	≥ 320	≤ 1.6	≤ 1.9	-
3F3	≥ 320	–	≤ 1.3	≤ 2.3

COIL FORMER DATA

Coil former material: polybuteleneterephtalate (PBT), glass reinforced, flame retardent in accordance with UL94V-0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 120 °C

Resistance to soldering heat: 400 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Dimensions in mm

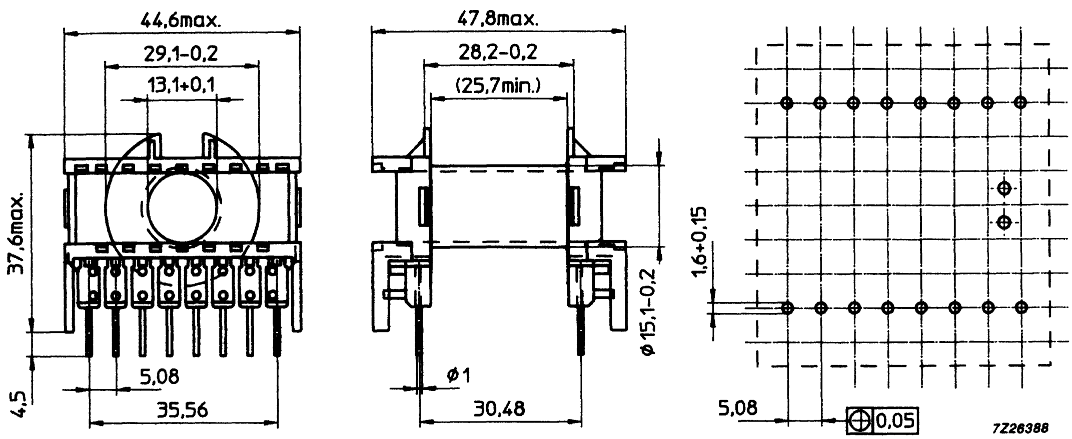


Fig.2 ETD39/20/13 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	16	177	25.7	69	4322 021 3386

ETD cores and accessories ETD39/20/13

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	3	4322 021 3390	stainless steel
earthing clip	4	4322 021 3395	CuNiZn alloy, dip soldered

Dimensions in mm

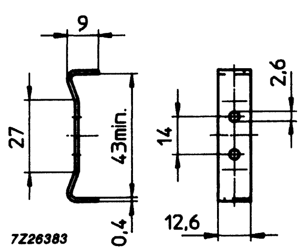


Fig.3 Mounting clip.

Dimensions in mm

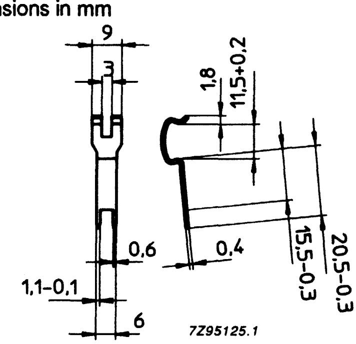


Fig.4 Earthing clip.

ETD cores and accessories — ETD44/22/15

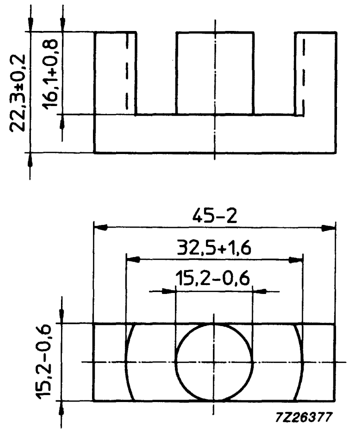


Fig.1 ETD44/22/15 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	0.589	mm^{-1}
V_e	effective volume	17800	mm^3
l_e	effective length	103	mm
A_e	effective area	173	mm^2
A_{min}	minimum area	172	mm^2
	mass of core half	≈ 47	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	3500 ± 25%	≈ 1650	4312 020 3710
	100	≈ 1400	≈ 660	4312 020 3759
	200	≈ 900	≈ 425	4312 020 3711
	500	≈ 460	≈ 220	4312 020 3712
	800	≈ 320	≈ 150	4312 020 3760
3C85	≈ 0	3500 ± 25%	≈ 1650	4312 020 3730
	100	≈ 1400	≈ 660	4312 020 3731
	200	≈ 900	≈ 425	4312 020 3732
	500	≈ 460	≈ 220	4312 020 3733
	800	≈ 320	≈ 150	4312 020 3734
3F3	≈ 0	3200 ± 25%	≈ 1500	4312 020 3803
	100	≈ 1350	≈ 640	4312 020 3817
	200	≈ 900	≈ 425	4312 020 3818
	500	≈ 460	≈ 220	4312 020 3819
	800	≈ 320	≈ 150	4312 020 3820

* measured in combination with an ungapped core half, clamping force 50 ± 20 N

ETD cores and accessories ETD44/22/15

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 3.6	–	-
3C85	≥ 320	≤ 2.5	≤ 3.0	-
3F3	≥ 320	–	≤ 2.0	≤ 3.7

COIL FORMER DATA

Coil former material: polybuteleneterephtalate (PBT), glass reinforced, flame retardent in accordance with UL94V-0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 120 °C

Resistance to soldering heat: 400 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Dimensions in mm

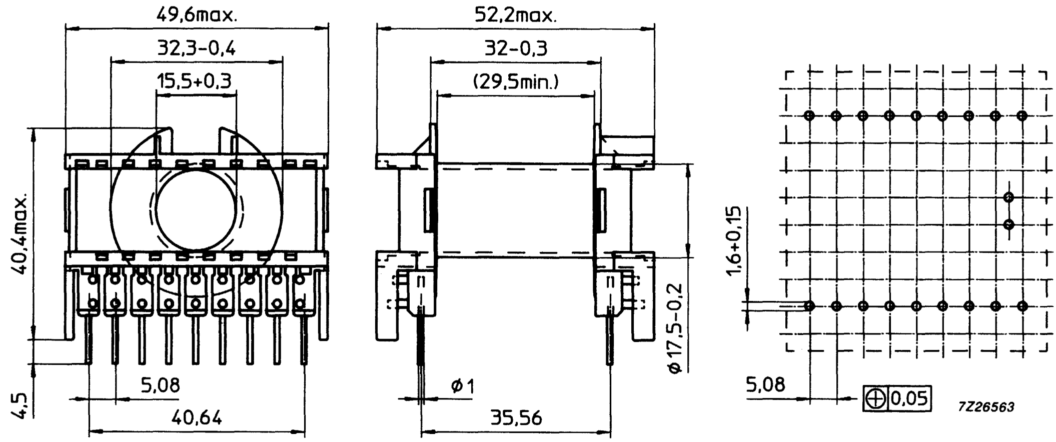


Fig.2 ETD44/22/15 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	18	214	29.5	77	4322 021 3387

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	3	4322 021 3391	stainless steel
earthing clip	4	4322 021 3396	CuNiZn alloy, dip soldered

Dimensions in mm

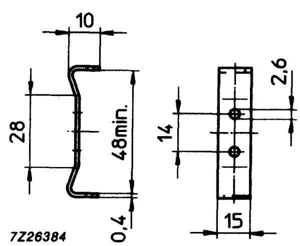


Fig.3 Mounting clip.

Dimensions in mm

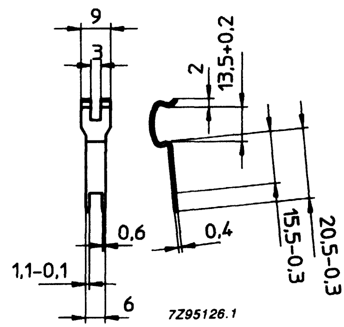


Fig.4 Earthing clip.

Dimensions in mm

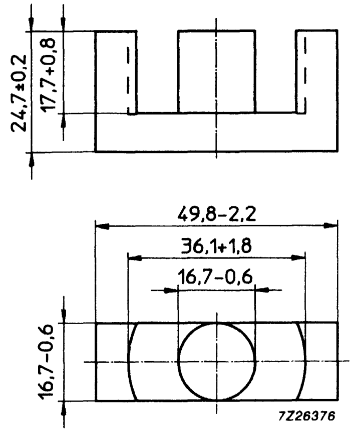


Fig.1 ETD49/25/16 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.534	mm^{-1}
V_e	effective volume	24000	mm^3
l_e	effective length	114	mm
A_e	effective area	211	mm^2
A_{min}	minimum area	209	mm^2
	mass of core half	≈ 62	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	4000 ± 25%	≈ 1700	4312 020 3715
	100	≈ 1600	≈ 690	4312 020 3770
	200	≈ 1100	≈ 470	4312 020 3716
	500	≈ 540	≈ 230	4312 020 3717
	800	≈ 380	≈ 160	4312 020 3756
	1400	≈ 250	≈ 110	4312 020 3755
3C85	≈ 0	4000 ± 25%	≈ 1700	4312 020 3735
	100	≈ 1600	≈ 690	4312 020 3736
	200	≈ 1100	≈ 470	4312 020 3737
	500	≈ 540	≈ 230	4312 020 3738
	800	≈ 380	≈ 160	4312 020 3739
	1400	≈ 250	≈ 110	4312 020 3790
3F3	≈ 0	3600 ± 25%	≈ 1550	4312 020 3804
	100	≈ 1550	≈ 670	4312 020 3821
	200	≈ 1100	≈ 470	4312 020 3822
	500	≈ 540	≈ 230	4312 020 3823
	800	≈ 380	≈ 160	4312 020 3824
	1400	≈ 250	≈ 110	4312 020 3725

* measured in combination with an ungapped core half, clamping force 50 ± 20 N

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P_V (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C80	≥ 320	≤ 4.6	–	–
3C85	≥ 320	≤ 3.4	≤ 4.0	–
3F3	≥ 320	–	≤ 2.6	≤ 5.2

COIL FORMER DATA

Coil former material: polybuteleneterephtalate (PBT), glass reinforced, flame retardent in accordance with UL94V-0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 120 °C

Resistance to soldering heat: 400 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Dimensions in mm

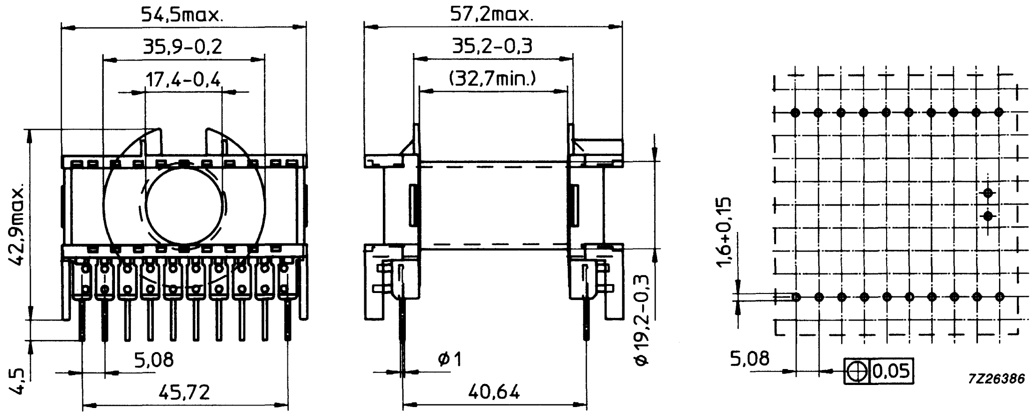


Fig.2 ETD49/25/16 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm²)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	20	273	32.7	85	4322 021 3388

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
mounting clip	3	4322 021 3392	stainless steel
earthing clip	4	4322 021 3397	CuNiZn alloy, dip soldered

Dimensions in mm

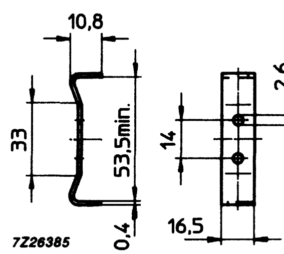


Fig.3 Mounting clip.

Dimensions in mm

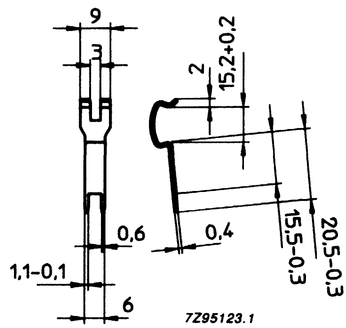


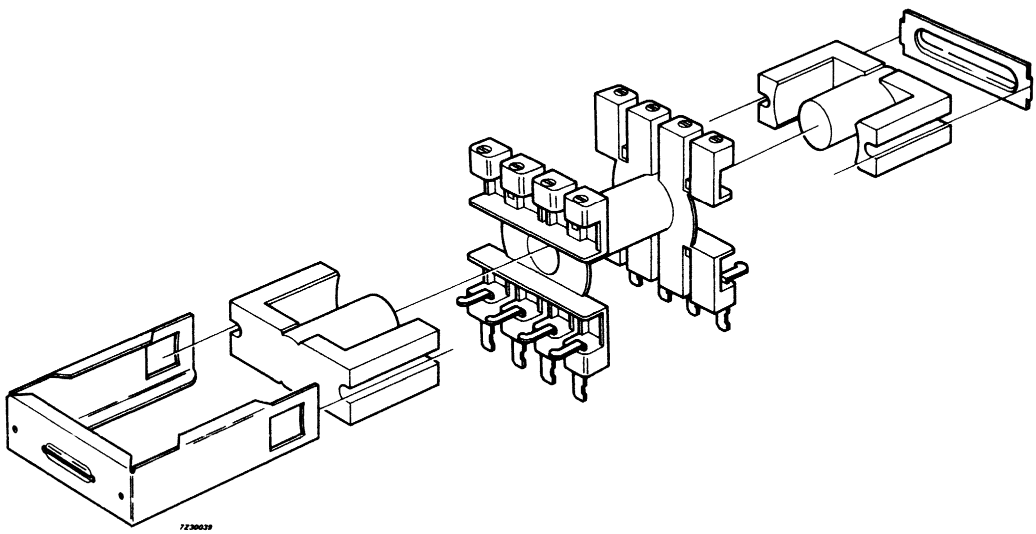
Fig.4 Earthing clip.

EC cores and accessories

Philips Components

Data sheet	
status	Product specification
date of issue	August 1990

EC35/17/10 to EC70/34/17
EC cores and accessories



EC cores and accessories

EC35/17/10

Dimensions in mm

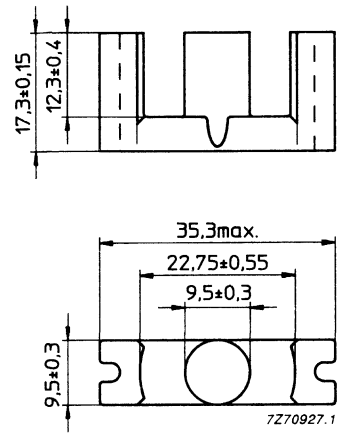


Fig.1 EC35/17/10 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.918	mm^{-1}
V_e	effective volume	6530	mm^3
l_e	effective length	77.4	mm
A_e	effective area	84.3	mm^2
A_{min}	minimum area	66.5	mm^2
	mass of core half	≈ 18	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	2100 ± 25%	≈ 1600	4322 020 5250
	250	≈ 330	≈ 240	4312 020 4617
	750	≈ 150	≈ 110	4312 020 4618
3C85	≈ 0	2100 ± 25%	≈ 1600	4312 020 4619
	250	≈ 330	≈ 240	4312 020 4620
	750	≈ 150	≈ 110	4312 020 4621

* A_L measured in combination with an ungapped core half

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C
3C80	≥ 320	≤ 2.0	-
3C85	≥ 320	≤ 1.0	≤ 1.2

EC cores and accessories | EC35/17/10

COIL FORMER DATA

Coil former material: phenolformaldehyde (PF), glass reinforced, flame retardent in accordance with UL 94V-0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 180 °C

Resistance to soldering heat: 430 °C, 2 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Average length of turn: 50 mm

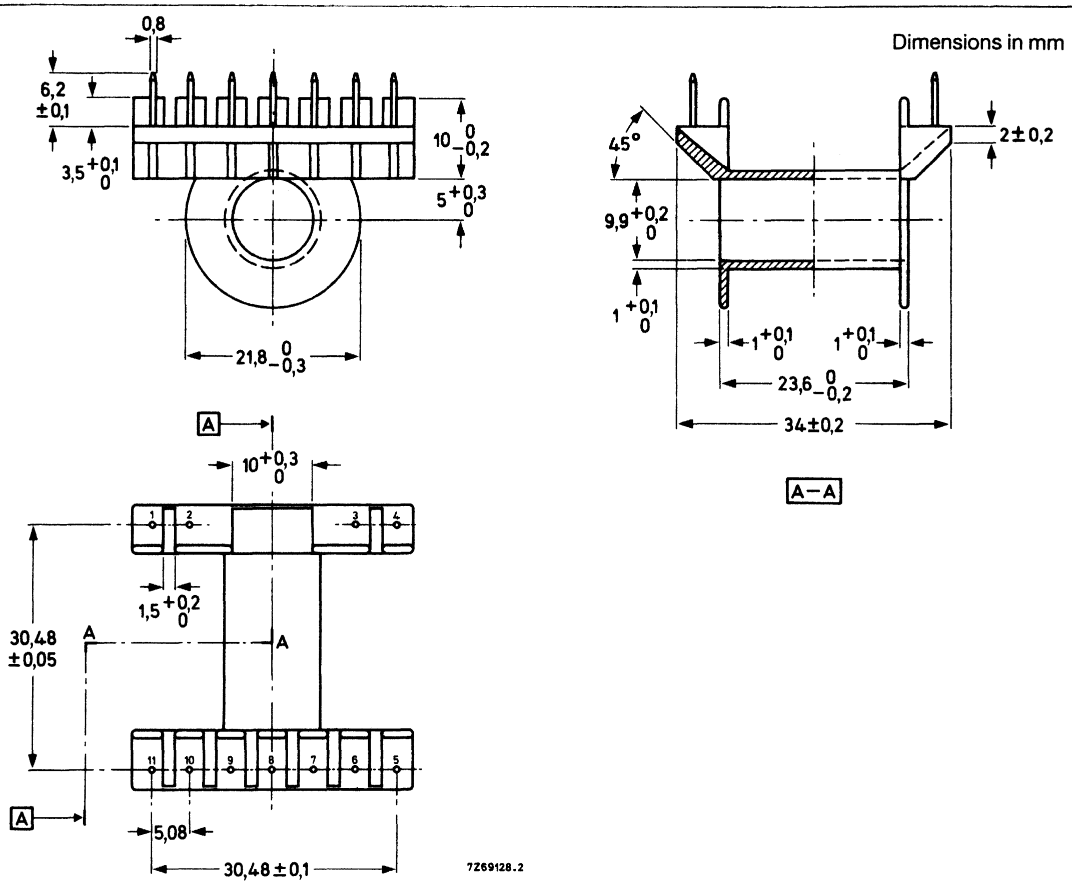


Fig.2 EC35/17/10 coil former, 11 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	11	all	97.5	21.2	4322 021 3341

COIL FORMER DATA

Coil former material:	polybutyleneterephtalate (PBT), glass reinforced,flame retardent in accordance with UL 94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	125 °C
Resistance to soldering heat:	400 °C, 4 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	53 mm

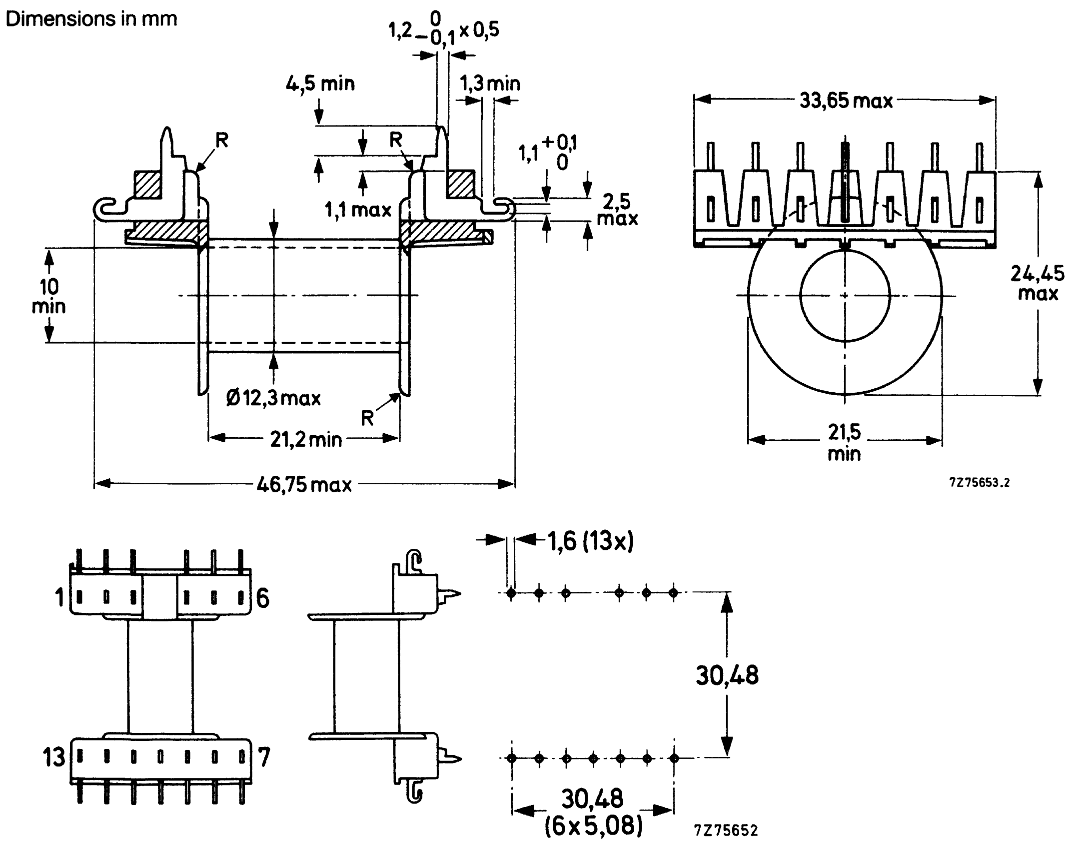


Fig.3 EC35/17/10 coil former, 13 pins.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	13	all	97	21.2	4322 021 3331

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
clasp	4	4312 021 2601	steel, zinc plated
spring	5	4312 021 2615	steel, zinc plated

Dimensions in mm

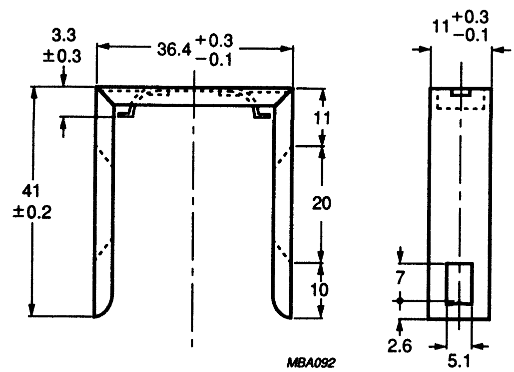


Fig.4 Clasp.

Dimensions in mm

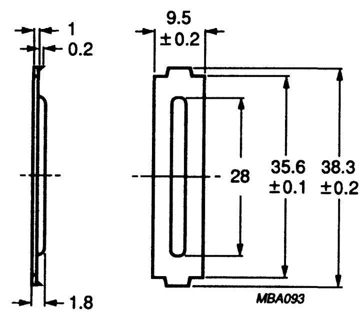


Fig.5 Spring.

EC cores and accessories — EC41/19/12

Dimensions in mm

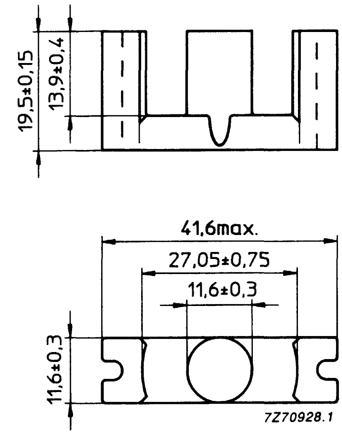


Fig.1 EC41/19/12 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	0.735	mm^{-1}
V_e	effective volume	10800	mm^3
l_e	effective length	89.3	mm
A_e	effective area	121	mm^2
A_{min}	minimum area	100	mm^2
	mass of core half	≈ 26	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	2700 ± 25%	≈ 1600	4322 020 5251
	500	≈ 280	≈ 160	4312 020 3509
	1500	≈ 125	≈ 80	4312 020 2564
3C85	≈ 0	2700 ± 25%	≈ 1600	4312 020 4622
	500	≈ 280	≈ 160	4312 020 4623
	1500	≈ 125	≈ 80	4312 020 4624

* A_L measured in combination with an ungapped core half

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C
3C80	≥ 320	≤ 3.1	-
3C85	≥ 320	≤ 1.7	≤ 2.0

EC cores and accessories EC41/19/12

COIL FORMER DATA

Coil former material:	polybutyleneterephtalate (PBT), glass reinforced,flame retardent in accordance with UL 94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	125 °C
Resistance to soldering heat:	400 °C, 4 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	62 mm

Dimensions in mm

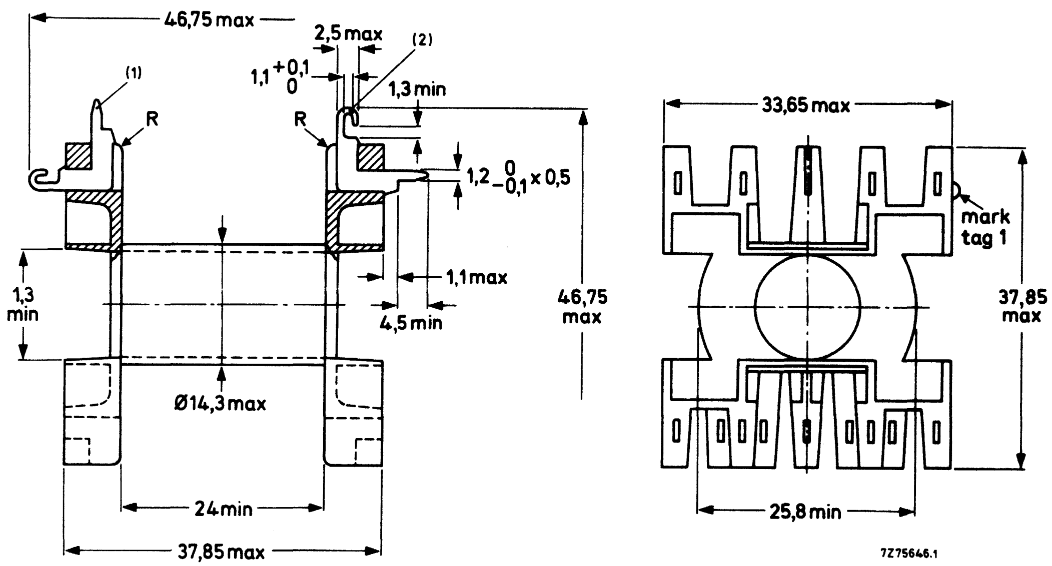


Fig.2 EC41/19/12 coil former.

Dimensions in mm

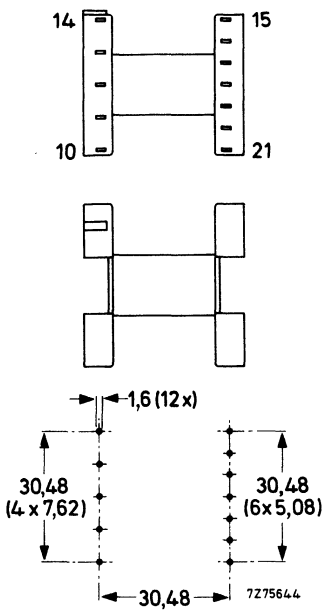


Fig.3 EC41/19/12 coil former, 12 pins (horizontal mounting).

Dimensions in mm

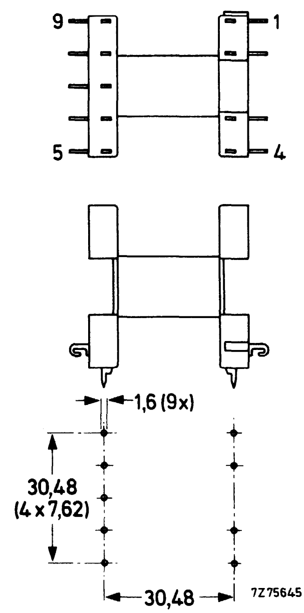


Fig.4 EC41/19/12 coil former, 9 pins (horizontal mounting).

WINDING DATA - STYLE 1, HORIZONTAL MOUNTING

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	12	10,11,12,13,14,15, 16,17,18,19,20,21	138	24	4322 021 3348

WINDING DATA - STYLE 2, HORIZONTAL MOUNTING

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	9	1,2,3,4,5,6,7,8,9	138	24	4322 021 3332

EC cores and accessories EC41/19/12

Dimensions in mm

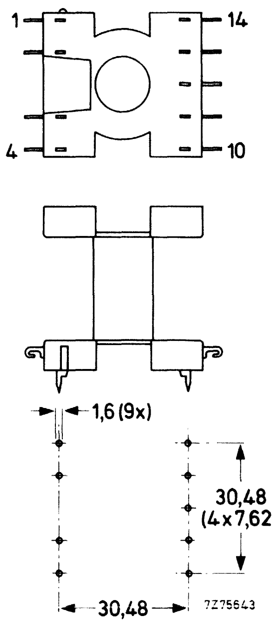


Fig.5 EC41/19/12 coil former, 9 pins (vertical mounting).

WINDING DATA - STYLE 3, VERTICAL MOUNTING

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	9	1,2,3,4,10,11,12,13,14	138	24	4322 021 3335

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
clasp	5 5	4312 021 2602 4312 021 2603	steel, zinc plated steel, zinc plated with mounting stud
spring	6	4312 021 2616	steel, zinc plated

Dimensions in mm

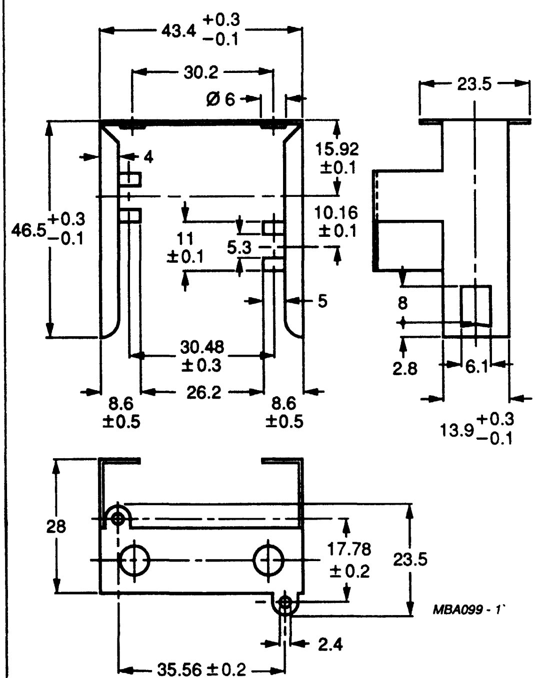


Fig.6 Clasp.

Dimensions in mm

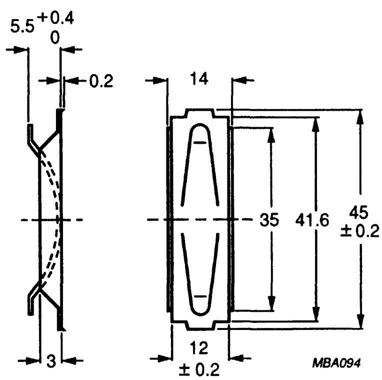


Fig.7 Spring.

EC cores and accessories | EC52/24/14

Dimensions in mm

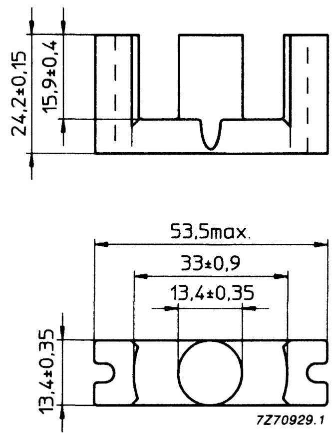


Fig.1 EC52/24/14 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.581	mm^{-1}
V_e	effective volume	18800	mm^3
l_e	effective length	105	mm
A_{min}	minimum area	134	mm^2
A_e	effective area	180	mm^2
	mass of core half	≈ 56	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	3600 ± 25%	≈ 1600	4322 020 5252
	500	≈ 390	≈ 180	4312 020 4625
	1500	≈ 160	≈ 70	4312 020 4626
3C85	≈ 0	3600 ± 25%	≈ 1600	4312 020 4627
	500	≈ 390	≈ 180	4312 020 4628
	1500	≈ 160	≈ 70	4312 020 4629

* A_L measured in combination with an ungapped core half

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C
3C80	≥ 320	≤ 4.2	-
3C85	≥ 320	≤ 2.9	≤ 3.4

EC cores and accessories EC52/24/14

COIL FORMER DATA

Coil former material:	polybutyleneterephtalate (PBT), glass reinforced,flame retardent in accordance with UL 94V-0
Pin material:	CuSn, SnPb plated
Maximum operating temperature:	125 °C
Resistance to soldering heat:	400 °C, 4 s
Solderability:	IEC 68-2-20, Part 2, Test TA, method 1
Average length of turn:	70 mm

Dimensions in mm

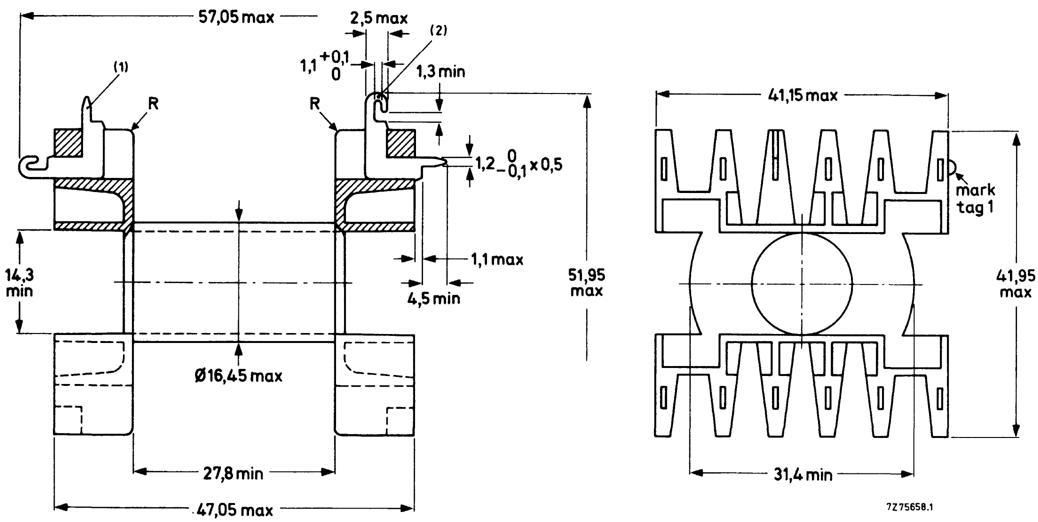


Fig.2 EC52/24/14 coil former.

Dimensions in mm

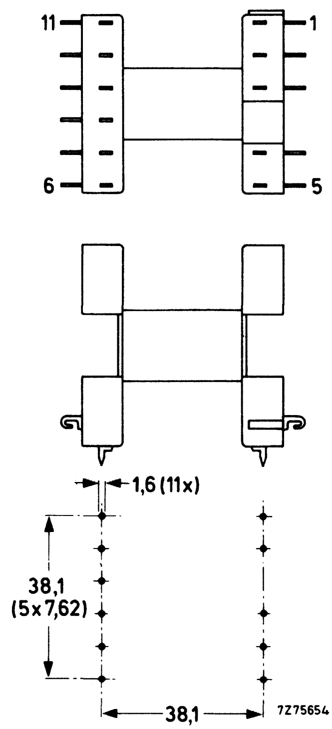


Fig.3 EC52/24/14 coil former, 11 pins (horizontal mounting).

Dimensions in mm

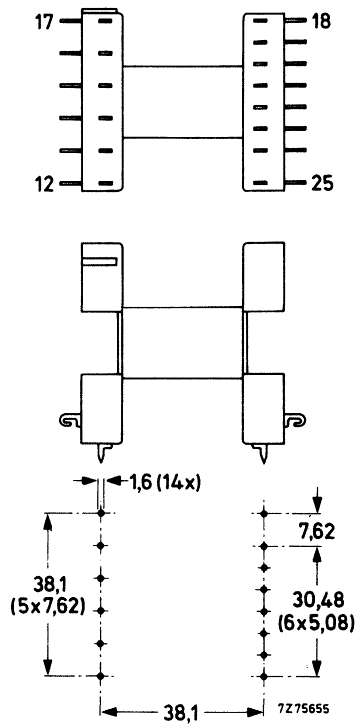


Fig.4 EC52/24/14 coil former, 14 pins (horizontal mouting).

WINDING DATA - STYLE 1, HORIZONTAL MOUNTING

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	11	all	210	27.8	4322 021 3333

WINDING DATA - STYLE 2, HORIZONTAL MOUNTING

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	14	12,13,14,15,16,17,18, 19,20,21,22,23, 24,25	210	27.8	4322 021 3350

Dimensions in mm

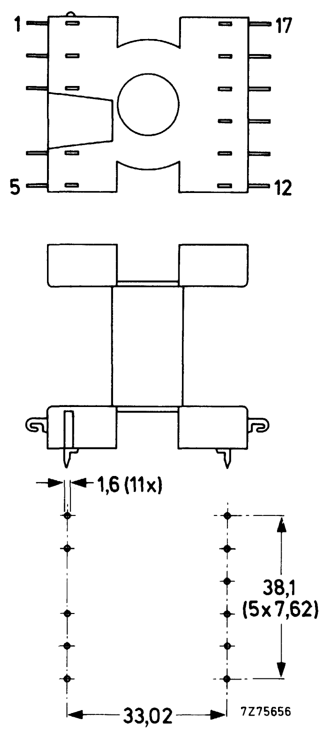


Fig.5 EC52/24/14 coil former, 11 pins (vertical mounting).

WINDING DATA - STYLE 3, VERTICAL MOUNTING

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm²)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	11	1,2,3,4,5,12, 13,14,15,16,17	210	27.8	4322 021 3336

EC cores and accessories EC52/24/14

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
clasp	5 5	4312 021 2604 4312 021 2605	steel, zinc plated steel, zinc plated with mounting stud
spring	6	4312 021 2617	steel, zinc plated

Dimensions in mm

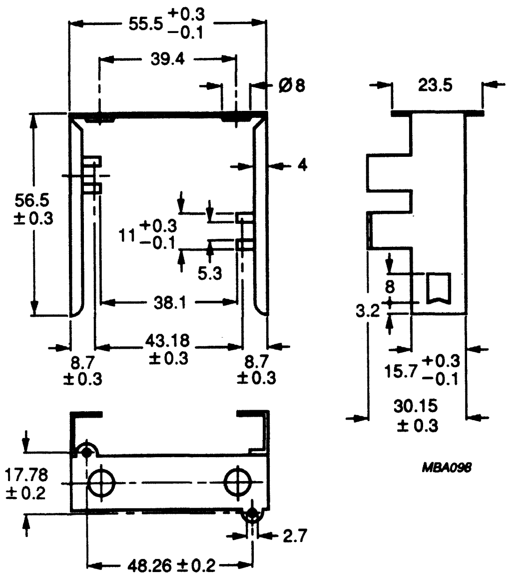


Fig.6 Clasp.

Dimensions in mm

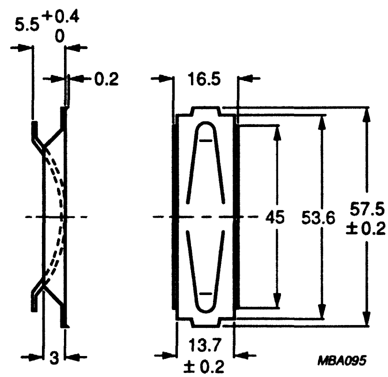


Fig.7 Spring.

EC cores and accessories | EC70/34/17

Dimensions in mm

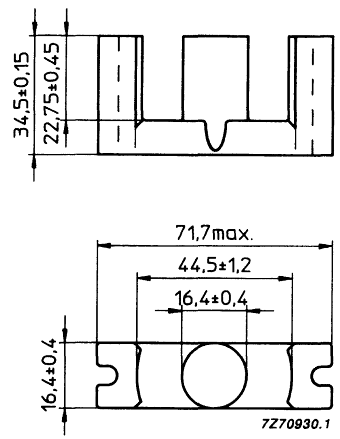


Fig.1 EC70/34/17 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.514	mm^{-1}
V_e	effective volume	40100	mm^3
l_e	effective length	144	mm
A_e	effective area	279	mm^2
A_{min}	minimum area	201	mm^2
	mass of core half	≈ 125	g

CORE HALVES

GRADE	AIRGAP (μm)	A_L* (nH)	μ_e	ORDERING CODE
3C80	≈ 0	3900 ± 25%	≈ 1600	4322 020 5253
	500	≈ 520	≈ 210	4312 020 3511
	1500	≈ 230	≈ 100	4312 020 4630
3C85	≈ 0	3900 ± 25%	≈ 1600	4312 020 4631
	500	≈ 520	≈ 210	4312 020 4632
	1500	≈ 230	≈ 100	4312 020 4633

* A_L measured in combination with an ungapped core half

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C
3C80	≥ 320	≤ 8.4	-
3C85	≥ 320	≤ 6.2	≤ 7.2

COIL FORMER DATA

Coil former material: polybutyleneterephtalate (PBT), glass reinforced,flame retardent in accordance with UL 94V-0

Pin material: CuSn, SnPb plated

Maximum operating temperature: 125 °C

Resistance to soldering heat: 400 °C, 4 s

Solderability: IEC 68-2-20, Part 2, Test TA, method 1

Average length of turn: 96 mm

Dimensions in mm

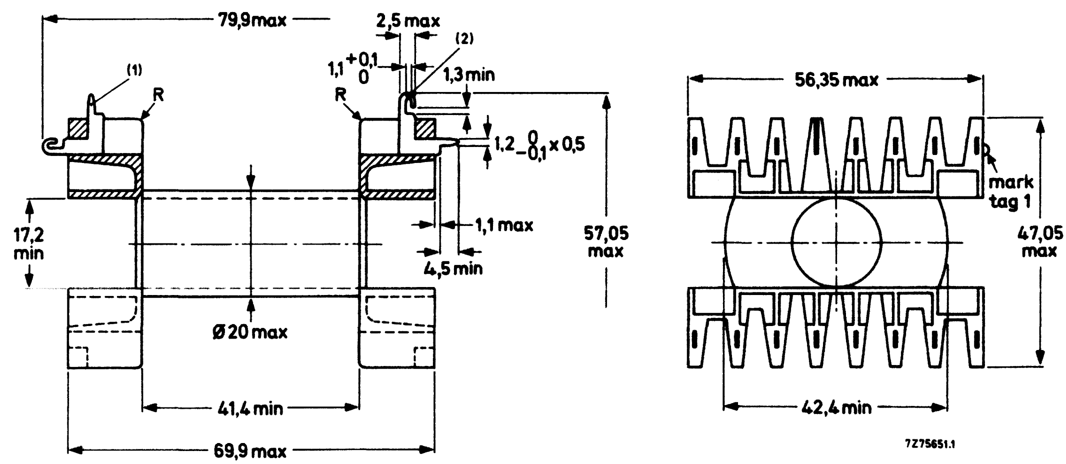


Fig.2 EC70/34/17 coil former.

Dimensions in mm

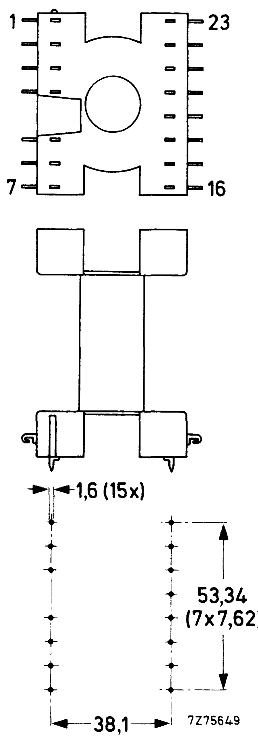


Fig.3 EC70/34/17 coil former, 15 pins (horizontal mounting).

Dimensions in mm

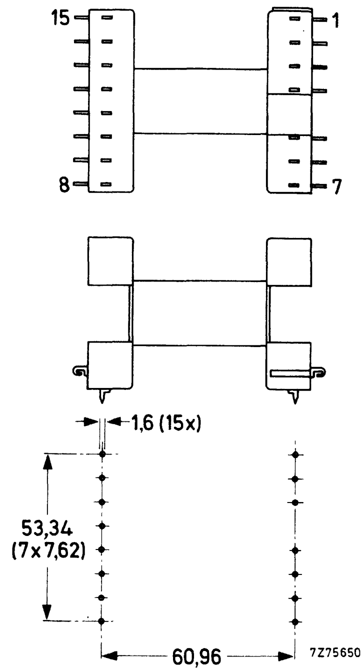


Fig.4 EC70/34/17 coil former, 15 pins (vertical mounting).

WINDING DATA - STYLE 1, HORIZONTAL MOUNTING

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	15	all	464	41.4	4322 021 3334

WINDING DATA - STYLE 2, VERTICAL MOUNTING

NUMBER OF SECTIONS	NUMBER OF PINS	PIN POSITIONS	WINDING AREA (mm^2)	MINIMUM WINDING WIDTH (mm)	ORDERING CODE
1	15	1,2,3,4,5,6,7,16,17, 18,19,20,21,22, 23	464	41.4	4322 021 3337

MOUNTING PARTS

ITEM	FIG. NO.	ORDERING CODE	REMARKS
clasp	4 4	4312 021 2606 4312 021 2607	steel, zinc plated steel, zinc plated with mounting stud
spring	5	4312 021 2618	steel, zinc plated

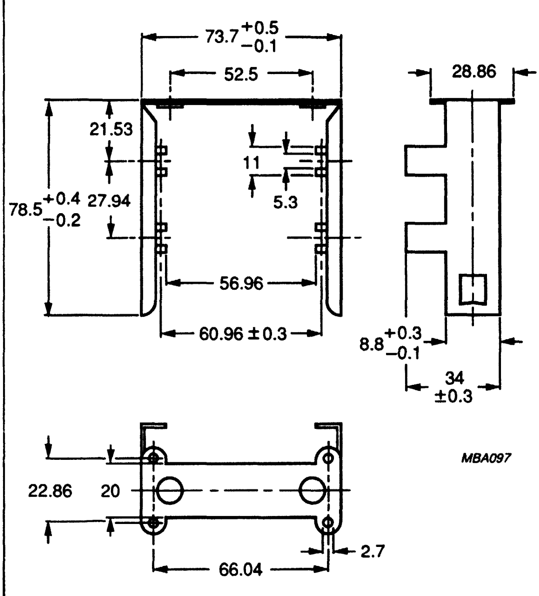


Fig.5 Clasp.

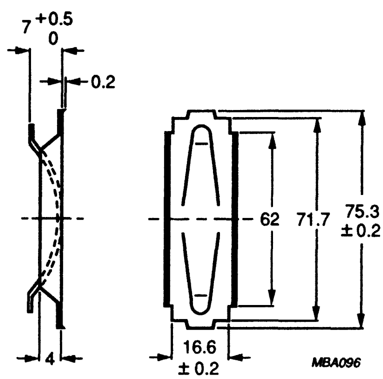


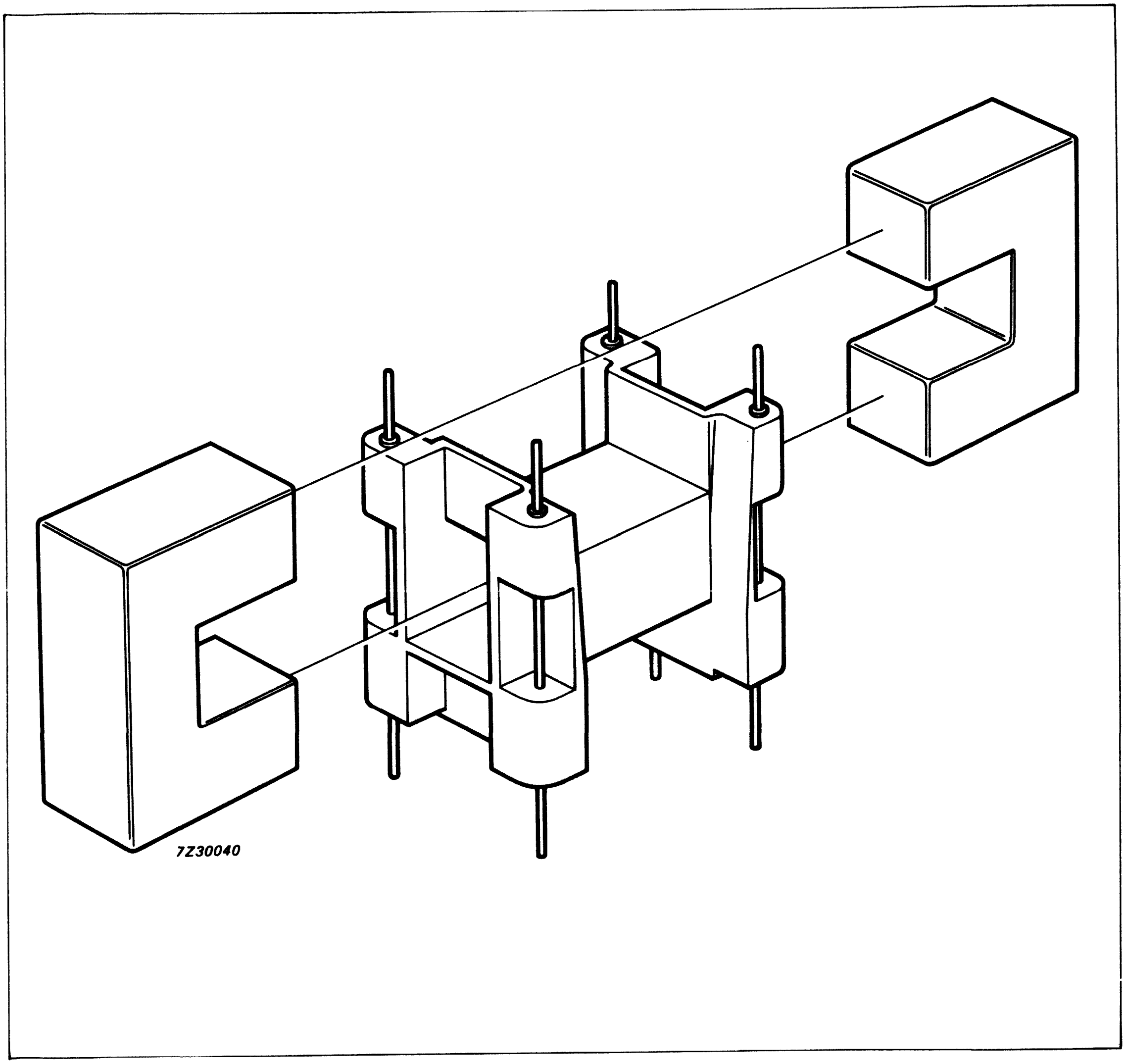
Fig.6 Spring.

U cores and accessories
I cores and accessories

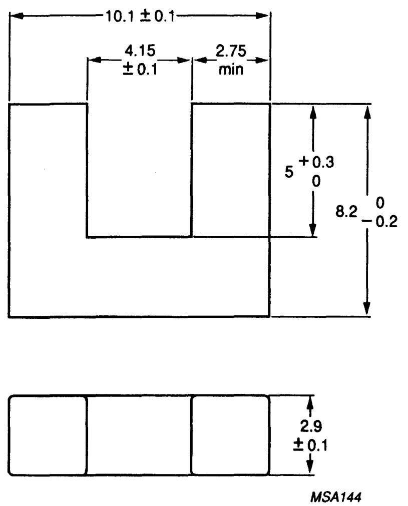
Philips Components

Data sheet	
status	Product specification
date of issue	August 1990

U10/8/3 to U100/57/75
I15/3/3 to I100/25/25



U cores and accessories U10/8/3



Dimensions in mm

Fig.1 U10/8/3 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/a)	core factor (C1)	4.46	mm^{-1}
V_e	effective volume	330	mm^3
l_e	effective length	38.4	mm
A_e	effective area	8.6	mm^2
	mass of core half	≈ 0.9	g

CORE HALVES

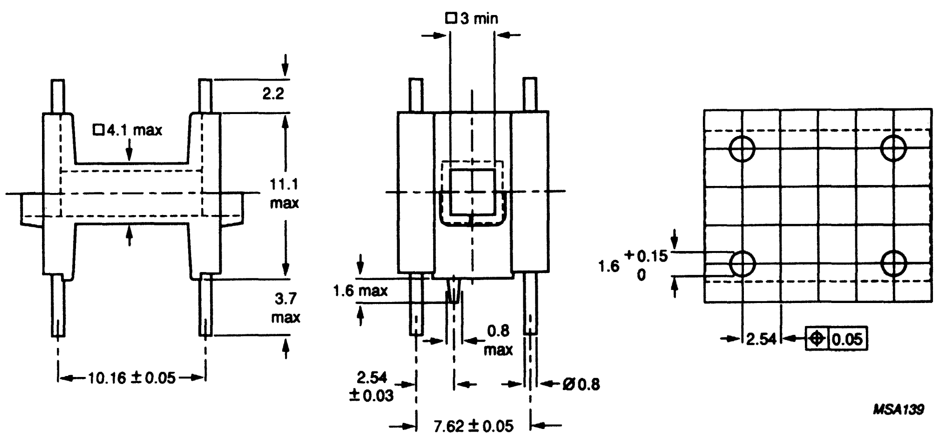
GRADE	A_L	μ_e	ORDERING CODE
3C80	540 ± 25%	≈ 1900	4312 020 4322
3C85	540 ± 25%	≈ 1900	4312 020 4328

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C
3C80	≥ 320	≤ 0.05	-	-
3C85	≥ 320	-	≤ 0.05	≤ 0.06

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2



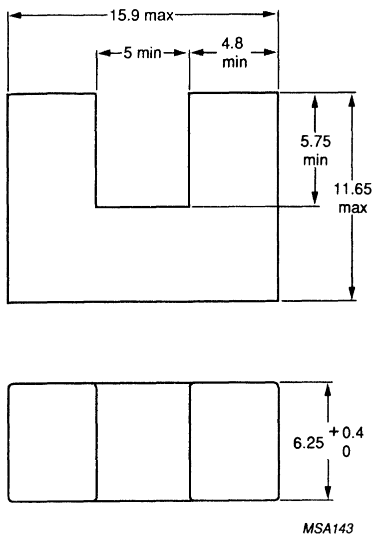
Dimensions in mm

Fig.2 U10/8/3 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	4	23	8	26	3122 134 0259

U cores and accessories U15/11/6



Dimensions in mm

Fig.1 U15/11/6 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/a)	core factor (C1)	1.60	mm^{-1}
V_e	effective volume	1440	mm^3
l_e	effective length	48	mm
A_e	effective area	30	mm^2
	mass of core half	≈ 4.4	g

CORE HALVES

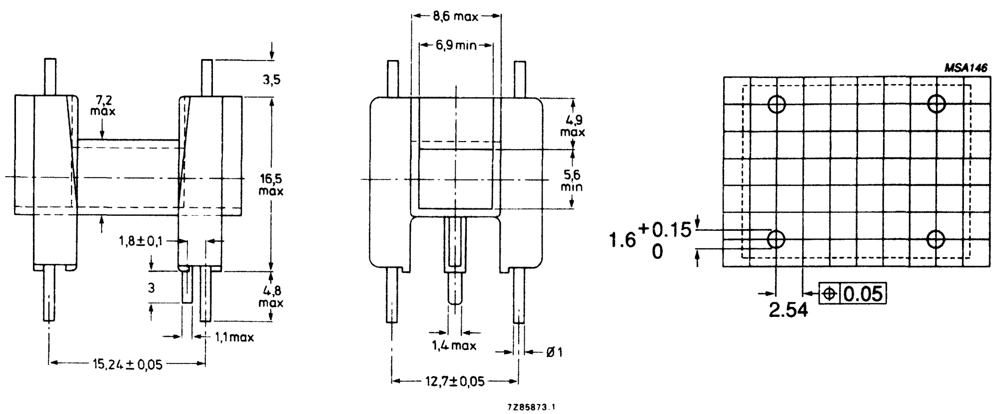
GRADE	A_L	μ_e	ORDERING CODE
3C80	1250 ± 25%	≈ 1550	4312 020 4323
3C85	1250 ± 25%	≈ 1550	4312 020 4329
3C11	2350 ± 25%	≈ 3000	4312 020 4311

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C
3C80	≥ 320	≤ 0.18	-	-
3C85	≥ 320	-	≤ 0.23	≤ 0.26

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2



Dimensions in mm

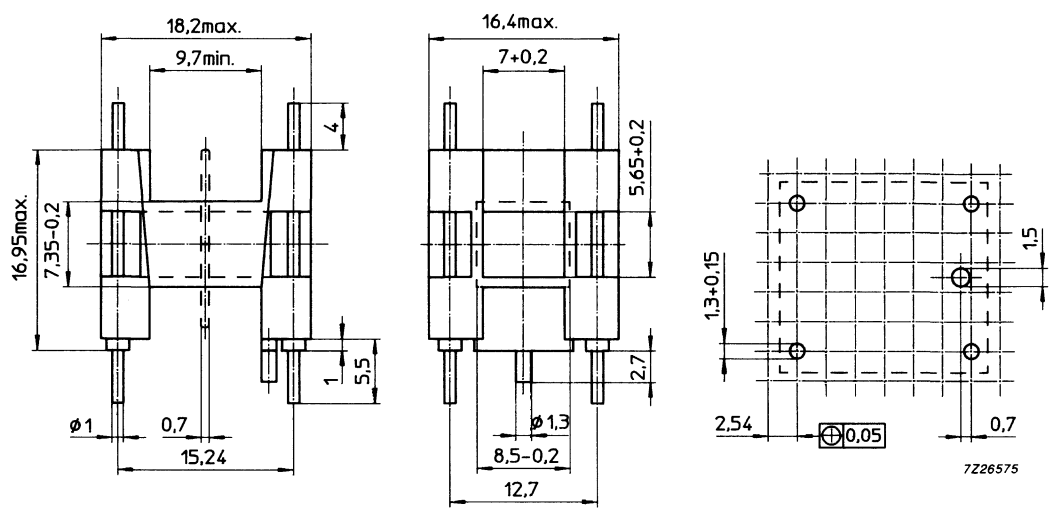
Fig.2 U15/11/6 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	4	38.2	9.8	43.5	3122 134 0254

COIL FORMER DATA

Coil former material: polyamide 6.6 , glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-0



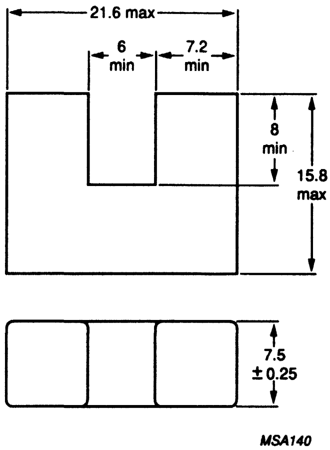
Dimensions in mm

Fig.3 U15/11/6 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm²)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	4	38.7	9.7	46.6	4322 021 3507
2	4	2 x 17.9	2 x 4.45	46.6	4322 021 3508

U cores and accessories U20/16/7



Dimensions in mm

Fig.1 U20/16/7 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/a)$	core factor (C1)	1.21	mm^{-1}
V_e	effective volume	3800	mm^3
l_e	effective length	68	mm
A_e	effective area	56	mm^2
	mass of core half	≈ 9	g

CORE HALVES

GRADE	A_L	μ_e	ORDERING CODE
3C80	1700 ± 25%	≈ 1650	4312 020 3351
3C85	1700 ± 25%	≈ 1650	4312 020 4303
3C11	3400 ± 25%	≈ 3250	4312 020 4312

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

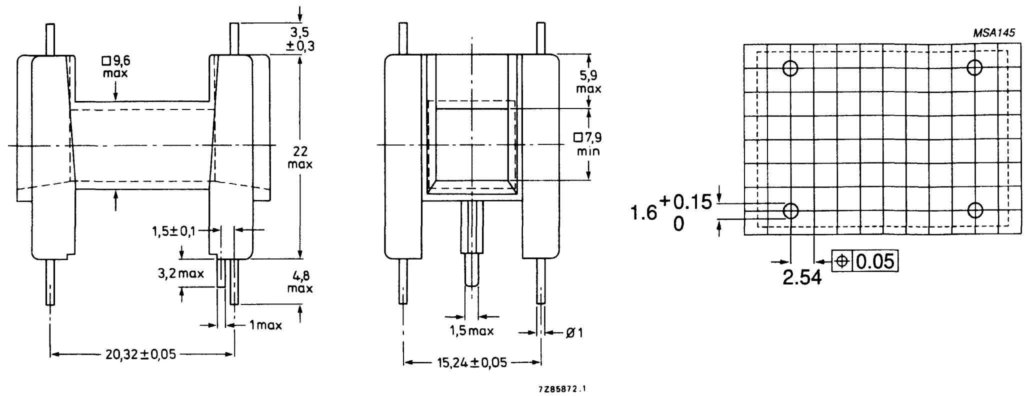
GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C
3C80	≥ 320	≤ 0.42	-	-
3C85	≥ 320	-	≤ 0.60	≤ 0.70

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced

Maximum operating temperature: 130 °C

Flammability: in accordance with UL94V-2



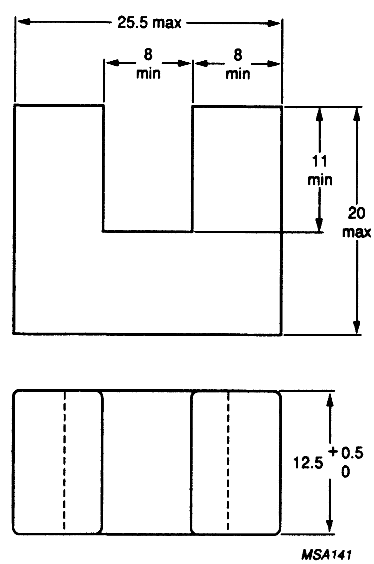
Dimensions in mm

Fig.2 U20/16/7 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm²)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	4	73	14.5	54	3122 137 6414

U cores and accessories U25/20/13



Dimensions in mm

Fig.1 U25/20/13 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/a)$	core factor (C1)	0.86	mm^{-1}
V_e	effective volume	8600	mm^3
l_e	effective length	86	mm
A_e	effective area	100	mm^2
	mass of core half	≈ 21	g

CORE HALVES

GRADE	A_L	μ_e	ORDERING CODE
3C80	2500 ± 25%	≈ 1700	4312 020 4307
3C85	2500 ± 25%	≈ 1700	4312 020 4330
3C11	5100 ± 25%	≈ 3450	4312 020 4313

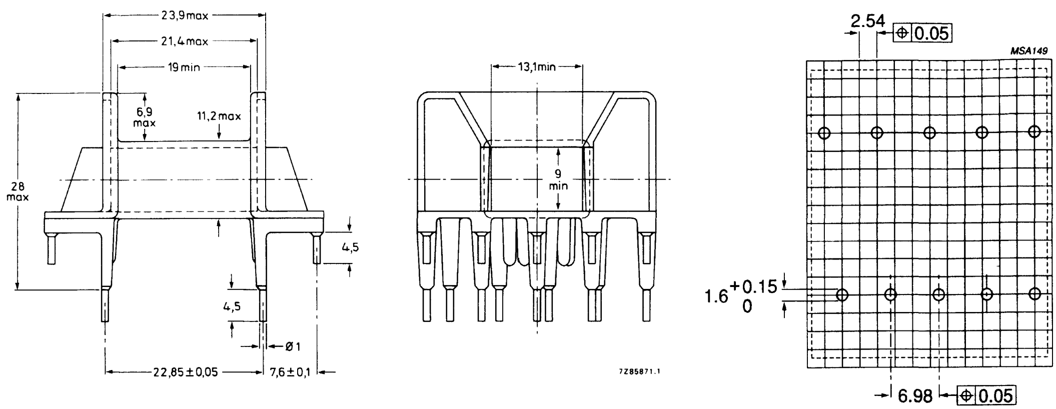
PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C
3C80	≥ 320	≤ 1.00	-	-
3C85	≥ 320	-	≤ 1.40	≤ 1.60

U cores and accessories U25/20/13

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2

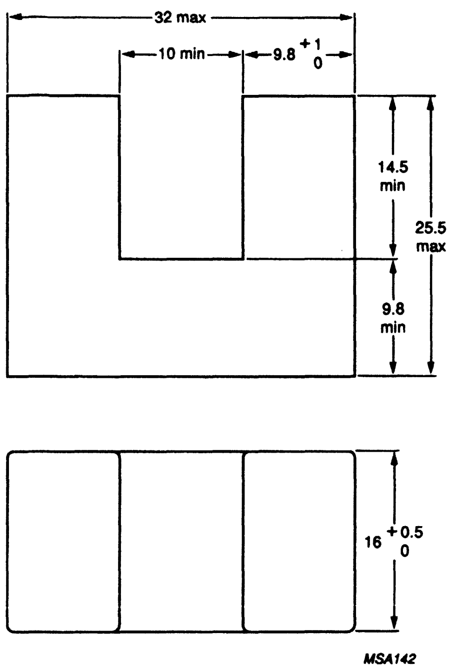


Dimensions in mm

Fig.2 U25/20/13 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm²)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	9	131	19	73	3122 137 6191



Dimensions in mm

Fig. 1 U30/25/16 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/a)$	core factor (C1)	0.707	mm^{-1}
V_e	effective volume	17400	mm^3
l_e	effective length	111	mm
A_e	effective area	157	mm^2
	mass of core half	≈ 48	g

CORE HALVES

GRADE	A_L	μ_e	ORDERING CODE
3C80	3300 ± 25%	≈ 1800	4312 020 4324
3C85	3300 ± 25%	≈ 1800	4312 020 4331
3C11	6500 ± 25%	≈ 3600	4312 020 4314

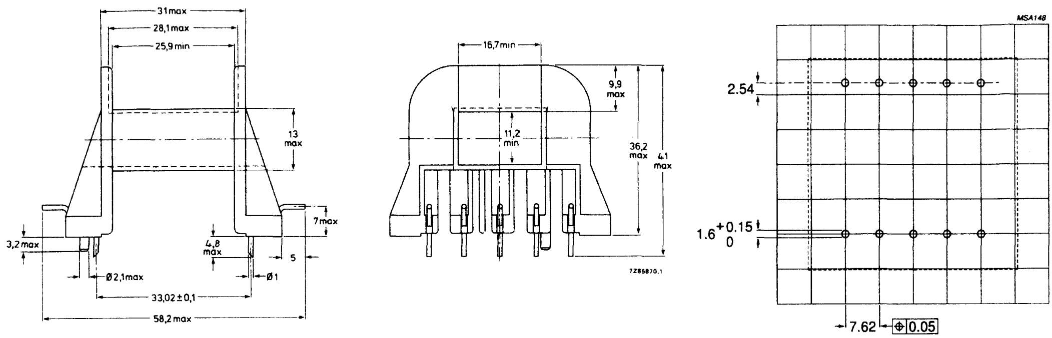
PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P_V (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C
3C80	≥ 320	≤ 2.00	-	-
3C85	≥ 320	-	≤ 2.70	≤ 3.20

U cores and accessories U30/25/16

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2



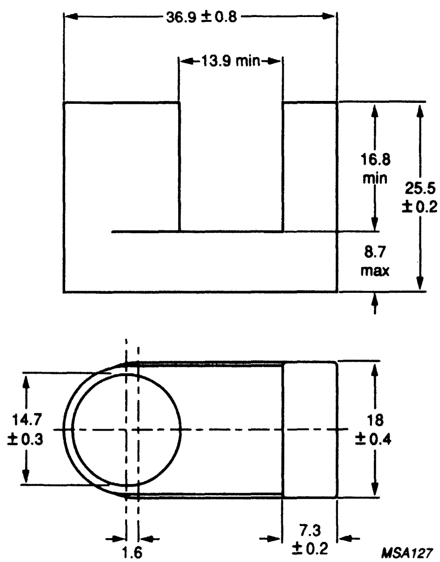
Dimensions in mm

Fig.2 U30/25/16 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm²)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	10	230	25.9	97	3122 137 5536

U cores and accessories U37/25/18



Dimensions in mm

Fig.1 U37/25/18 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/a)$	core factor (C1)	0.833	mm^{-1}
V_e	effective volume	18800	mm^3
l_e	effective length	125	mm
A_e	effective area	150	mm^2
A_{min}	minimum area	132	mm^2
	mass of core half	≈ 48	g

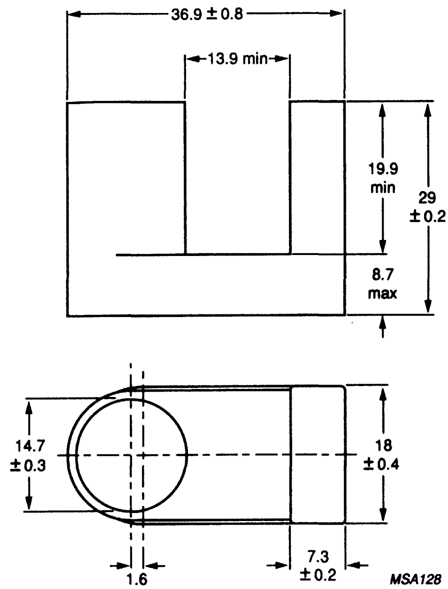
CORE HALVES

GRADE	A_L	μ_e	ORDERING CODE
3C80	≈ 2600	≈ 1750	4312 020 3374
3C10	≈ 2400	≈ 1600	4312 020 4317

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C
3C80	≥ 330	≤ 2.10

U cores and accessories U37/29/18



Dimensions in mm

Fig.1 U37/29/18 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/a)$	core factor (C1)	0.967	mm^{-1}
V_e	effective volume	21500	mm^3
l_e	effective length	145	mm
A_e	effective area	150	mm^2
A_{min}	minimum area	132	mm^2
	mass of core half	≈ 55	g

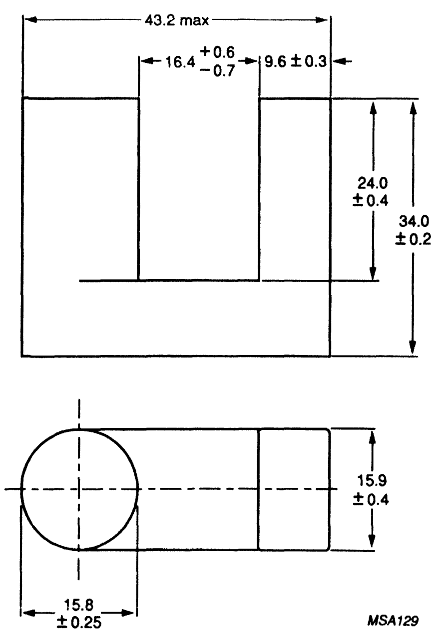
CORE HALVES

GRADE	A_L	μ_e	ORDERING CODE
3C80	≈ 2400	≈ 1800	4312 020 3371
3C10	≈ 2200	≈ 1650	4312 020 4319

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C
3C80	≥ 330	≤ 2.40

U cores and accessories U43/34/16



Dimensions in mm

Fig.1 U43/34/16 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/a)$	core factor (C1)	0.98	mm^{-1}
V_e	effective volume	27100	mm^3
l_e	effective length	163	mm
A_e	effective area	166	mm^2
A_{min}	minimum area	153	mm^2
	mass of core half	≈ 70	g

CORE HALVES

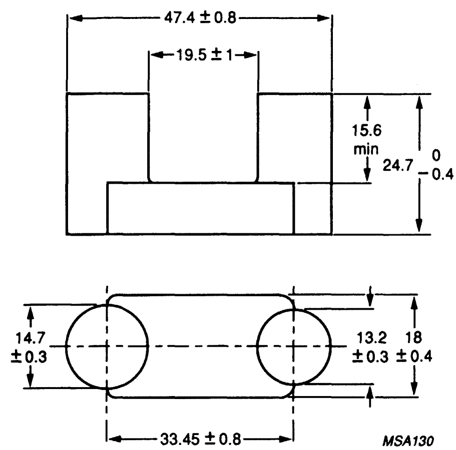
GRADE	A_L	μ_e	ORDERING CODE
3C80	≈ 2400	≈ 1800	4312 020 3368

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C
3C80	≥ 330	≤ 3.00

U cores and accessories

U47/25/18



Dimensions in mm

Fig.1 U47/25/18 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/a)$	core factor (C1)	0.91	mm^{-1}
V_e	effective volume	20900	mm^3
l_e	effective length	138	mm
A_e	effective area	151	mm^2
A_{min}	minimum area	137	mm^2
	mass of core half	≈ 54	g

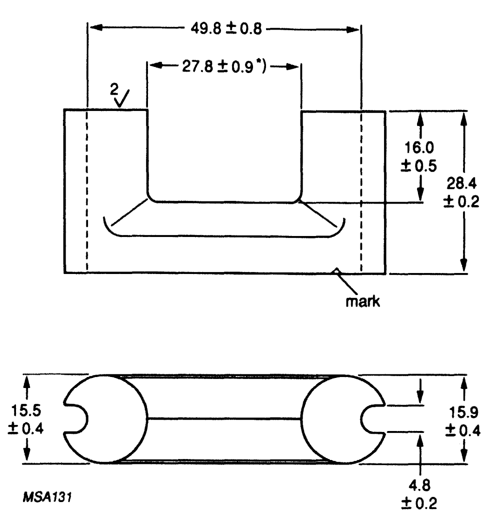
CORE HALVES

GRADE	A_L	μ_e	ORDERING CODE
3C80	≈ 2400	≈ 1800	4312 020 3352

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C
3C80	≥ 330	≤ 2.30

U cores and accessories U57/28/16



Dimensions in mm

Fig.1 U57/28/16 core half.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/a)$	core factor (C1)	0.95	mm^{-1}
V_e	effective volume	27500	mm^3
l_e	effective length	163	mm
A_e	effective area	171	mm^2
A_{min}	minimum area	160	mm^2
	mass of core half	≈ 70	g

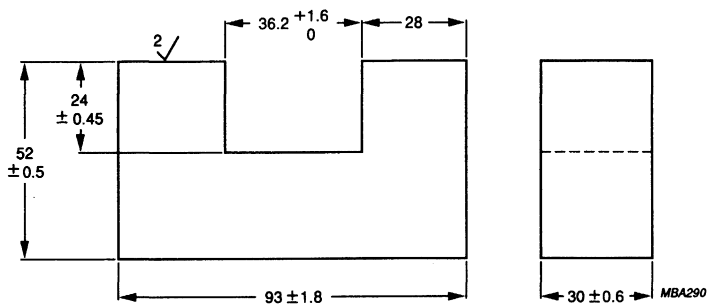
CORE HALVES

GRADE	A_L	μ_e	ORDERING CODE
3C80	≈ 2400	≈ 1800	4312 020 3319

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C
3C80	≥ 330	≤ 3.10

U cores and accessories | U93/52/30



Dimensions in mm

Fig.1 U93/52/30 core half.

EFFECTIVE CORE PARAMETERS FOR UU-COMBINATION

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/a)$	core factor (C1)	0.326	mm^{-1}
V_e	effective volume	200000	mm^3
l_e	effective length	254	mm
A_e	effective area	780	mm^2
	mass of core half	≈ 560	g

CORE HALVES

GRADE	A_L*	μ_e	ORDERING CODE
3C80	7200	≈ 1850	4312 020 3358

* measured on a combination of two U-cores.

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C	REMARKS
3C80	≥ 290	≤ 22.0	UU93/104/30 combination

I cores and accessories I93/28/30

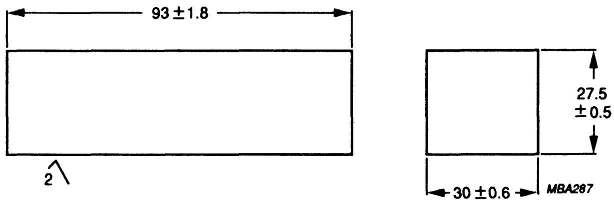


Fig.2 I93/28/30 core.

EFFECTIVE CORE PARAMETERS IN COMBINATION WITH U93/76/30

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/a)$	core factor (C1)	0.326	mm^{-1}
V_e	effective volume	200000	mm^3
l_e	effective length	254	mm
A_e	effective area	780	mm^2
	mass of core	≈ 370	g

CORE HALVES

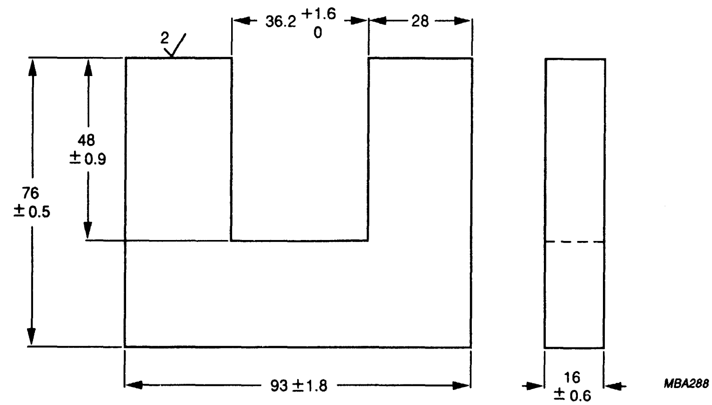
GRADE	A_L*	μ_e	ORDERING CODE
3C80	7100	≈ 1850	4312 020 3359

* measured on an UI-combination.

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C	REMARKS
3C80	≥ 330	≤ 22	UI93/104/30 combination

U cores and accessories U93/76/16



Dimensions in mm

Fig.1 U93/76/16 core half.

EFFECTIVE CORE PARAMETERS FOR UU-COMBINATION

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/a)	core factor (C1)	0.778	mm^{-1}
V_e	effective volume	147000	mm^3
l_e	effective length	350	mm
A_e	effective area	450	mm^2
	mass of core half	≈ 400	g

CORE HALVES

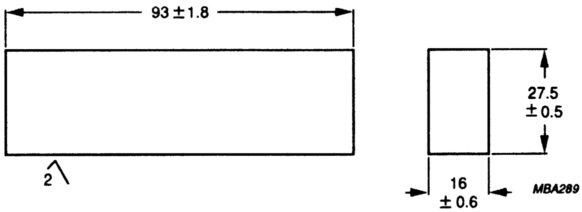
GRADE	A_L*	μ_e	ORDERING CODE
3C80	3100	≈ 1900	4312 020 3355

* measured on a combination of two U-cores.

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C	REMARKS
3C80	≥ 290	≤ 16.2	UU93/152/16 combination

I cores and accessories I93/28/16



Dimensions in mm

Fig.2 I93/28/16 core.

EFFECTIVE CORE PARAMETERS IN-COMBINATION WITH U93/76/16

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/a)	core factor (C1)	0.605	mm^{-1}
V_e	effective volume	107	mm^3
l_e	effective length	254	mm
A_e	effective area	420	mm^2
	mass of core	≈ 200	g

CORE HALVES

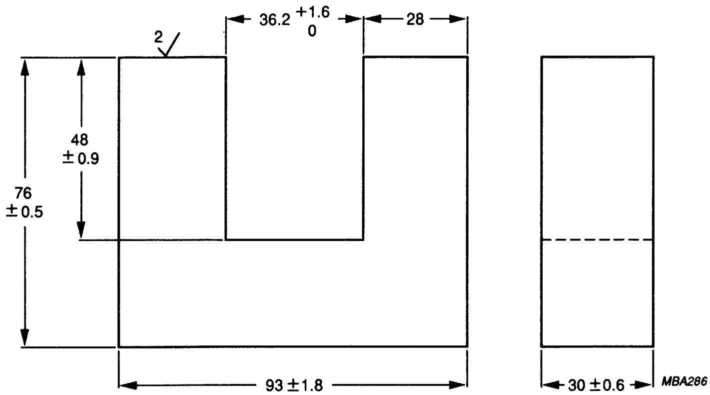
GRADE	A_L*	μ_e	ORDERING CODE
3C80	4000	≈ 1900	4312 020 3356

* measured on an UI-combination.

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C	REMARKS
3C80	≥ 330	≤ 11.8	UI93/104/16 combination

U cores and accessories U93/76/30



Dimensions in mm

Fig.1 U93/76/30 core half.

EFFECTIVE CORE PARAMETERS FOR UU-COMBINATION

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/a)	core factor (C1)	0.449	mm^{-1}
V_e	effective volume	273000	mm^3
l_e	effective length	350	mm
A_e	effective area	780	mm^2
	mass of core half	≈ 760	g

CORE HALVES

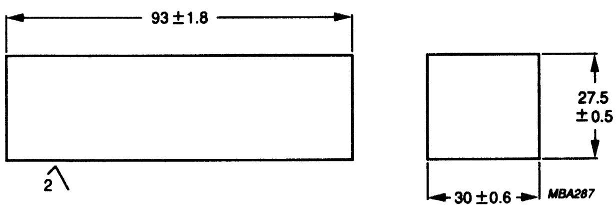
GRADE	A_L*	μ_e	ORDERING CODE
3C80	5200	≈ 1850	4312 020 3357

* measured on a combination of two U93/76/30-cores.

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C	REMARKS
3C80	≥ 290	≤ 30	UU93/152/30 combination

I cores and accessories | I93/28/30



Dimensions in mm

Fig.2 I93/28/30 core.

EFFECTIVE CORE PARAMETERS IN COMBINATION WITH U93/52/30

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/a)	core factor (C1)	0.262	mm^{-1}
V_e	effective volume	158000	mm^3
l_e	effective length	204	mm
A_e	effective area	780	mm^2
	mass of core	≈ 370	g

CORE HALVES

GRADE	A_L*	μ_e	ORDERING CODE
3C80	8900	≈ 1850	4312 020 3359

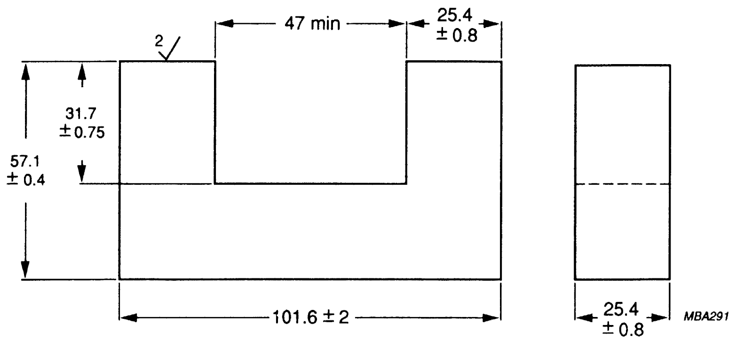
* measured in combination with U93/52/30.

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C	REMARKS
3C80	≥ 330	≤ 17.4	UI93/80/30 combination

U cores and accessories

U100/57/25



Dimensions in mm

Fig.1 U100/57/25 core half.

EFFECTIVE CORE PARAMETERS FOR UU-COMBINATION

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/a)$	core factor (C1)	0.484	mm^{-1}
V_e	effective volume	186000	mm^3
l_e	effective length	300	mm
A_e	effective area	620	mm^2
	mass of core half	≈ 500	g

CORE HALVES

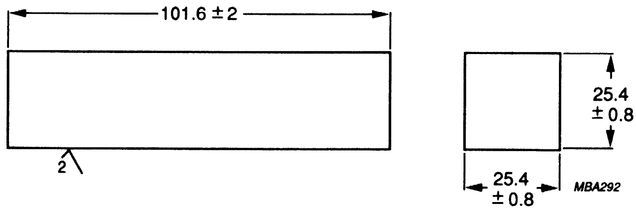
GRADE	A_L*	μ_e	ORDERING CODE
3C80	5000	≈ 1900	4312 020 3360

* measured on a combination of two U-cores.

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C	REMARKS
3C80	≥ 290	≤ 20.5	UU100/114/25 combination

I cores and accessories I100/25/25



Dimensions in mm

Fig.2 I100/25/25 core.

EFFECTIVE CORE PARAMETERS IN COMBINATION WITH U100/57/25

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/a)	core factor (C1)	0.387	mm^{-1}
V_e	effective volume	149000	mm^3
l_e	effective length	240	mm
A_e	effective area	620	mm^2
	mass of core	≈ 300	g

CORE HALVES

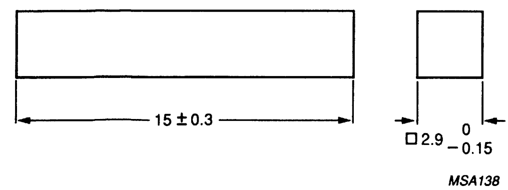
GRADE	A_L*	μ_e	ORDERING CODE
3C80	6200	≈ 1900	4312 020 3361

* measured on an UI-combination.

PROPERTIES OF CORE SETS UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P_V (W) at f = 16 kHz; $\hat{B}$ = 200 mT; T = 100 °C	REMARKS
3C80	≥ 330	≤ 16.4	UI100/82/25 combination

I cores and accessories I15/3/3



Dimensions in mm

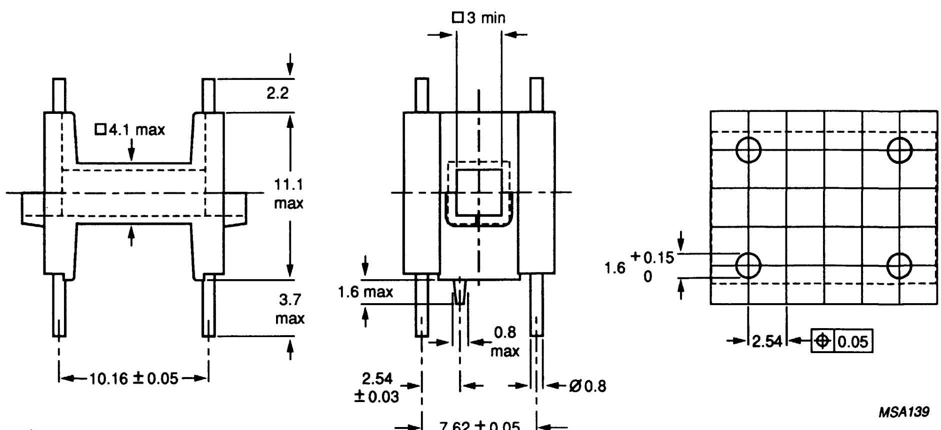
Fig.1 I15/3/3 core.

CORE

GRADE	ORDERING CODE
3C80	4312 020 4325

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2



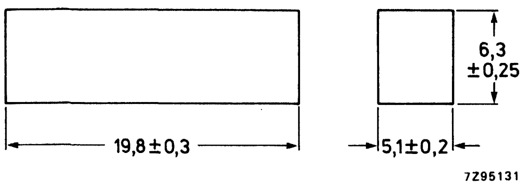
Dimensions in mm

Fig.2 I15/3/3 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	4	28	8	30	3122 134 0259

I cores and accessories — I20/6/5



Dimensions in mm

Fig.1 I20/6/5 core.

CORE

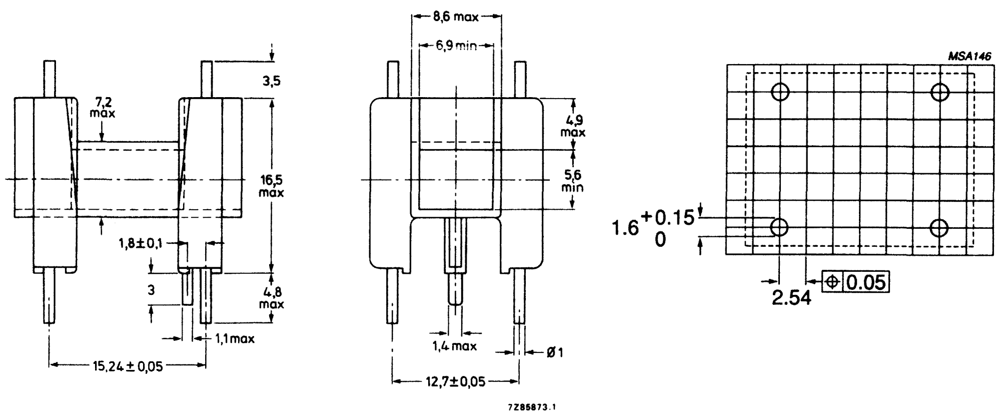
GRADE	ORDERING CODE
3C80	4312 020 4326

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced

Maximum operating temperature: 130 °C

Flammability: in accordance with UL94V-2



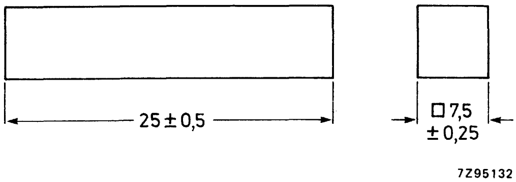
Dimensions in mm

Fig.2 I20/6/5 coil former.

WINDING DATA

NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	4	46	9.8	47	3122 134 0254

I cores and accessories I25/7/7



Dimensions in mm

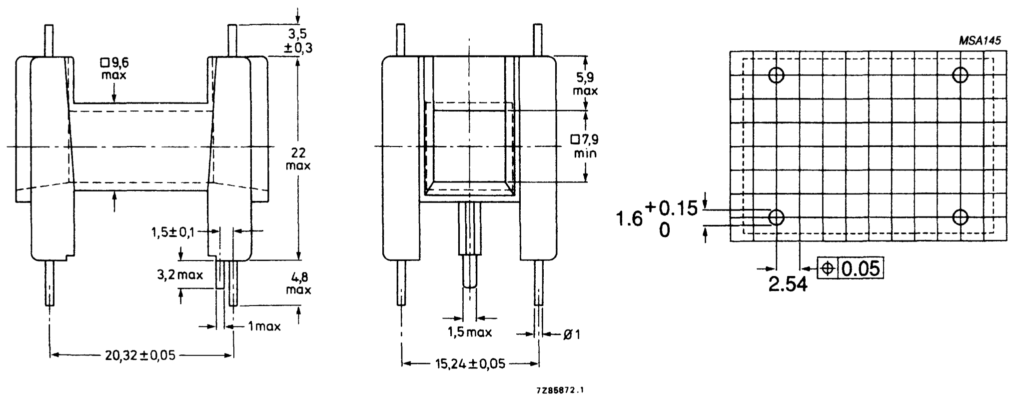
Fig.1 I25/7/7 core.

CORE

GRADE	ORDERING CODE
3C80	4312 020 4327

COIL FORMER DATA

Coil former material: polycarbonate (PC), glass reinforced
Maximum operating temperature: 130 °C
Flammability: in accordance with UL94V-2



Dimensions in mm

Fig.2 I25/7/7 coil former.

WINDING DATA

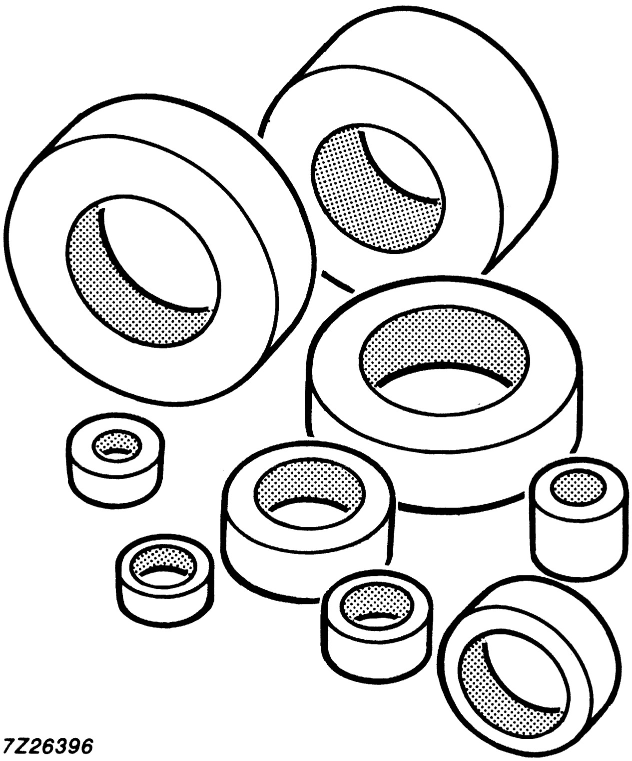
NUMBER OF SECTIONS	NUMBER OF PINS	WINDING AREA (mm^2)	WINDING WIDTH (mm)	WINDING LENGTH (mm)	ORDERING CODE
1	4	90	14.5	63	3122 137 6414

Ferrite ring cores
Iron powder ring cores

Philips Components

Data sheet	
status	Product specification
date of issue	August 1990

RC2.5/1.5/1 to RCC36/23/15
Ferrite ring cores
RCC7.5/4.1/3 to RCC32.6/20.2/10.
Iron powder ring cores



7Z26396

Ferrite ring cores

RC2.5/1.5/1

Dimensions in mm

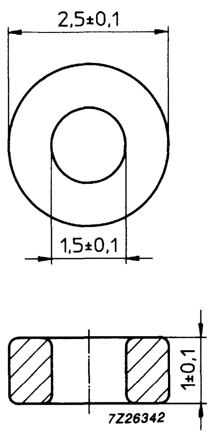


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	12.3	mm^{-1}
V_e	effective volume	2.94	mm^3
l_e	effective length	6.02	mm
A_e	effective area	0.489	mm^2
	mass	≈ 0.015	g

GRADE	A_L (nH)	ORDERING CODE
4C65	13 ± 25%	4330 030 3472
4A11	71 ± 25%	4330 030 3405
3F3	180 ± 25%	4330 030 3513
3E25	610 ± 25%	4330 030 3719
3E5	920 ± 30%	4330 030 3514

Ferrite ring cores RCC4/2.2/1.1

Dimensions in mm

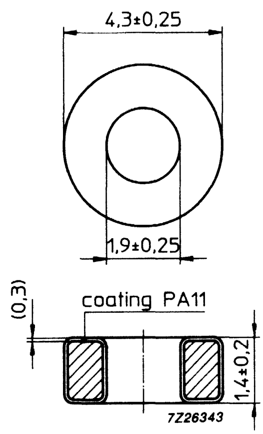


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	9.55	mm^{-1}
V_e	effective volume	8.82	mm^3
l_e	effective length	9.18	mm
A_e	effective area	0.961	mm^2
	mass	≈ 0.04	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
4C65	16 ± 25%	violet	4330 030 3469
4A11	92 ± 25%	pink	4330 030 3436
3F3	240 ± 25%	blue	4330 030 3789
3E25	725 ± 30%	orange	4330 030 3735
3E5	1120 ± 30%	yellow	4330 030 3761

Ferrite ring cores

RCC4/2.2/1.6

Dimensions in mm

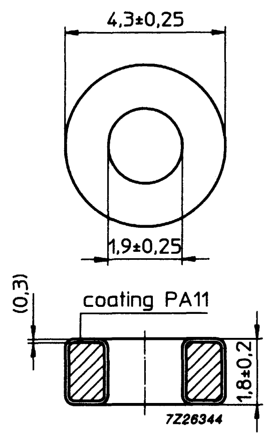


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	6.56	mm^{-1}
V_e	effective volume	12.9	mm^3
l_e	effective length	9.2	mm
A_e	effective area	1.40	mm^2
	mass	≈ 0.10	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
4C65	24 ± 25%	violet	4330 030 3470
4A11	134 ± 25%	pink	4330 030 3437
3F3	340 ± 25%	blue	4330 030 3478
3E25	1050 ± 30%	orange	4330 030 3707
3E5	1630 ± 30%	yellow	4330 030 3760

Ferrite ring cores RCC6/4/2

Dimensions in mm

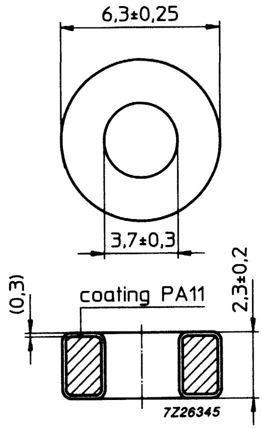


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	7.75	mm^{-1}
V_e	effective volume	30.2	mm^3
l_e	effective length	15.3	mm
A_e	effective area	1.97	mm^2
	mass	≈ 0.15	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
4C65	20 ± 25%	violet	4322 020 9716
4A11	114 ± 25%	pink	4330 030 3438
3F3	290 ± 25%	blue	4330 030 3790
3E25	890 ± 30%	orange	4330 030 3708
3E5	1380 ± 30%	yellow	4330 030 3762

Ferrite ring cores RCC6.3/3.8/2.5

Dimensions in mm

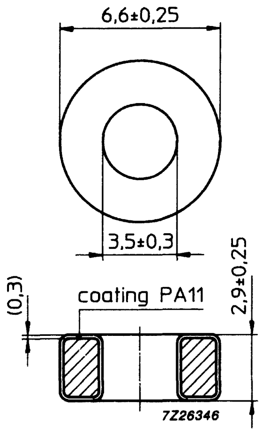


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	4.97	mm^{-1}
V_e	effective volume	46.5	mm^3
l_e	effective length	15.2	mm
A_e	effective area	3.06	mm^2
	mass	≈ 0.23	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
4C65	32 ± 25%	violet	4330 030 3479
4A11	177 ± 25%	pink	4330 030 3487
3F3	450 ± 25%	blue	4330 030 3497
3E25	1390 ± 30%	orange	4330 030 3494
3E5	2150 ± 30%	yellow	4330 030 3496

Ferrite ring cores

RCC9/6/3

Dimensions in mm

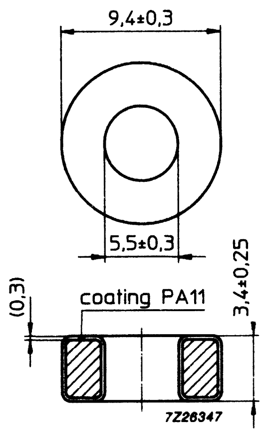


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	5.17	mm^{-1}
V_e	effective volume	102	mm^3
l_e	effective length	22.9	mm
A_e	effective area	4.44	mm^2
	mass	≈ 0.5	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
4C65	30 ± 25%	violet	4322 020 9717
4A11	170 ± 25%	pink	4330 030 3439
3F3	440 ± 25%	blue	4330 030 3791
3E25	1340 ± 30%	orange	4330 030 3709
3E5	2070 ± 30%	yellow	4330 030 3763
3R1	-	black	4330 030 3768

Ferrite ring cores RCC10/6/4

Dimensions in mm

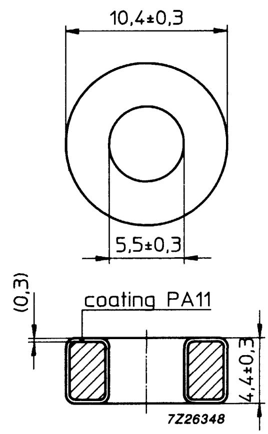


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	3.07	mm^{-1}
V_e	effective volume	188	mm^3
l_e	effective length	24.1	mm
A_e	effective area	7.8	mm^2
	mass	≈ 0.95	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
4C65	52 ± 25%	violet	4330 030 3480
4A11	285 ± 25%	pink	4330 030 3488
3F3	740 ± 25%	blue	4330 030 3498
3C11	1750 ± 25%	white	4330 030 3450
3E25	2250 ± 30%	orange	4330 030 3458
3E5	3470 ± 30%	yellow	4330 030 3466

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3F3	≥ 320	–	≤ 0.03	≤ 0.04

Ferrite ring cores RCC12.5/7.5/5

Dimensions in mm

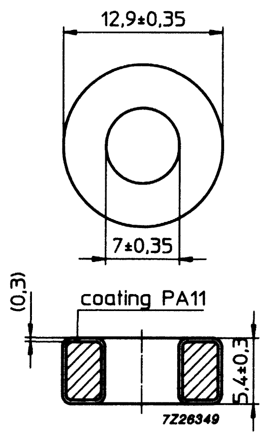


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	2.46	mm^{-1}
V_e	effective volume	368	mm^3
l_e	effective length	30.1	mm
A_e	effective area	12.2	mm^2
	mass	≈ 1.8	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L	COLOUR CODE	ORDERING CODE
4C65	64 ± 25%	violet	4330 030 3481
4A11	360 ± 25%	pink	4330 030 3440
3C85	1000 ± 25%	red	4330 030 3779
3F3	900 ± 25%	blue	4330 030 3792
3C11	2200 ± 25%	white	4330 030 3492
3E25	2810 ± 30%	orange	4330 030 3710
3E5	4340 ± 30%	yellow	4330 030 3764

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.06	≤ 0.07	–
3F3	≥ 320	–	≤ 0.04	≤ 0.07

Ferrite ring cores RCC14/9/5

Dimensions in mm

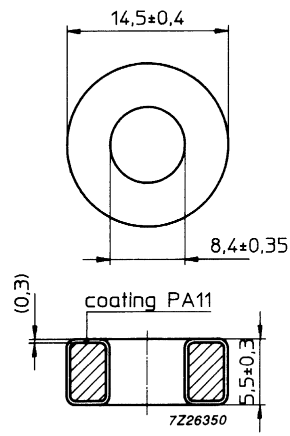


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	2.84	mm^{-1}
V_e	effective volume	430	mm^3
l_e	effective length	35	mm
A_e	effective area	12.3	mm^2
	mass	≈ 2.1	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
4C65	55 ± 25%	violet	4322 020 9718
4A11	310 ± 25%	pink	4330 030 3441
3C85	880 ± 25%	red	4330 030 3745
3F3	790 ± 25%	blue	4330 030 3793
3C11	1900 ± 25%	white	4330 030 3746
3E25	2430 ± 30%	orange	4330 030 3711
3E5	3760 ± 30%	yellow	4330 030 3765
3R1	–	black	4330 030 3769

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.07	≤ 0.08	–
3F3	≥ 320	–	≤ 0.05	≤ 0.08

Ferrite ring cores RCC14/9/9

Dimensions in mm

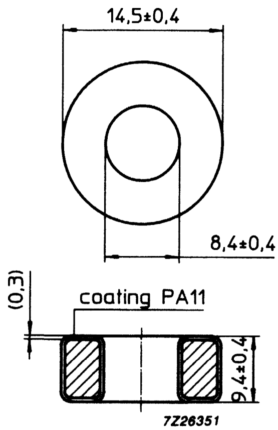


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	1.58	mm^{-1}
V_e	effective volume	774	mm^3
l_e	effective length	35	mm
A_e	effective area	22.1	mm^2
	mass	≈ 3.8	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
4A11	560 ± 25%	pink	4330 030 3442
3C85	1600 ± 25%	red	4330 030 3780
3F3	1430 ± 25%	blue	4330 030 3794
3E25	4370 ± 30%	orange	4330 030 3712
3E5	6760 ± 30%	yellow	4330 030 3766

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.12	≤ 0.14	–
3F3	≥ 320	–	≤ 0.09	≤ 0.15

Ferrite ring cores

RCC16/9.6/6.3

Dimensions in mm

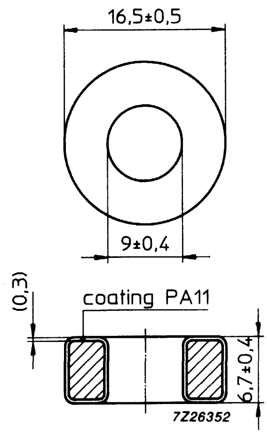


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	1.95	mm^{-1}
V_e	effective volume	760	mm^3
l_e	effective length	38.5	mm
A_e	effective area	19.7	mm^2
	mass	≈ 3.8	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
4A11	450 ± 25%	pink	4330 030 3443
3C85	1300 ± 25%	red	4330 030 3781
3F3	1160 ± 25%	blue	4330 030 3795
3C11	2700 ± 25%	white	4330 030 3718
3E25	3540 ± 25%	orange	4330 030 3713
3E5	5470 ± 30%	yellow	4330 030 3767

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.12	≤ 0.14	–
3F3	≥ 320	–	≤ 0.09	≤ 0.15

Ferrite ring cores

RCC19/10.6/10

Dimensions in mm

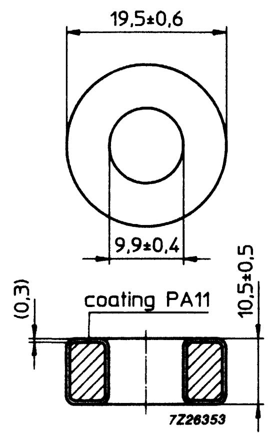


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	1.08	mm^{-1}
V_e	effective volume	1795	mm^3
l_e	effective length	44.0	mm
A_e	effective area	40.8	mm^2
	mass	≈ 9.2	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
3C85	2330 ± 25%	red	4330 030 3491
3C11	5000 ± 25%	white	4330 030 3747
3E25	6420 ± 25%	orange	4330 030 3734

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.28	≤ 0.32	–

Ferrite ring cores

RCC19/10.6/15

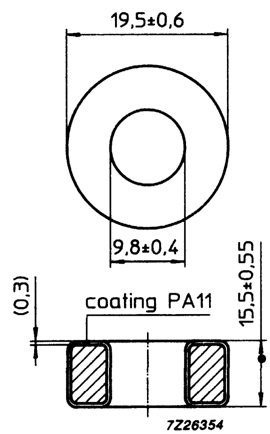


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.718	mm^{-1}
V_e	effective volume	2692	mm^3
l_e	effective length	44.0	mm
A_e	effective area	61.2	mm^2
	mass	≈ 13.8	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
3C85	3500 ± 25%	red	4330 030 3748
3C11	7500 ± 25%	white	4330 030 3749
3E25	9630 ± 25%	orange	4330 030 3714

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.42	≤ 0.49	−

Ferrite ring cores

RCC20/10/7

Dimensions in mm

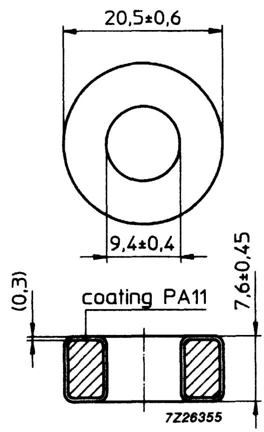


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	1.30	mm^{-1}
V_e	effective volume	1465	mm^3
l_e	effective length	43.6	mm
A_e	effective area	33.6	mm^2
	mass	≈ 7.7	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
4C65	121 ± 25%	violet	4330 030 3482
3C85	1950 ± 25%	red	4330 030 3447
3C11	4150 ± 25%	white	4330 030 3451
3E25	5340 ± 25%	orange	4330 030 3459
3E5	8250 ± 30%	yellow	4330 030 3525

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; B̂ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; B̂ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; B̂ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.23	≤ 0.27	–

Ferrite ring cores

RCC23/14/7

Dimensions in mm

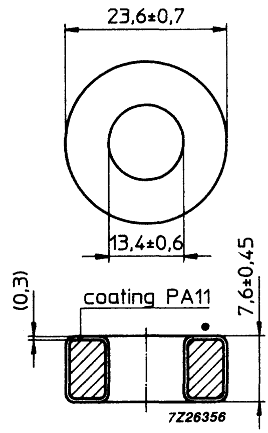


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	1.81	mm^{-1}
V_e	effective volume	1722	mm^3
l_e	effective length	55.8	mm
A_e	effective area	30.9	mm^2
	mass	≈ 8.4	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
4C65	87 ± 25%	violet	4322 020 9719
4A11	485 ± 25%	pink	4330 030 3444
3C85	1400 ± 25%	red	4330 030 3750
3F3	1250 ± 25%	blue	4330 030 3499
3C11	3000 ± 25%	white	4330 030 3751
3E25	3820 ± 25%	orange	4330 030 3716
3R1	–	black	4330 030 3770

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.27	≤ 0.31	–
3F3	≥ 320	–	≤ 0.19	≤ 0.33

Ferrite ring cores

RCC25/15/10

Dimensions in mm

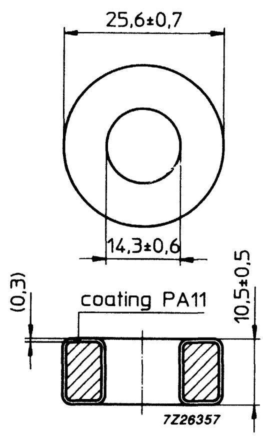


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	1.23	mm^{-1}
V_e	effective volume	2944	mm^3
l_e	effective length	60.2	mm
A_e	effective area	48.9	mm^2
	mass	≈ 15	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
3C85	2050 ± 25%	red	4330 030 3448
3F3	1840 ± 25%	blue	4330 030 3500
3C11	4400 ± 25%	white	4330 030 3452
3E25	5620 ± 25%	orange	4330 030 3460
3E5	8680 ± 30%	yellow	4330 030 3526

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.46	≤ 0.53	–
3F3	≥ 320	–	≤ 0.33	≤ 0.56

Ferrite ring cores

RCC26/14.5/10

Dimensions in mm

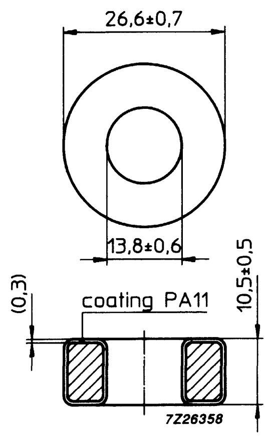


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	1.08	mm^{-1}
V_e	effective volume	3361	mm^3
l_e	effective length	60.1	mm
A_e	effective area	55.9	mm^2
	mass	≈ 17	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
3C85	2300 ± 25%	red	4330 030 3783
3C11	5000 ± 25%	white	4330 030 3752
3E25	6420 ± 25%	orange	4330 030 3717

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.52	≤ 0.60	–

Ferrite ring cores RCC26/14.5/20

Dimensions in mm

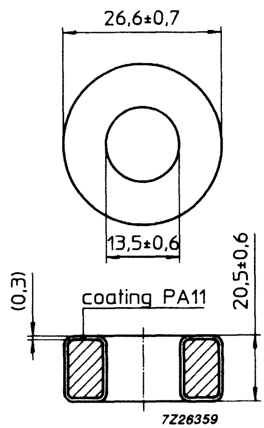


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	0.538	mm^{-1}
V_e	effective volume	6723	mm^3
l_e	effective length	60.1	mm
A_e	effective area	112	mm^2
	mass	≈ 34	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
3C85	4700 ± 25%	red	4330 030 3784
3C11	10000 ± 25%	white	4330 030 3753
3E25	12800 ± 25%	orange	4330 030 3754

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 1.1	≤ 1.2	–

Ferrite ring cores — RCC29/19/7.5

Dimensions in mm

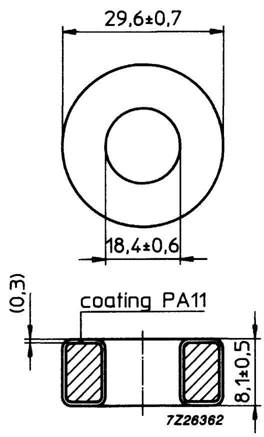


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	1.98	mm^{-1}
V_e	effective volume	2704	mm^3
l_e	effective length	73.2	mm
A_e	effective area	36.9	mm^2
	mass	≈ 13.5	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
3C85	1300 ± 25%	red	4330 030 3785
3C11	2700 ± 25%	white	4330 030 3758

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.42	≤ 0.49	–

Ferrite ring cores RCC31.5/19/12.5

Dimensions in mm

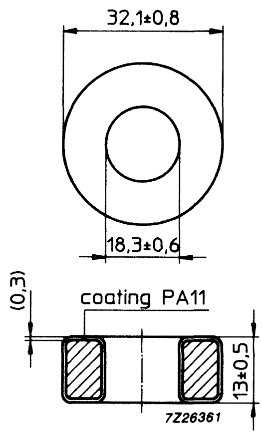


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	0.99	mm^{-1}
V_e	effective volume	5816	mm^3
l_e	effective length	76	mm
A_e	effective area	76.5	mm^2
	mass	≈ 29	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
3C85	2530 ± 25%	red	4330 030 3449
3F3	2270 ± 25%	blue	4330 030 3501
3C11	5450 ± 25%	white	4330 030 3453
3E25	6950 ± 25%	orange	4330 030 3461
3E5	10700 ± 30%	yellow	4330 030 3527

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.90	≤ 1.1	–
3F3	≥ 320	–	≤ 0.64	≤ 1.1

Ferrite ring cores RCC36/23/10

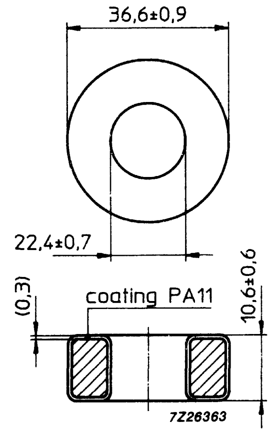


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	1.40	mm^{-1}
V_e	effective volume	5731	mm^3
l_e	effective length	89.6	mm
A_e	effective area	63.9	mm^2
	mass	≈ 28	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
4C65	112 ± 25%	violet	4330 030 3471
3C85	1800 ± 25%	red	4330 030 3786
3C11	3900 ± 25%	white	4330 030 3755

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; $\hat{B}$ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; $\hat{B}$ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; $\hat{B}$ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 0.89	≤ 1.1	–

Ferrite ring cores

RCC36/23/15

Dimensions in mm

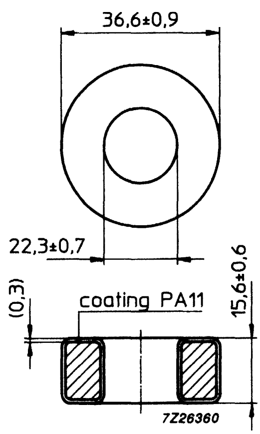


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	0.935	mm^{-1}
V_e	effective volume	8596	mm^3
l_e	effective length	89.6	mm
A_e	effective area	95.9	mm^2
	mass	≈ 42	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

NON-COATED CORES ARE AVAILABLE ON REQUEST

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
4C65	170 ± 25%	violet	4322 020 9720
4A11	940 ± 25%	pink	4330 030 3445
3C85	2700 ± 25%	red	4330 030 3787
3F3	2420 ± 25%	blue	4330 030 3502
3C11	5800 ± 25%	white	4330 030 3756
3E25	7390 ± 25%	orange	4330 030 3422
3R1	–	black	4330 030 3431
3E5	11400 ± 30%	yellow	4330 030 3528

PROPERTIES OF CORES UNDER POWER CONDITIONS

GRADE	B (mT) at H = 250 A/m; f = 25 kHz; T = 100 °C	P (W) at f = 25 kHz; B̂ = 200 mT; T = 100 °C	P (W) at f = 100 kHz; B̂ = 100 mT; T = 100 °C	P (W) at f = 400 kHz; B̂ = 50 mT; T = 100 °C
3C85	≥ 320	≤ 1.4	≤ 1.6	–
3F3	≥ 320	–	≤ 0.95	≤ 1.7

Iron powder ring cores RCC7.5/4.1/3

Dimensions in mm

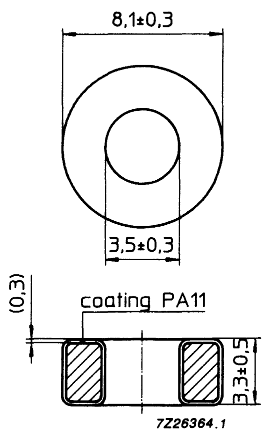


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	3.58	mm^{-1}
V_e	effective volume	83	mm^3
l_e	effective length	17.3	mm
A_e	effective area	4.81	mm^2
	mass	≈ 0.6	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
2P40	14 ± 10%	dark yellow	4330 030 6001
2P50	18 ± 10%	dark blue	4330 030 6008
2P65	23 ± 10%	dark red	4330 030 6150
2P80	28 ± 10%	dark green	4330 030 6022
2P90	30 ± 10%	dark brown	4330 030 6029

Iron powder ring cores

RCC12.3/8/4.4

Dimensions in mm

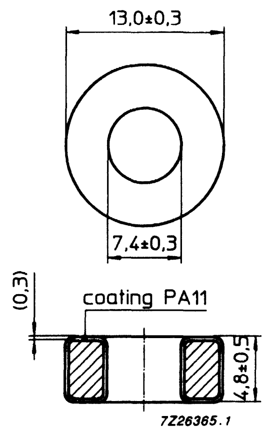


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	3.30	mm^{-1}
V_e	effective volume	290	mm^3
l_e	effective length	30.9	mm
A_e	effective area	9.37	mm^2
	mass	≈ 2	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
2P40	15 ± 10%	dark yellow	4330 030 6002
2P50	19 ± 10%	dark blue	4330 030 6009
2P65	25 ± 10%	dark red	4330 030 6016
2P80	31 ± 10%	dark green	4330 030 6023
2P90	33 ± 10%	dark brown	4330 030 6030

Iron powder ring cores RCC17.1/9.8/4.4

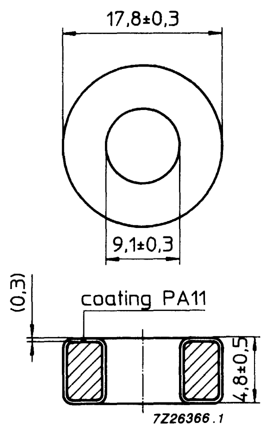


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	2.55	mm^{-1}
V_e	effective volume	635	mm^3
l_e	effective length	40.2	mm
A_e	effective area	15.8	mm^2
	mass	≈ 5	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
2P40	20 ± 10%	dark yellow	4330 030 6003
2P50	25 ± 10%	dark blue	4330 030 6010
2P65	32 ± 10%	dark red	4330 030 6017
2P80	40 ± 10%	dark green	4330 030 6024
2P90	42 ± 10%	dark brown	4330 030 6031

Iron powder ring cores | RCC19.9/12.9/6

Dimensions in mm

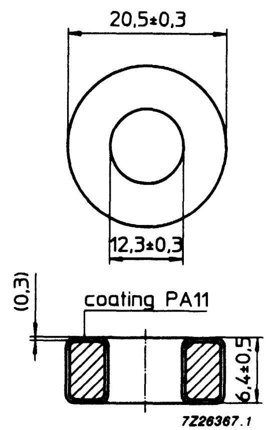


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(I/A)	core factor (C1)	2.44	mm^{-1}
V_e	effective volume	1020	mm^3
l_e	effective length	49.9	mm
A_e	effective area	20.4	mm^2
	mass	≈ 7.5	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
2P40	21 ± 10%	dark yellow	4330 030 6004
2P50	26 ± 10%	dark blue	4330 030 6011
2P65	34 ± 10%	dark red	4330 030 6018
2P80	41 ± 10%	dark green	4330 030 6025
2P90	44 ± 10%	dark brown	4330 030 6032

Iron powder ring cores

RCC23.5/14.6/7.5

Dimensions in mm

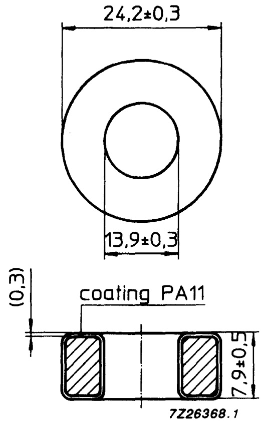


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
Σ(l/A)	core factor (C1)	1.76	mm^{-1}
V_e	effective volume	1895	mm^3
l_e	effective length	57.8	mm
A_e	effective area	32.8	mm^2
	mass	≈ 13	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
2P40	29 ± 10%	dark yellow	4330 030 6005
2P50	36 ± 10%	dark blue	4330 030 6012
2P65	47 ± 10%	dark red	4330 030 6019
2P80	57 ± 10%	dark green	4330 030 6026
2P90	64 ± 10%	dark brown	4330 030 6033

Iron powder ring cores

RCC26.5/14.9/10.7

Dimensions in mm

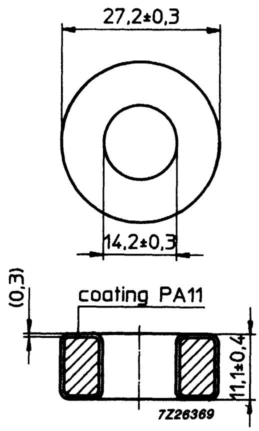


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	1.02	mm^{-1}
V_e	effective volume	3720	mm^3
l_e	effective length	61.6	mm
A_e	effective area	60.4	mm^2
	mass	≈ 25	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
2P40	49 ± 10%	dark yellow	4330 030 6006
2P50	62 ± 10%	dark blue	4330 030 6013
2P65	80 ± 10%	dark red	4330 030 6020
2P80	94 ± 10%	dark green	4330 030 6027

Iron powder ring cores | RCC32.6/20.2/10.7

Dimensions in mm

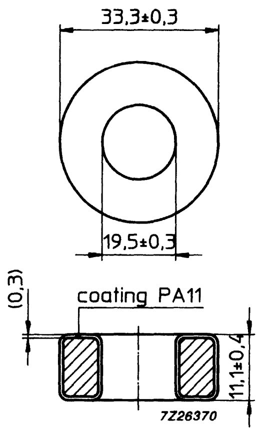


Fig.1 Outline of ring core.

EFFECTIVE CORE PARAMETERS

SYMBOL	PARAMETER	VALUE	UNIT
$\Sigma(l/A)$	core factor (C1)	1.23	mm^{-1}
V_e	effective volume	5200	mm^3
l_e	effective length	80.0	mm
A_e	effective area	65.0	mm^2
	mass	≈ 35	g

Coating: Polyamide 11 (PA11), flame retardent in accordance with UL94V-2

GRADE	A_L (nH)	COLOUR CODE	ORDERING CODE
2P40	41 ± 10%	dark yellow	4330 030 6007
2P50	51 ± 10%	dark blue	4330 030 6014
2P65	67 ± 10%	dark red	4330 030 6021
2P80	82 ± 10%	dark green	4330 030 6028

Rods
Impeder cores
Tubes
RFI suppression beads
RFI suppression beads on wire
Multi-hole cores
Wideband chokes

Soft ferrites | Rods

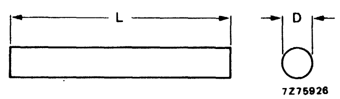


Fig.1 Rod.

STANDARD PROGRAMME

D (mm)	TOLERANCE (mm)	L (mm)	TOLERANCE (mm)	ORDERING CODE	
				4B1	3B1
2	− 0.05	10	− 0.6	4330 030 4021	4330 030 3133
2	− 0.05	15	− 0.8	4330 030 4022	4330 030 3134
2	− 0.05	20	− 0.9	4330 030 4054	4330 030 3145
3	− 0.05	15	− 0.8	4330 030 4023	4330 030 3135
3	− 0.05	20	− 0.9	4330 030 4024	4330 030 3136
3	− 0.05	25	− 1.0	4330 030 4055	4330 030 3147
4	− 0.05	15	− 0.8	4330 030 4025	4330 030 3137
4	− 0.05	20	− 0.9	4330 030 4026	4330 030 3138
4	− 0.05	25	− 1.0	4330 030 4056	4330 030 3149
5	− 0.05	20	− 0.9	4330 030 4027	4330 030 3139
5	− 0.05	25	− 1.0	4330 030 4028	4330 030 3140
5	− 0.05	30	− 1.2	4330 030 4057	4330 030 3151
6	− 0.10	30	− 1.2	4330 030 4029	4330 030 3141
6	− 0.10	40	− 1.6	4330 030 4030	4330 030 3142
6	− 0.10	50	± 1.0	4330 030 4058	4330 030 3153
8	− 0.40	50	± 1.0	4330 030 4031	4330 030 3143
8	− 0.40	150	± 3.0	4330 030 4032	4330 030 3144
8	− 0.40	200	± 4.0	4330 030 4059	4330 030 3155
10	− 0.50	200	± 4.0	4330 030 4003	4330 030 3146

LIST OF CURRENT TYPES

D (mm)	L (mm)	GRADE	ORDERING CODE
1.55 + 0.2	14.2 − 0.4	4B1	4312 020 3056
1.65 − 0.05	28.0 ± 0.2	4B1	4322 020 3209
1.70 − 0.15	14.2 − 0.4	4E1	4322 020 3206
2.20 − 0.2	16.0 ± 0.5	4B1	4312 020 3046
2.20 − 0.1	16.0 ± 0.5	4B1	4330 030 3108
2.50 − 0.25	20.1 − 1	4B1	4312 020 3051
3.00 − 0.2	20.0 − 0.6	4B1	4330 030 3110
3.95 − 0.95	25.0 − 1	4B1	4330 030 3025
4.0 − 0.2	21.0 − 1	4B1	4330 030 3111
4.0 − 0.2	25.0 − 1	4B1	4330 030 3112
4.0 − 0.3	45.0 ± 1.35	3C80	4330 030 3107
4.0 − 0.3	15.0 ± 0.45	3C80	4330 030 3118
5.0 − 0.3	20.0 ± 0.5	4B1	4312 020 3057
5.0 − 0.3	25.0 − 1	4B1	4330 030 3008
6.0 − 0.4	30.0 − 1.8	6B1	4330 030 4009
6.5 − 0.3	25.0 ± 0.6	4B1	4330 030 3113

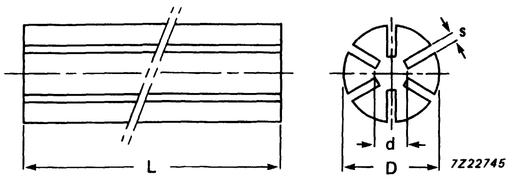


Fig.1 Impeder.

GRADE	NUMBER OF SLOTS	DIMENSIONS				ORDERING CODE
		D (mm)	d (mm)	L (mm)	s (mm)	
3D3	6	6 ±0.2	3	200±5	0.6	4330 030 3119
3C85	6	6 ±0.2	3	200±5	0.6	4330 030 3121
3D3	6	8 +0/-0.5	3	125±5	0.6	4330 030 3097
3C85	6	8 ±0.25	3	200±5	0.6	4330 030 3122
3D3	6	10 +0/-0.5	4.5	170±5	0.6	4330 030 3099
3C85	6	10 ±0.25	4.5	200±5	0.6	4330 030 3123
3D3	8	12 +0/-0.7	5.5	170±5	0.7	4330 030 3125
3C85	8	12 ±0.35	5.5	200±5	0.7	4330 030 3124
3D3	8	14.3 +0/-0.8	6.5	170±5	0.8	4330 030 3120
3C85	8	14.3±0.4	6.5	200±5	0.8	4330 030 3126

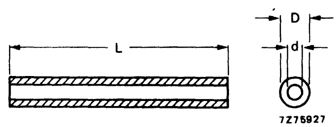


Fig.1 Tube.

STANDARD PROGRAMME

DIMENSIONS						ORDERING CODE		
D (mm)	TOLERANCE (mm)	d (mm)	TOLERANCE (mm)	L (mm)	TOLERANCE (mm)	4B1 4330 030	3B1 4330 030	3C85 4330 030
3.5	− 0.25	1.2	+ 0.15	5	− 0.3	4033	3354	3367
3.5	− 0.25	1.2	+ 0.15	15	− 0.8	4034	3355	3368
4.0	− 0.25	1.6	+ 0.15	15	− 0.8	4035	3356	3369
4.0	− 0.25	1.6	+ 0.15	40	− 1.6	4036	3357	3370
5.0	− 0.30	2.0	+ 0.20	15	− 0.8	4037	3358	3371
5.0	− 0.30	2.0	+ 0.20	50	± 1	4038	3359	3372
6.0	− 0.30	3.0	+ 0.20	20	− 0.9	4039	3360	3373
6.0	− 0.30	3.0	+ 0.20	30	− 1.2	4040	3361	3374
8.0	− 0.40	4.0	+ 0.30	20	− 0.9	4041	3362	3375
8.0	− 0.40	4.0	+ 0.30	40	− 1.6	4042	3363	3376
8.0	− 0.40	4.0	+ 0.30	200	± 4	-	-	3345
10.0	− 0.50	4.2	+ 0.30	20	− 0.9	4043	3364	3377
10.0	− 0.50	4.2	+ 0.30	45	− 1.8	4044	3365	3378
10.0	− 0.50	5.0	+ 0.40	200	± 4	-	-	3346
10.0	− 0.50	6.5	+ 0.40	20	− 0.9	4045	3366	3379

LIST OF CURRENT TYPES

D (mm)	d (mm)	L (mm)	GRADE	ORDERING CODE
2.60 − 0.3	1.20 ± 0.15	1.60 ± 0.15	4E1	4330 030 3285
2.80 − 0.05	1.20 ± 0.1	8.20 ± 0.2	3B1	4322 020 3434
3.45 ± 0.1	1.30 + 0.2	3.0 + 0.5	3B1	4312 020 3106
3.50 ± 0.2	1.30 + 0.2	15.2 − 0.4	3B1	4312 020 3132
3.50 ± 0.2	1.30 + 0.2	7.5 + 0.5	3B1	4312 020 3133
3.50 ± 0.2	1.20 ± 0.2	5.0 ± 0.5	4D2	4330 030 3263
3.50 ± 0.2	1.20 ± 0.2	5.0 ± 0.5	4E1	4330 030 3266
3.70 − 0.4	1.20 + 0.2	3.5 − 0.5	3B1	4322 020 3440
3.70 − 0.4	1.20 + 0.2	3.5 − 0.5	4B1	4322 020 3442
3.70 − 0.4	1.50 + 0.2	3.5 − 0.5	3B1	4322 020 3443
3.70 − 0.4	1.30 + 0.2	5.0 + 0.5	4B1	4330 030 3252
3.70 − 0.4	1.50 + 0.2	7.5 + 0.5	3B1	4330 030 3265
4.00 ± 0.2	2.00 ± 0.2	5.0 ± 0.5	3B1	4313 020 1517
4.05 − 0.25	1.50 ± 0.15	5.5 ± 0.2	4B1	4313 020 1546
4.10 + 0.1	2.0 + 0.2	20.0 ± 0.2	3B1	4312 020 3103
4.10 + 0.1	2.0 + 0.2	11.0 ± 0.2	3D3	4312 020 3125
4.10 + 0.2	2.0 + 0.2	3.0 ± 0.2	3B1	4330 030 3023
4.30 − 0.2	2.0 + 0.2	15.4 − 0.8	3B1	4322 020 3675
4.30 − 0.2	2.0 + 0.2	25.5 − 1.0	3B1	4322 020 3678
9.50 ± 0.3	6.5 ± 0.2	17.4 ± 0.2	3B1	4313 020 1518

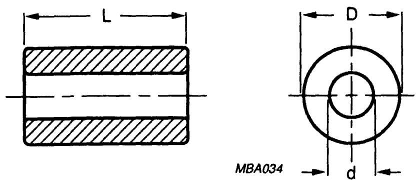


Fig.1 Bead.

TOLERANCES
0.7 + 0.15
1 + 0.15
1.5 + 0.15
2 + 0.2
3 ± 0.2
4 ± 0.2
5 ± 0.2
8 ± 0.2
10 ± 0.3

GRADE	|Z| min. (Ω) * AT FREQUENCY (MHz)						DIMENSIONS			ORDERING CODE
	1	3	10	30	100	300	D (mm)	d (mm)	L (mm)	
3S1	19	38	39	31	26	23	3	0.7	4	4330 030 3210
	27	52	53	42	36	32	5	0.7	4	4330 030 3214
	58	95	97	77	66	58	3	0.7	10	4330 030 3211
	70	125	128	90	70	50	5	0.7	10	4330 030 3215
	14	29	30	24	20	18	3	1	4	4330 030 3212
	33	72	73	58	50	44	3	1	10	4330 030 3213
	15	25	32	26	22	20	5	1.5	4	4330 030 3216
	40	72	80	64	55	48	5	1.5	10	4330 030 3217
	10	18	24	20	17	15	5	2	4	4330 030 3218
	29	51	61	49	42	37	5	2	10	4330 030 3219
4S2	2	8	22	32	50	54	3	0.7	4	4330 030 3311
	5	15	30	44	68	77	5	0.7	4	4330 030 3313
	9	30	55	81	125	135	3	0.7	10	4330 030 3324
	12	40	75	110	170	190	5	0.7	10	4330 030 3326
	3	9	18	25	38	43	3	1	4	4330 030 3312
	7	23	43	61	95	107	3	1	10	4330 030 3321
	3	10	20	27	41	47	5	1.5	4	4330 030 3314
	4	14	27	38	57	65	8	1.5	4	4330 030 3316
	7	25	45	68	104	116	5	1.5	10	4330 030 3322
	10	34	70	93	145	161	8	1.5	10	4330 030 3325
	2	8	15	20	32	36	5	2	4	4330 030 3315
	4	10	20	31	49	55	8	2	4	4330 030 3317
	6	15	30	51	80	89	5	2	10	4330 030 3319
	9	28	55	77	121	134	8	2	10	4330 030 3323
	2	8	15	22	34	38	8	3	4	4330 030 3318
	6	20	40	55	85	95	8	3	10	4330 030 3320

* Typical |Z| values up to 25% higher.

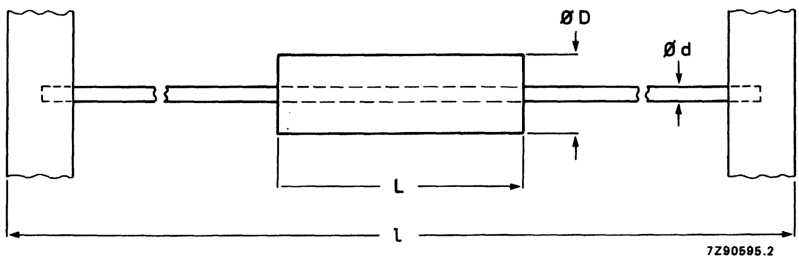


Fig.1 Bead on wire.

Taping standard in accordance with IEC 286, part 1 and EIA-RS-296-D

GRADE	|Z| min. (Ω) AT FREQUENCY (MHz)						DIMENSIONS				ORDERING CODE
	1	3	10	30	100	300	D (mm)	L (mm)	l (mm)	d (mm)	
3S1	70	125	128	90	70	50	4.9	10	64.4	0.64	4330 030 3333
4S2	4	13	26	39	60	70	3.5	4.5	64.4	0.64	4330 030 3873
4S2	5	17	35	53	80	95	3.5	6.0	64.4	0.64	4330 030 3874
4S2	6	20	39	59	88	105	3.5	6.7	64.4	0.64	4330 030 3875
4S2	7	22	44	67	105	120	3.5	7.6	64.4	0.64	4330 030 3876
4S2	8	26	52	78	117	140	3.5	8.9	64.4	0.64	4330 030 3877
4S2	3	10	19	29	46	52	3.5	3.3	64.4	0.64	4330 030 3881

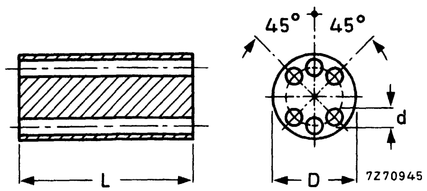


Fig.1 Six hole bead (MHC1).

MULTIHOLE CORES

GRADE	DIMENSIONS			ORDERING CODE
	D (mm)	d (mm)	L (mm)	
3B1	6 ± 0.3	0.7 + 0.2	10 ± 0.5	4312 020 3150
4B1	6 ± 0.3	0.7 + 0.2	10 ± 0.5	4312 020 3155

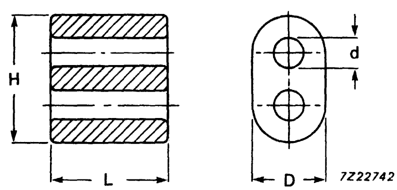


Fig.2 Twin bead (MHC2).

GRADE	DIMENSIONS				ORDERING CODE
	D (mm)	d (mm)	L (mm)	H (mm)	
4B1	8.5 – 0.5	3.5 + 0.5	8 ± 0.3	14 + 0.5	4312 020 3157
4B1	8.5 – 0.5	3.5 ± 0.5	14 ± 0.4	14 + 0.5	4312 020 3152
4B1	8.0 ± 0.3	3 ± 0.3	6 ± 0.3	13 ± 0.3	4313 020 4003*
3C85	8.0 ± 0.3	3 + 0.3	6 ± 0.3	13 ± 0.3	4312 020 4005*

* Chamfered holes and sides.

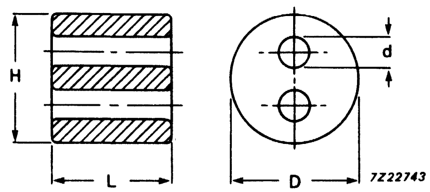


Fig.3 Twin bead (MHC3).

GRADE	DIMENSIONS			ORDERING CODE
	D (mm)	d (mm)	L (mm)	
4B1	5.6 ± 0.15	1.5 ± 0.15	12 ± 0.2	4330 030 3274

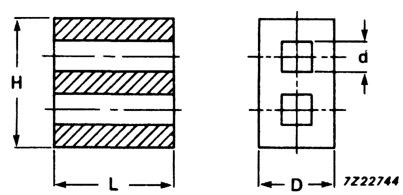


Fig.4 Twin bead (MHC4).

GRADE	DIMENSIONS				ORDERING CODE
	D (mm)	d (mm)	L (mm)	H (mm)	
4A11	5.4 ± 0.3	2.0 ± 0.3	10.9 ± 0.3	10.8 ± 0.3	4313 020 2057
3C85	5.4 ± 0.3	2.0 ± 0.3	10.9 ± 0.3	10.8 ± 0.3	4313 020 2080

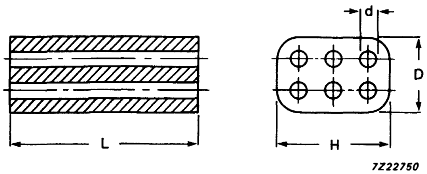
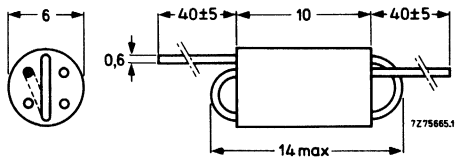


Fig.5 Six hole bead (MHC5).

GRADE	DIMENSIONS				ORDERING CODE
	D (mm)	d (mm)	L (mm)	H (mm)	
3B1	4 ± 0.2	0.7 + 0.3	10 ± 0.5	6.1 ± 0.3	4312 020 3153



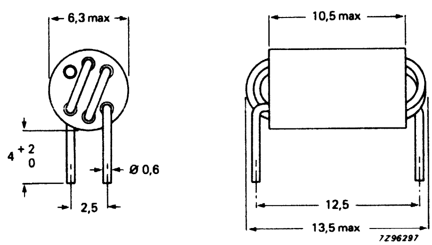
Dimensions in mm

Fig.1 Wideband choke.

Wire material : Cu, SnPb plated

Solderability : in accordance with IEC 68-2-20 part 2, test TA, method 1.

GRADE	NUMBER OF TURNS	|Z| at f (Ω)	(MHz)	ORDERING CODE
3B1	1.5	≥ 300	120	4312 020 3663
3B1	2.5	≥ 600	50	4312 020 3664
3B1	2 x 1.5	≥ 700	50	4312 020 3665
4B1	1.5	≥ 350	250	4312 020 3669
4B1	2.5	≥ 700	180	4312 020 3670
4B1	2 x 1.5	≥ 800	110	4312 020 3671



Dimensions in mm

Fig.2 Wideband choke.

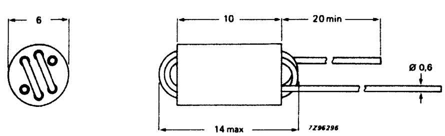
Wire material : Cu, SnPb plated

Solderability : in accordance with IEC 68-2-20 part 2, test TA, method 1.

GRADE	NUMBER OF TURNS	|Z| at f (Ω)	(MHz)	ORDERING CODE
3B1	2.5	≥ 600	50	4330 030 3808
3B1	2.5	≥ 600	50	4330 030 3896*
3B1	2.5	≥ 600	50	4330 030 3899**

* With enamelled wire, pre-soldered.

** With isolated body.



Dimensions in mm

Fig.3 Wideband choke.

Wire material : Cu, SnPb plated

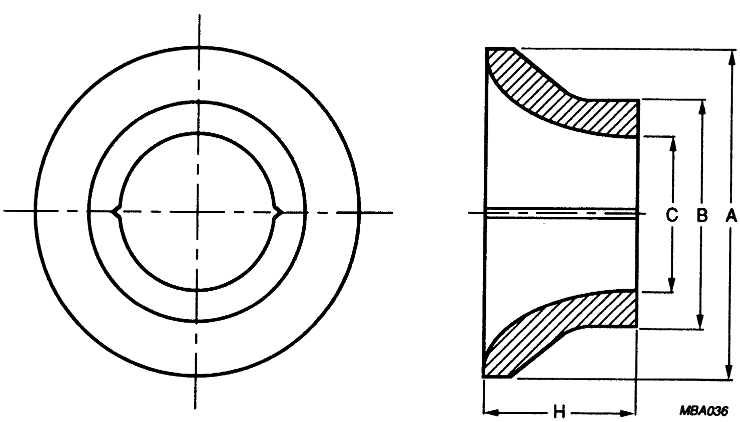
Solderability : in accordance with IEC 68-2-20 part 2, test TA, method 1.

GRADE	NUMBER OF TURNS	|Z| at f (Ω)	(MHz)	ORDERING CODE
3B1	3	≈ 1000	40	4312 020 3676

Yoke rings

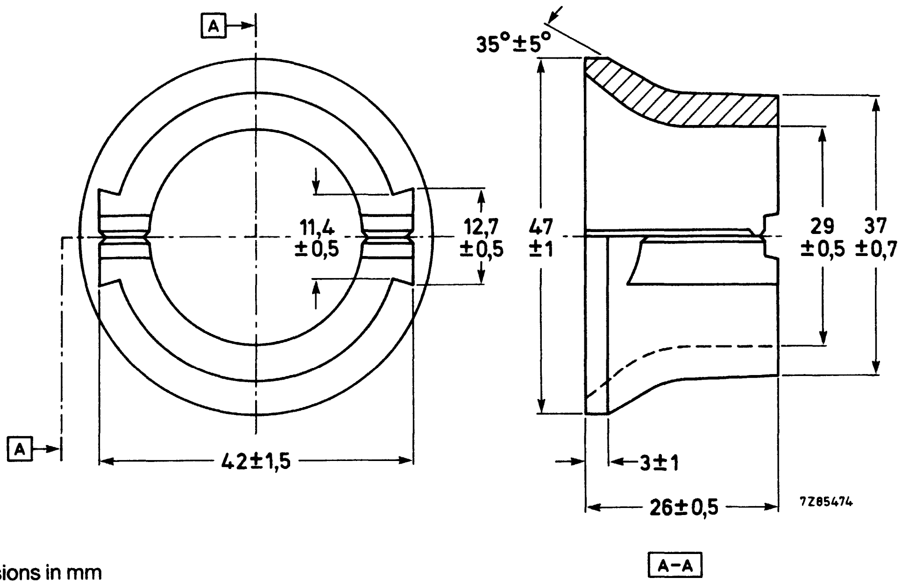
Survey of types

APPLICATION	GRADE	MASS (g)	A (mm)	B (mm)	C (mm)	H (mm)	ORDERING CODE
BLACK/WHITE							
90° (tiny vision)	2A2	62	47	37	29	26	3122 134 9168
110°	2A2	135	56.3	58	39.5	27.5	3122 134 9194
110°	3C2	135	56.3	58	39.5	26	3122 104 9384
110°	3C2	215	79	54	-	37	3122 134 9075
110° (tiny vision)	3C2	90	57	40.7	30.6	26.5	4313 020 3538
	3C2	196	74	54	38	37	4322 020 3507
90°	3C2	112	63	50	38	32	3122 134 9060
Data graphic display	3C2	364	94	58	46	54	3122 134 9203
COLOUR							
90°	2A2	235	92	60	48	46.5	3122 134 9161
90°	2A2	153	74	52	40	37	3122 134 9251
90° (39SW)	2A2	228	92	60	48	42	3122 134 9260
90° (51FS)	2A2	235	89	60	46.5	42	3122 134 9278
90° (36FS)	2A2	157	76	52	40	33	3122 134 9305
90° (39SW)	2A2	225	92	66	51	36	3122 134 9937
110° (30AX)	3C2	505	138	73.5	60	57.6	3122 134 9250
110° (45AX)	3C2	367	113	65.5	49.5	44.8	3122 134 9275
Data graphic display	3C2	285	92	64.2	52	48	3122 134 9259
Data graphic display	3C2	760	132	65	51	87	3122 134 9185



General outline of yoke ring.

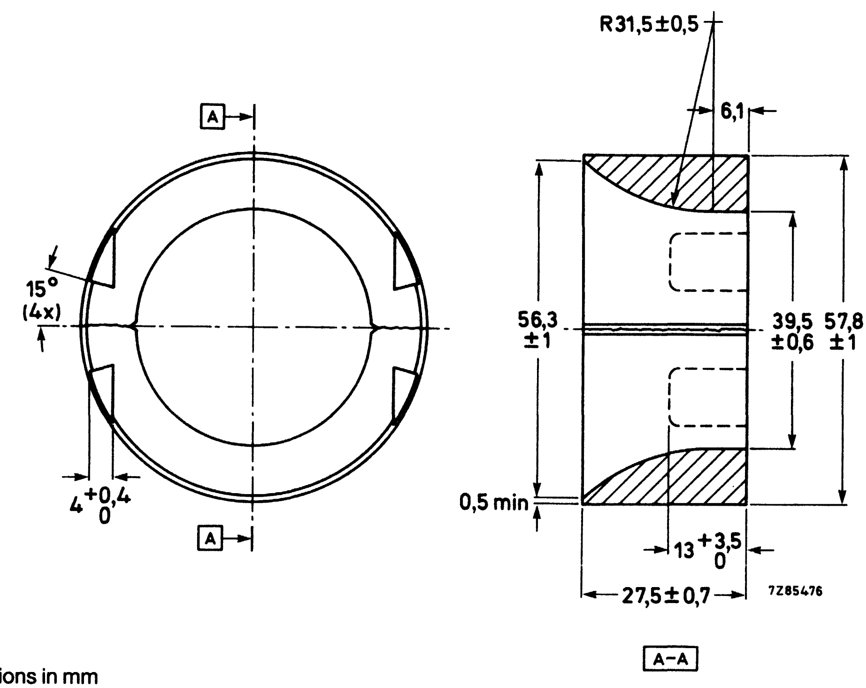
Yoke rings YR29/26



Dimensions in mm

Fig.1 Yoke ring.

- Material grade 2A2
- Mass 62 g
- Ordering code 3122 134 9168



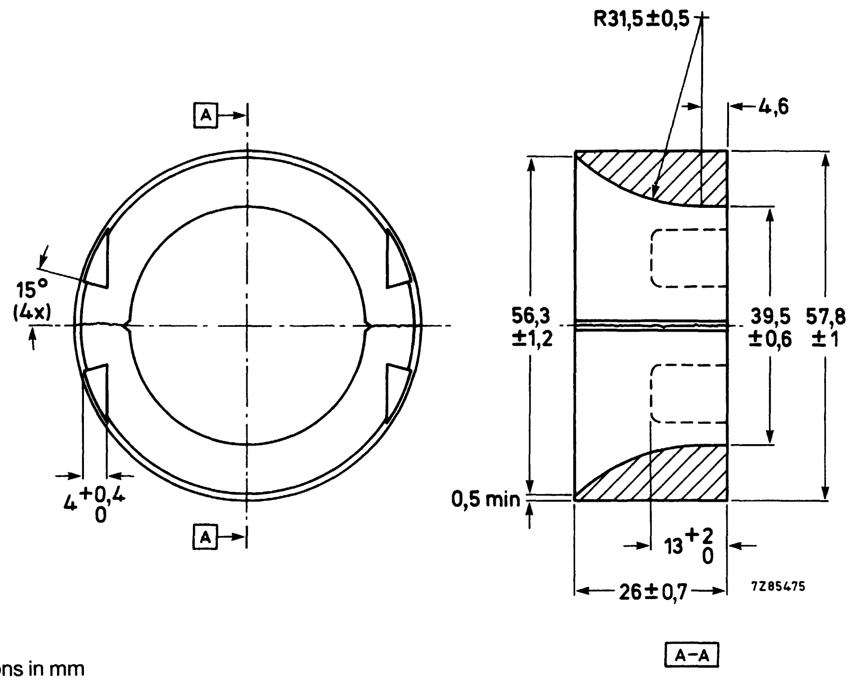
Dimensions in mm

Fig.1 Yoke ring.

- Material grade 2A2
- Mass 135 g
- Ordering code 3122 134 9194

Yoke rings

YRS 39.5/26



Dimensions in mm

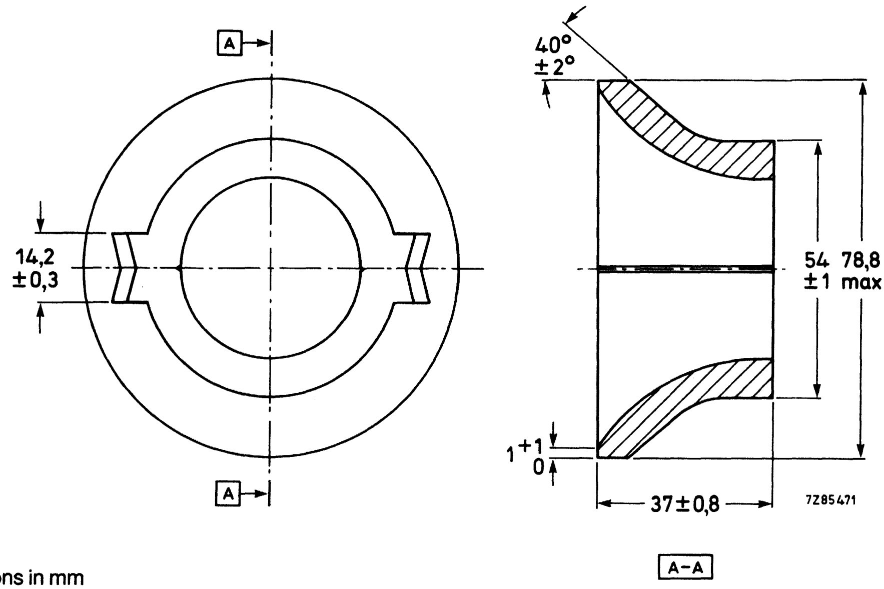
Fig.1 Yoke ring.

- Material grade 3C2
- Mass 135 g
- Ordering code 3122 104 9384

Spring clips for assembling can be supplied,

- Ordering code 3122 101 0634

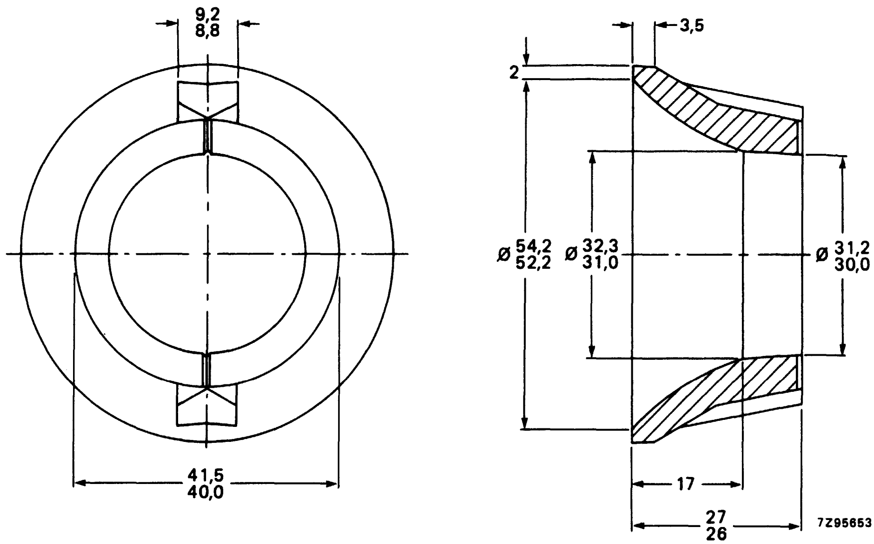
Yoke rings YR38/37



Dimensions in mm

Fig.1 Yoke ring.

- Material grade 3C2
- Mass 215 g
- Ordering code 3122 134 9075



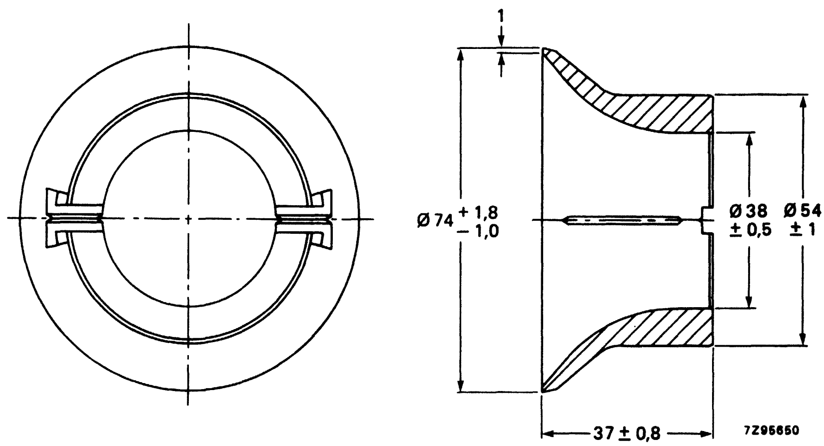
Dimensions in mm

Fig.1 Yoke ring.

- Material grade 3C2
- Mass 90 g
- Ordering code 4313 020 3538

Yoke rings

YR38/37

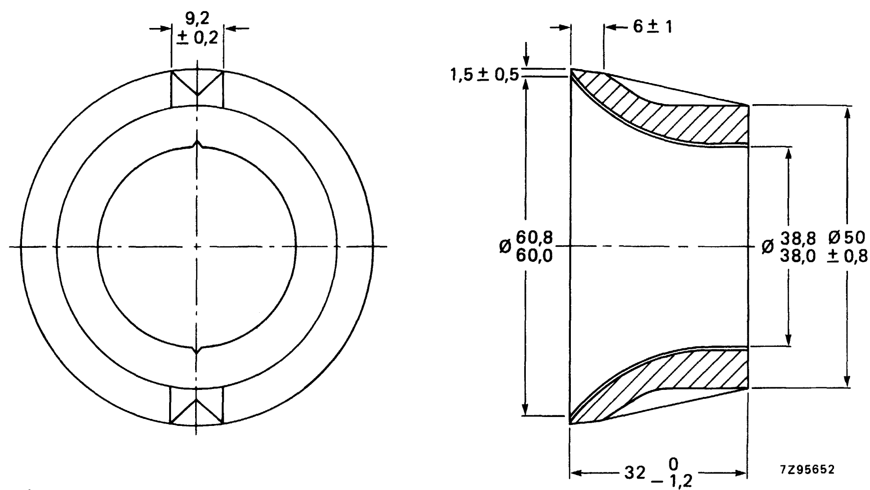


Dimensions in mm

Fig.1 Yoke ring.

- Material grade 3C2
- Mass 196 g
- Ordering code 4322 020 3507

Yoke rings YR38.4/32

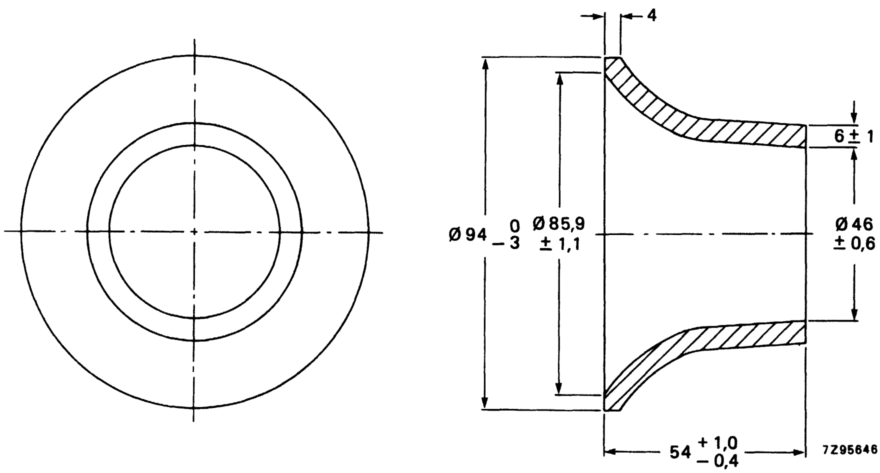


Dimensions in mm

Fig.1 Yoke ring.

- Material grade 3C2
- Mass 112 g
- Ordering code 3122 134 9060

Yoke rings YR46/54

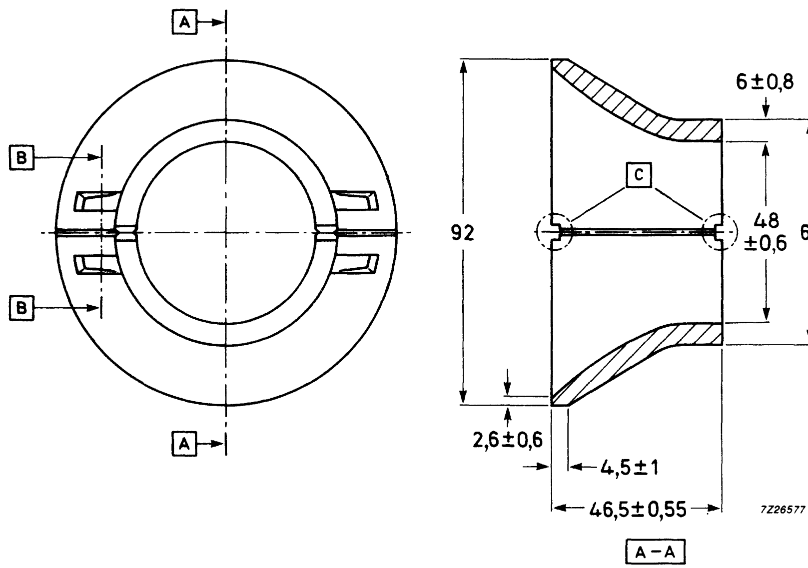


Dimensions in mm

Fig.1 Yoke ring.

- Material grade 3C2 (silanated)
- Mass 364 g
- Ordering code 3122 134 9203

Yoke rings | YR48/46.5



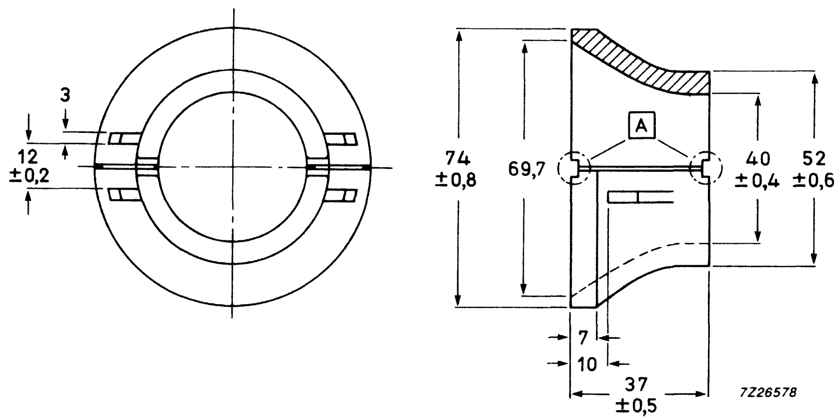
Dimensions in mm

Fig.1 Yoke ring.

- Material grade 2A2
- Mass 235 g
- Ordering code 3122 134 9161

Yoke rings

YR40/37



Dimensions in mm

Fig.1 Yoke ring.

- Material grade 2A2
- Mass 153 g
- Ordering code 3122 134 9251

Yoke rings YR48/42

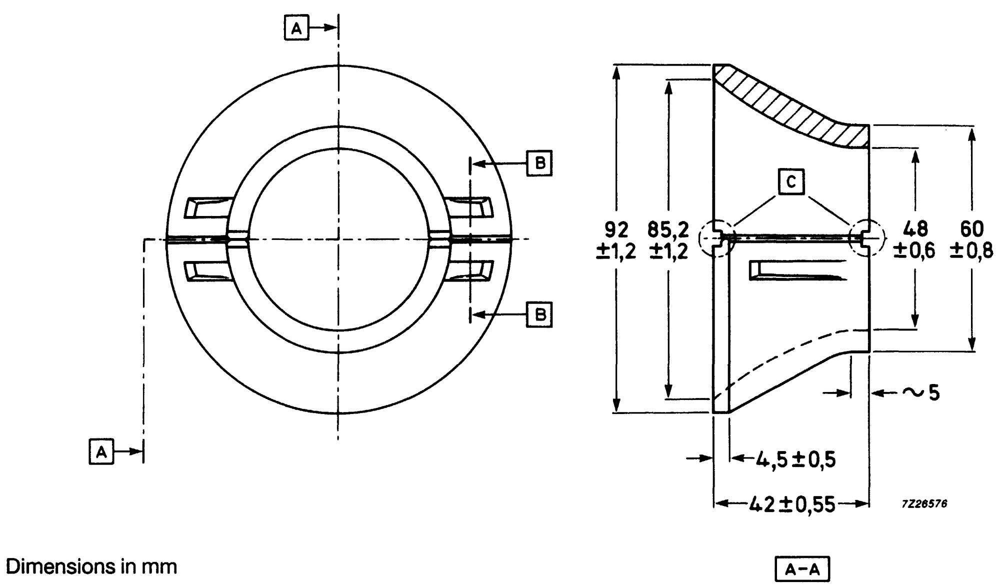
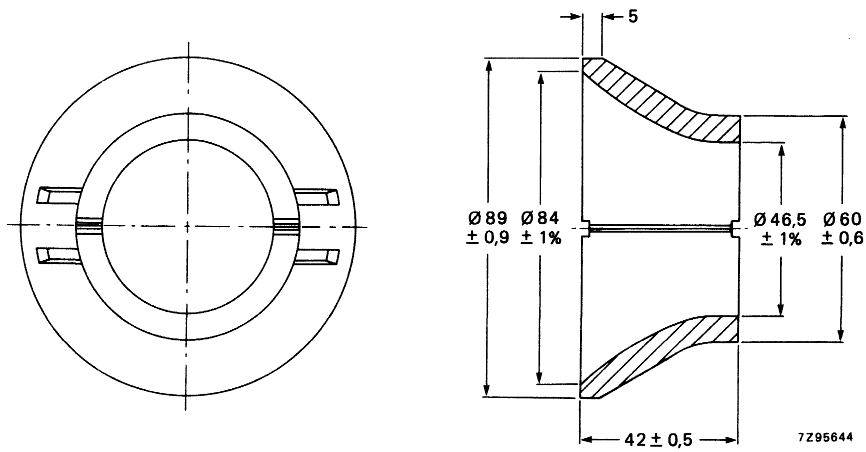


Fig.1 Yoke ring.

- Material grade 2A2
- Mass 228 g
- Ordering code 3122 134 9260 (4313 020 3540 export packed)

Yoke rings YR46.5/42

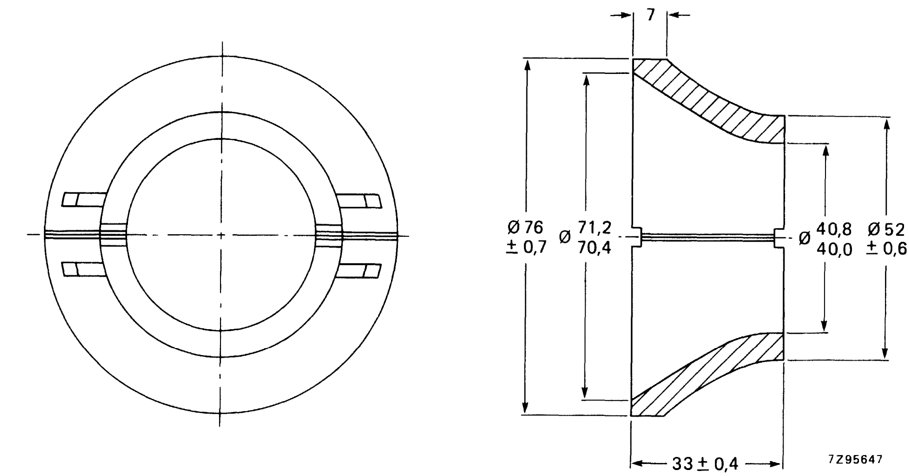


Dimensions in mm

Fig.1 Yoke ring.

- Material grade 2A2
- Mass 235 g
- Ordering code 3122 134 9278 (4313 020 3550 export packed)

Yoke rings | YR40.8/33

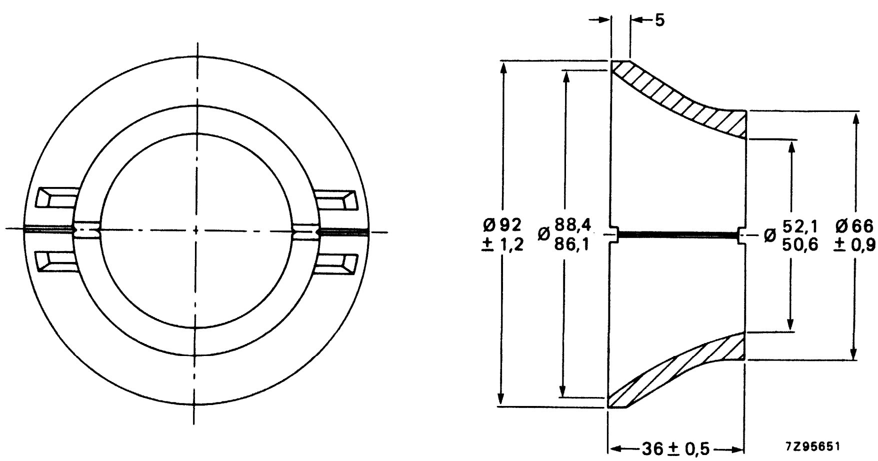


Dimensions in mm

Fig.1 Yoke ring.

- Material grade: 2A2
- Mass: 157 g
- Ordering code: 3122 134 9305

Yoke rings YR52.1/36

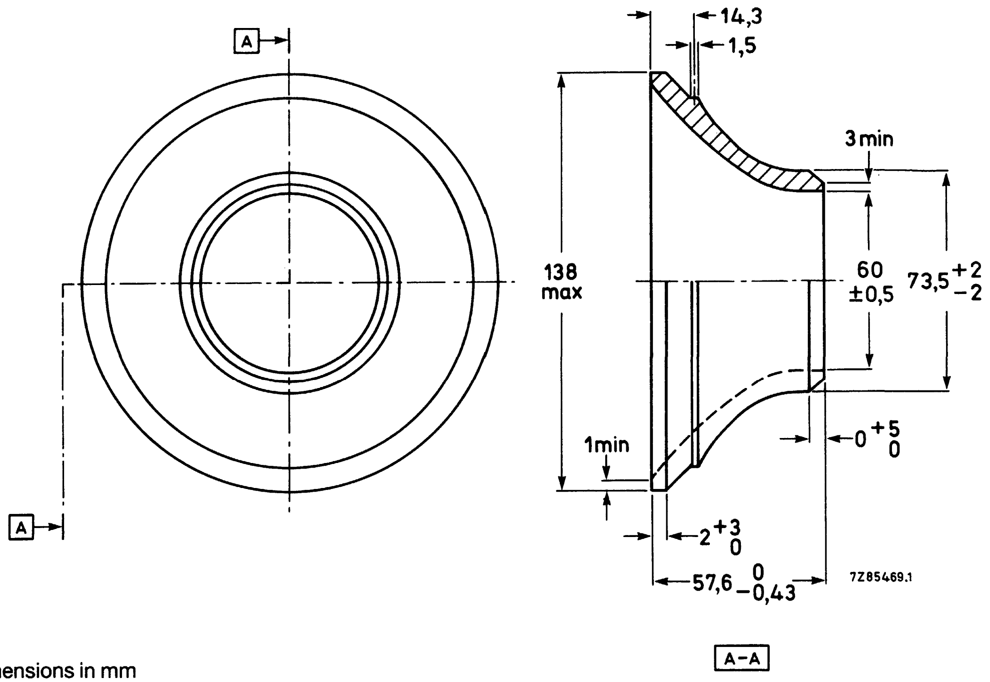


Dimensions in mm

Fig.1 Yoke ring.

- Material grade 2A2
- Mass 225 g
- Ordering code 3122 134 9937 (4313 020 3591 export packed)

Yoke rings | YR60/57.6

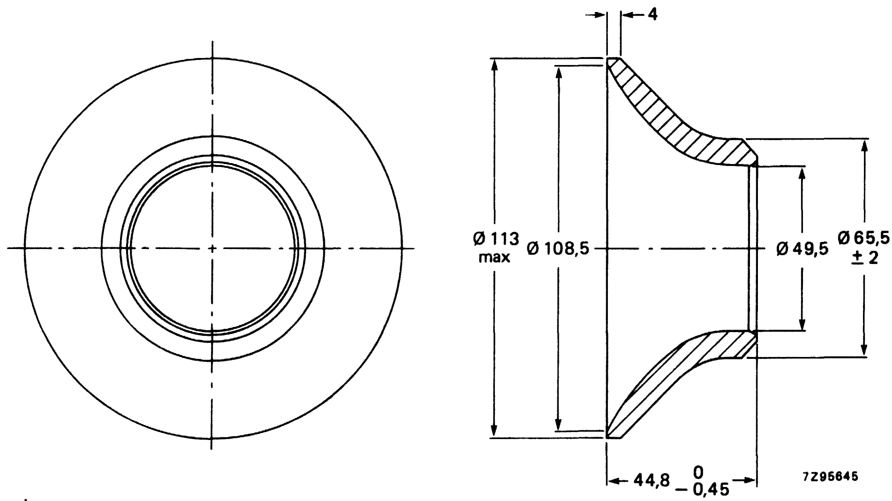


Dimensions in mm

Fig.1 Yoke ring.

- Material grade — 3C2 (silanated)
- Mass — 505 g
- Ordering code — 3122 134 9250

Yoke rings | YR49.5/44.8



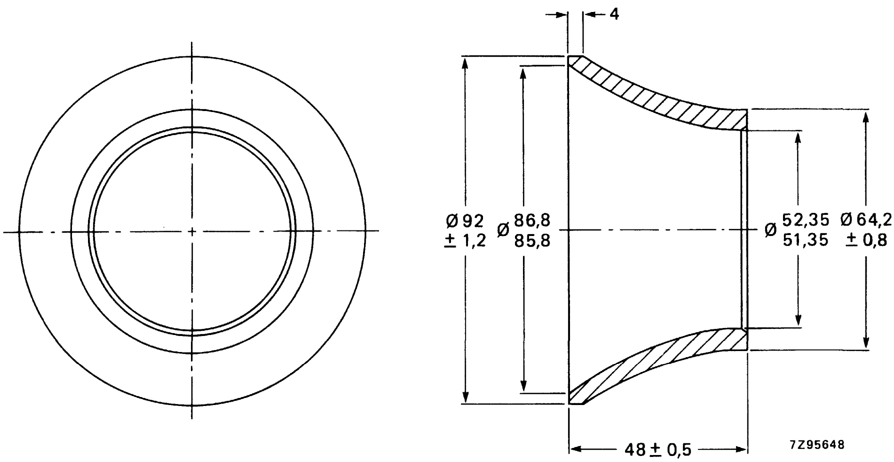
Dimensions in mm

Fig.1 Yoke ring.

- Material grade — 3C2 (silanated)
- Mass — 367 g
- Ordering code — 3122 134 9275

Yoke rings

YR51.9/48

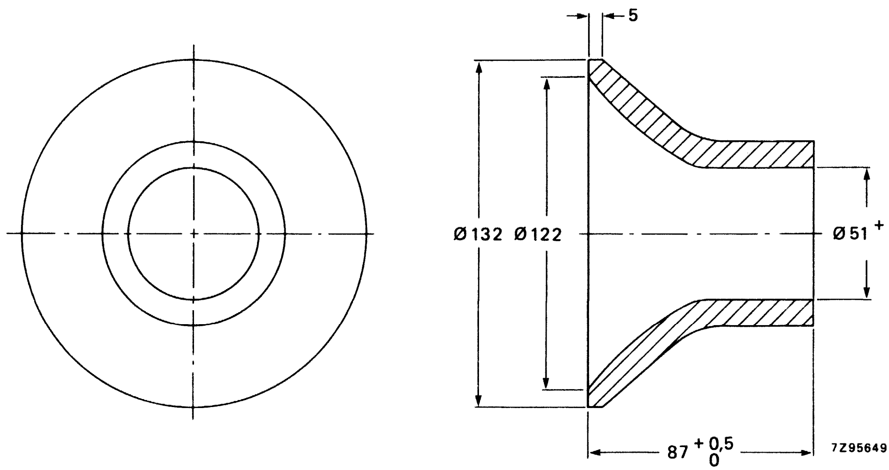


Dimensions in mm

Fig.1 Yoke ring.

• Material grade	3C2 (silanated)
• Mass	285 g
• Ordering code	3122 134 9259

Yoke rings YR51/87



Dimensions in mm

Fig.1 Yoke ring.

- Material grade 3C2
- Mass 760 g
- Ordering code 3122 134 9185

Structure of type description

Soft ferrites

Structure of type description

PRODUCTNAME	CLASS	PRIME-NAME	EXAMPLE
ADJUSTER	ACCESSORY	ADJ	ADJ-P22/RM8-BLACK
CLASP	ACCESSORY	CLA	CLA-EC70-ST
CLIP	ACCESSORY	CLI	CLI-EFD25
COILFORMER,THERMOPLASTIC	ACCESSORY	CP	CP-P36/22-2S
COILFORMER,THERMOPLASTIC,HORIZONTAL	ACCESSORY	CPH	CPH-ETD34-1S-14P
COILFORMER,THERMOPLASTIC,VERTICAL	ACCESSORY	CPV	CPV-EC70-1S-15P
COILFORMER,THERMOSETTING	ACCESSORY	CS	
COILFORMER,THERMOSETTING,HORIZONTAL	ACCESSORY	CSH	CSH-EP13-1S-10P
COILFORMER,THERMOSETTING,VERTICAL	ACCESSORY	CSV	CSV-RM10-1S-11P
COILFORMER,THERMOSETTING,COAX,OUTER	ACCESSORY	CSCO	
COILFORMER,THERMOSETTING,COAX,INNER	ACCESSORY	CSCI	
CONTAINER	ACCESSORY	CON	CON-X22
COVER	ACCESSORY	COV	COV-X30
EARTH-CLIP	ACCESSORY	ECLI	ECLI-ETD34
FIXING BUSH	ACCESSORY	FIB	FIB
NUT	ACCESSORY	NUT	NUT-P
SOLDER-CLIP	ACCESSORY	SCLI	
SPRING	ACCESSORY	SPR	SPR-E20
STUD	EXTENSION	ST	CLA-EC52-ST
TAG	ACCESSORY	TAG	
TAGPLATE	ACCESSORY	TGP	TGP-P30/19
AIR COIL	CHOKE	AC	
BEAD-ON-WIRE	CHOKE	BDW	BDW3.5/6-4S2
CURRENT COMPENSATED CHOKE	CHOKE	CCC	
FERRITE CORE,WOUND	CHOKE	FCW	
RING CORE,WOUND	CHOKE	RCW	
WIDE-BAND-CHOKE	CHOKE	WBC	WBC2.5-3B1
ADJUSTER-CORE	CORE	ADC	
BAR	CORE	BAR	
BEAD	CORE	BD	BD3/1/10-4S2
BLOCK	CORE	BLK	
BOBBIN-CORE	CORE	BC	BC22/18.5-3C85
CHIP-CORE	CORE	CC	
COILFORMER	CORE	CFR	
CROSS-CORE	CORE	X	X35-3H1-A630/N
EC-CORE	CORE	EC	EC35/17-3C80-G250
EFD-CORE	CORE	EFD	EFD25/9-3C85-A315
EF-CORE	CORE	EF	EF12.6/7/4-3C80-G50
EI-CORE	CORE	EI	
EP-CORE	CORE	EP	EP13-3E25-A4500
ETD-CORE	CORE	ETD	ETD44/22-3F3-G500
E-CORE	CORE	E	E42/21/15-3C85-G800
FLAT-CABLE-SHIELD	CORE	FCS	FCS45/15/30-4A11
FRAME-CORE	CORE	FRA	
H-CORE	CORE	H	H20-3E25-SET
IMPEDER	CORE	IMP	IMP8/3/200-3C85
I-CORE	CORE	I	I100/25/25-3C80
MACHINED FERRITE	CORE	MFE	

PRODUCTNAME	CLASS	PRIME-NAME	EXAMPLE
MICRO-CHOKE-CORE	CORE	MCC	
MULTI-HOLE-CORE	CORE	MHC	MHC2-6/13-4B1
MUSHROOM-CORE	CORE	MSC	
PLATE	CORE	PLT	
POTCORE-HALF	CORE	PH	PH14/7.5-3H1
POT-CORE	CORE	P	P18/11-3H1-A400
PROFILE-CORE	CORE	PC	
RING-CORE	CORE	RC	RC2.4/1-3C11
RING-CORE, COATED	CORE	RCC	RCC23.5/7.5-2P90
RING-CORE, LAQUERED	CORE	RCL	
ROD	CORE	ROD	ROD6/40-3B1
ROTATING-TRANSFORMER-RING	CORE	RTR	
ROUND-CABLE-SHIELD	CORE	RCS	RCS25/25/30-4A11
SCREW-CORE	CORE	SCR	
SQUARE-CORE	CORE	RM	RM5-3D3-A63/N
SQUARE-CORE,SPEC.VERSION	CORE	RM_-S	RM6-S-3H3-A160
SQUARE-CORE,SPEC.VERSION	CORE	RM_-R	RM6-R-4C6-A25/N
SQUARE-CORE WITHOUT HOLE	CORE	RM_/i	RM6-S/i-3F3-A1950
TUBE	CORE	TUB	TUB5/2/50-3C85
U-CORE	CORE	U	U30/25/16-3C11
YOKE-RING	CORE	YKR	
AL-VALUE,NANOHENRY	EXTENSION	A	SEE ABOVE
COAXIAL,INNER PART	EXTENSION	CI	CS-ETD34-1S-7P-CI
COAXIAL,OUTER PART	EXTENSION	CO	CS-ETD34-1S-7P-CO
COLOUR-CODE	EXTENSION	BLACK	SEE ABOVE
COLOUR-CODE	EXTENSION	BROWN	SEE ABOVE
COLOUR-CODE	EXTENSION	GREEN	SEE ABOVE
COLOUR-CODE	EXTENSION	GREY	SEE ABOVE
COLOUR-CODE	EXTENSION	ORANGE	SEE ABOVE
COLOUR-CODE	EXTENSION	RED	SEE ABOVE
COLOUR-CODE	EXTENSION	VIOLET	SEE ABOVE
COLOUR-CODE	EXTENSION	WHITE	SEE ABOVE
COLOUR-CODE	EXTENSION	YELLOW	SEE ABOVE
GAP, MICROMETER	EXTENSION	G	SEE ABOVE
HORIZONTAL	EXTENSION	H	CPH-EC70-1S-15P
NUT FOR ADJUSTER	EXTENSION	/N	SEE ABOVE
PIN	EXTENSION	P	SEE ABOVE
PIN,LONG	EXTENSION	PL	SEE ABOVE
PIN,DUAL-IN-LINE	EXTENSION	PD	CPV-RM10-1S-12PD
SECTOR	EXTENSION	S	SEE ABOVE
SET	EXTENSION	SET	SEE ABOVE
VERTICAL	EXTENSION	V	CSV-EC70-1S-15P
MATERIAL GRADE	GRADE	1P04	SEE ABOVE
MATERIAL GRADE	GRADE	1P11	SEE ABOVE
MATERIAL GRADE	GRADE	1P30	SEE ABOVE
MATERIAL GRADE	GRADE	2A2	SEE ABOVE
MATERIAL GRADE	GRADE	2B1	SEE ABOVE
MATERIAL GRADE	GRADE	2P40	SEE ABOVE

Soft ferrites

Structure of type description

PRODUCTNAME	CLASS	PRIME-NAME	EXAMPLE
MATERIAL GRADE	GRADE	2P50	SEE ABOVE
MATERIAL GRADE	GRADE	2P65	SEE ABOVE
MATERIAL GRADE	GRADE	2P80	SEE ABOVE
MATERIAL GRADE	GRADE	2P90	SEE ABOVE
MATERIAL GRADE	GRADE	3B1	SEE ABOVE
MATERIAL GRADE	GRADE	3B8	SEE ABOVE
MATERIAL GRADE	GRADE	3C10	SEE ABOVE
MATERIAL GRADE	GRADE	3C11	SEE ABOVE
MATERIAL GRADE	GRADE	3C2	SEE ABOVE
MATERIAL GRADE	GRADE	3C80	SEE ABOVE
MATERIAL GRADE	GRADE	3C85	SEE ABOVE
MATERIAL GRADE	GRADE	3D3	SEE ABOVE
MATERIAL GRADE	GRADE	3E1	SEE ABOVE
MATERIAL GRADE	GRADE	3E25	SEE ABOVE
MATERIAL GRADE	GRADE	3E4	SEE ABOVE
MATERIAL GRADE	GRADE	3E5	SEE ABOVE
MATERIAL GRADE	GRADE	3F3	SEE ABOVE
MATERIAL GRADE	GRADE	3H1	SEE ABOVE
MATERIAL GRADE	GRADE	3H3	SEE ABOVE
MATERIAL GRADE	GRADE	3R1	SEE ABOVE
MATERIAL GRADE	GRADE	3S1	SEE ABOVE
MATERIAL GRADE	GRADE	4A11	SEE ABOVE
MATERIAL GRADE	GRADE	4B1	SEE ABOVE
MATERIAL GRADE	GRADE	4C6	SEE ABOVE
MATERIAL GRADE	GRADE	4C65	SEE ABOVE
MATERIAL GRADE	GRADE	4D1	SEE ABOVE
MATERIAL GRADE	GRADE	4E1	SEE ABOVE
MATERIAL GRADE	GRADE	4S2	SEE ABOVE

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PHILIPS 12NC	digit 12	TYPE	PHILIPS 12NC	digit 12	TYPE
3122 134 0259.	1	CPH-U10/I15-1S-4P	4312 020 3518.	1	E55/28/21-3C80-G150
3122 137 5536.	1	CPH-U30-1S-10P	4312 020 3521.	1	E55/28/21-3C80-G450
3122 137 6191.	4	CPH-U25-1S-9P	4312 020 3523.	1	E42/21/20-3C80-G100
3122 137 6414.	1	CPH-U20/I25-1S-4P	4312 020 3524.	1	E42/21/20-3C80-G200
4312 020 3023.		TUB4.1/2/3-3B1	4312 020 3525.	2	E42/21/20-3C80-G500
4312 020 3046.	3	ROD2.2/16-4B1	4312 020 3526.	1	E42/21/20-3C80-G800
4312 020 3051.	1	ROD2.5/20.1-4B1	4312 020 3528.	3	E42/21/15-3C80-G500
4312 020 3056.	1	ROD1.5/14.2-4B1	4312 020 3529.	1	E42/21/15-3C80-G100
4312 020 3057.	1	ROD5/20-4B1	4312 020 3530.	1	E42/21/15-3C80-G200
4312 020 3103.	1	TUB4.1/2/20-3B1	4312 020 3533.	1	E30/15/7-3C80-G100
4312 020 3105.	1	TUB3.4/1.3/3-3B1	4312 020 3534.	1	E30/15/7-3C80-G200
4312 020 3125.	2	TUB4.1/2/11-3D3	4312 020 3535.	1	E30/15/7-3C80-G800
4312 020 3132.	1	TUB3.5/1.3/15.2-3B1	4312 020 3536.	1	E20/10/5-3C80-G50
4312 020 3133.	1	TUB3.5/1.3/7.5-3B1	4312 020 3537.	1	E20/10/5-3C80-G150
4312 020 3150.	2	MHC1-3B1	4312 020 3540.	1	EF32/16/9-3C80
4312 020 3152.	1	MHC2-14/14-4B1	4312 020 3541.	1	EF32/16/9-3C80-G100
4312 020 3153.	1	MHC5-4B1	4312 020 3542.	1	EF32/16/9-3C80-G200
4312 020 3155.	2	MHC1-4B1	4312 020 3543.	1	EF32/16/9-3C80-G500
4312 020 3157.	1	MHC2-8/14-4B1	4312 020 3544.	1	EF32/16/9-3C80-G800
4312 020 3319.	1	U57/28/16-3C80	4312 020 3545.	1	EF25/13/7-3C80-G50
4312 020 3351.	1	U20/16/7-3C80	4312 020 3546.	1	EF25/13/7-3C80-G150
4312 020 3352.	1	U47/25/18-3C80	4312 020 3550.	1	EF20/10/6-3C80-G50
4312 020 3355.	2	U93/76/16-3C80	4312 020 3551.	1	EF20/10/6-3C80-G150
4312 020 3356.	2	I93/28/16-3C80	4312 020 3555.	1	EF16/8/5-3C80
4312 020 3357.	2	U93/76/30-3C80	4312 020 3556.	1	EF20/10/6-3C11
4312 020 3358.	2	U93/52/30-3C80	4312 020 3562.	1	EF25/13/7-3C11
4312 020 3359.	2	I93/28/30-3C80	4312 020 3564.	1	E42/21/15-3C85
4312 020 3360.	2	U100/57/25-3C80	4312 020 3565.	2	E42/21/20-3C85
4312 020 3361.	2	I100/25/25-3C80	4312 020 3580.	1	E30/15/7-3C80-G500
4312 020 3368.	1	U43/34/16-3C80	4312 020 3581.	1	E42/21/15-3C85-G200
4312 020 3371.	1	U37/29/18-3C80	4312 020 3587.	1	E65/32/27-3C80-G1250
4312 020 3374.	1	U37/25/18-3C80	4312 020 3591.	1	E55/28/21-3C85
4312 020 3402.	4	EF25/13/7-3C80	4312 020 3592.	1	E55/28/25-3C85
4312 020 3407.	3	E20/10/5-3C80	4312 020 3597.	1	E20/10/5-3C11
4312 020 3410.	2	E55/28/21-3C80	4312 020 3598.	1	E42/21/15-3C11
4312 020 3411.	2	E42/21/15-3C80	4312 020 3700.	2	ETD34/17-3C80
4312 020 3412.	3	E42/21/20-3C80	4312 020 3701.	2	ETD34/17-3C80-G100
4312 020 3438.	3	E65/32/27-3C80	4312 020 3702.	2	ETD34/17-3C80-G200
4312 020 3447.	3	EF12.6/7/4-3C80	4312 020 3703.	2	ETD34/17-3C80-G500
4312 020 3455.	3	E30/15/7-3C80	4312 020 3705.	2	ETD39/20-3C80
4312 020 3492.	1	E55/28/21-3C80-G1200	4312 020 3706.	2	ETD39/20-3C80-G100
4312 020 3493.	1	EF32/16/9-3C11	4312 020 3707.	2	ETD39/20-3C80-G200
4312 020 3496.	3	E42/21/15-3C80-G800	4312 020 3708.	2	ETD39/20-3C80-G500
4312 020 3504.	1	EF20/10/6-3C80	4312 020 3710.	2	ETD44/22-3C80
4312 020 3508.	1	E30/15/7-3C11	4312 020 3711.	2	ETD44/22-3C80-G200
4312 020 3509.	1	EC41/19-3C80-G500	4312 020 3712.	2	ETD44/22-3C80-G500
4312 020 3511.	1	EC70/34-3C80-G500	4312 020 3715.	2	ETD49/25-3C80
4312 020 3512.	1	E65/32/27-3C80-G150	4312 020 3716.	2	ETD49/25-3C80-G200
4312 020 3515.	1	E65/32/27-3C80-G450	4312 020 3717.	2	ETD49/25-3C80-G500

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PHILIPS 12NC	digit 12	TYPE	PHILIPS 12NC	digit 12	TYPE
4312 020 3720.	2	ETD34/17-3C85	4312 020 3815.	1	ETD39/20-3F3-G500
4312 020 3721.	2	ETD34/17-3C85-G100	4312 020 3816.	1	ETD39/20-3F3-G800
4312 020 3722.	2	ETD34/17-3C85-G200	4312 020 3817.	1	ETD44/22-3F3-G100
4312 020 3723.	2	ETD34/17-3C85-G500	4312 020 3818.	1	ETD44/22-3F3-G200
4312 020 3724.	2	ETD34/17-3C85-G800	4312 020 3819.	1	ETD44/22-3F3-G500
4312 020 3725.	1	ETD39/20-3C85	4312 020 3820.	1	ETD44/22-3F3-G800
4312 020 3726.	1	ETD39/20-3C85-G100	4312 020 3821.	1	ETD49/25-3F3-G100
4312 020 3727.	1	ETD39/20-3C85-G200	4312 020 3822.	1	ETD49/25-3F3-G200
4312 020 3728.	1	ETD39/20-3C85-G500	4312 020 3823.	1	ETD49/25-3F3-G500
4312 020 3729.	1	ETD39/20-3C85-G800	4312 020 3824.	1	ETD49/25-3F3-G800
4312 020 3730.	1	ETD44/22-3C85	4312 020 3825.	1	ETD49/25-3F3-G1400
4312 020 3731.	1	ETD44/22-3C85-G100	4312 020 4100.	1	EFD15/5-3F3-A700
4312 020 3732.	1	ETD44/22-3C85-G200	4312 020 4101.	1	EFD15/5-3F3-A100
4312 020 3733.	1	ETD44/22-3C85-G500	4312 020 4102.	1	EFD15/5-3F3-A160
4312 020 3734.	1	ETD44/22-3C85-G800	4312 020 4103.	1	EFD15/5-3F3-A250
4312 020 3735.	2	ETD49/25-3C85	4312 020 4108.	1	EFD20/7-3F3-A1150
4312 020 3736.	2	ETD49/25-3C85-G100	4312 020 4109.	1	EFD20/7-3F3-A100
4312 020 3737.	2	ETD49/25-3C85-G200	4312 020 4110.	1	EFD20/7-3F3-A160
4312 020 3738.	2	ETD49/25-3C85-G500	4312 020 4111.	1	EFD20/7-3F3-A250
4312 020 3739.	2	ETD49/25-3C85-G800	4312 020 4116.	1	EFD25/9-3F3-A1800
4312 020 3750.	2	ETD29/16-3C85	4312 020 4117.	1	EFD25/9-3F3-A160
4312 020 3751.	2	ETD29/16-3C85-G50	4312 020 4118.	1	EFD25/9-3F3-A250
4312 020 3752.	2	ETD29/16-3C85-G150	4312 020 4119.	1	EFD25/9-3F3-A315
4312 020 3754.	2	ETD29/16-3C85-G350	4312 020 4120.	1	EFD25/9-3C85-A2100
4312 020 3755.	2	ETD49/25-3C80-G1400	4312 020 4121.	1	EFD25/9-3C85-A160
4312 020 3756.	1	ETD49/25-3C80-G800	4312 020 4122.	1	EFD25/9-3C85-A250
4312 020 3759.	2	ETD44/22-3C80-G100	4312 020 4123.	1	EFD25/9-3C85-A315
4312 020 3760.	2	ETD44/22-3C80-G800	4312 020 4124.	1	EFD30/9-3F3-A2000
4312 020 3763.	2	ETD39/20-3C80-G800	4312 020 4125.	1	EFD30/9-3F3-A160
4312 020 3766.	2	ETD34/17-3C80-G800	4312 020 4126.	1	EFD30/9-3F3-A250
4312 020 3769.	2	ETD29/16-3C85-G1000	4312 020 4127.	1	EFD30/9-3F3-A315
4312 020 3770.	1	ETD49/25-3C80-G100	4312 020 4128.	1	EFD30/9-3C85-A1900
4312 020 3789.	1	ETD29/16-3C11	4312 020 4129.	1	EFD30/9-3C85-A160
4312 020 3790.	1	ETD49/25-3C85-G1400	4312 020 4130.	1	EFD30/9-3C85-A250
4312 020 3800.	1	ETD29/16-3F3	4312 020 4131.	1	EFD30/9-3C85-A315
4312 020 3801.	1	ETD34/17-3F3	4312 020 4303.	1	U20/16/7-3C85
4312 020 3802.	1	ETD39/20-3F3	4312 020 4307.	1	U25/20/13-3C80
4312 020 3803.	1	ETD44/22-3F3	4312 020 4311.	1	U15/11/6-3C11
4312 020 3804.	1	ETD49/25-3F3	4312 020 4312.	1	U20/16/7-3C11
4312 020 3805.	1	ETD29/16-3F3-G50	4312 020 4313.	1	U25/20/13-3C11
4312 020 3806.	1	ETD29/16-3F3-G150	4312 020 4314.	1	U30/25/16-3C11
4312 020 3807.	1	ETD29/16-3F3-G350	4312 020 4317.	1	U37/25/18-3C10
4312 020 3808.	1	ETD29/16-3F3-G1000	4312 020 4319.	1	U37/29/18-3C10
4312 020 3809.	1	ETD34/17-3F3-G100	4312 020 4322.	1	U10/8/3-3C80
4312 020 3810.	1	ETD34/17-3F3-G200	4312 020 4323.	1	U15/11/6-3C80
4312 020 3811.	1	ETD34/17-3F3-G500	4312 020 4324.	1	U30/25/16-3C80
4312 020 3812.	1	ETD34/17-3F3-G800	4312 020 4325.	3	I15/3/3-3C80
4312 020 3813.	1	ETD39/20-3F3-G100	4312 020 4326.	4	I20/6/5-3C80
4312 020 3814.	1	ETD39/20-3F3-G200	4312 020 4327.	7	I25/7/7-3C80

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PHILIPS 12NC	digit 12	TYPE	PHILIPS 12NC	digit 12	TYPE
4312 020 4328.	1	U10/8/3-3C85	4312 020 4550.	1	E42/21/15-3F3
4312 020 4329.	1	U15/11/6-3C85	4312 020 4551.	1	E42/21/20-3F3
4312 020 4330.	1	U25/20/13-3C85	4312 020 4552.	1	E20/10/5-3F3
4312 020 4331.	1	U30/25/16-3C85	4312 020 4553.	1	E30/15/7-3F3
4312 020 4501.	1	EF25/13/7-3C80-G500	4312 020 4554.	1	EF20/10/6-3F3
4312 020 4503.	1	E55/28/25-3C80-G2500	4312 020 4555.	1	EF25/13/7-3F3
4312 020 4504.	1	E55/28/21-3C11	4312 020 4556.	1	EF12.6/7/4-3F3
4312 020 4508.	1	EF12.6/7/4-3C80-G150	4312 020 4557.	1	EF12.6/7/4-3F3-G50
4312 020 4509.	1	EF12.6/7/4-3C80-G500	4312 020 4558.	1	EF12.6/7/4-3F3-G150
4312 020 4510.	1	EF12.6/7/4-3C85	4312 020 4559.	1	EF12.6/7/4-3F3-G500
4312 020 4511.	1	EF12.6/7/4-3C85-G50	4312 020 4560.	1	EF16/8/5-3F3
4312 020 4512.	1	EF12.6/7/4-3C85-G150	4312 020 4561.	1	EF16/8/5-3F3-G50
4312 020 4513.	1	EF12.6/7/4-3C85-G500	4312 020 4562.	1	EF16/8/5-3F3-G150
4312 020 4514.	1	EF12.6/7/4-3C11	4312 020 4563.	1	EF16/8/5-3F3-G500
4312 020 4515.	1	E55/28/25-3C80	4312 020 4564.	1	E30/15/7-3F3-G100
4312 020 4516.	1	EF16/8/5-3C80-G50	4312 020 4565.	1	EF20/10/6-3F3-G50
4312 020 4517.	1	EF16/8/5-3C80-G150	4312 020 4566.	1	EF20/10/6-3F3-G150
4312 020 4518.	1	EF16/8/5-3C80-G500	4312 020 4567.	1	EF20/10/6-3F3-G500
4312 020 4519.	1	EF16/8/5-3C85	4312 020 4568.	1	E30/15/7-3F3-G200
4312 020 4520.	1	EF16/8/5-3C85-G50	4312 020 4569.	1	EF25/13/7-3F3-G50
4312 020 4521.	1	EF16/8/5-3C85-G150	4312 020 4570.	1	EF25/13/7-3F3-G150
4312 020 4522.	1	EF16/8/5-3C85-G500	4312 020 4571.	1	EF25/13/7-3F3-G500
4312 020 4523.	1	EF16/8/5-3C11	4312 020 4572.	1	EF32/16/9-3F3
4312 020 4524.	1	EF20/10/6-3C80-G500	4312 020 4573.	1	EF32/16/9-3F3-G100
4312 020 4525.	1	EF20/10/6-3C85	4312 020 4574.	1	EF32/16/9-3F3-G200
4312 020 4526.	1	EF20/10/6-3C85-G50	4312 020 4575.	1	EF32/16/9-3F3-G500
4312 020 4527.	1	EF20/10/6-3C85-G150	4312 020 4576.	1	EF32/16/9-3F3-G800
4312 020 4528.	1	EF20/10/6-3C85-G500	4312 020 4577.	1	E30/15/7-3F3-G500
4312 020 4529.	1	EF25/13/7-3C85	4312 020 4578.	1	E20/10/5-3F3-G50
4312 020 4530.	1	EF25/13/7-3C85-G50	4312 020 4579.	1	E20/10/5-3F3-G150
4312 020 4531.	1	EF25/13/7-3C85-G150	4312 020 4580.	1	E20/10/5-3F3-G500
4312 020 4532.	1	EF25/13/7-3C85-G500	4312 020 4581.	1	E30/15/7-3F3-G800
4312 020 4533.	1	EF32/16/9-3C85	4312 020 4582.	1	E42/21/15-3F3-G100
4312 020 4534.	1	EF32/16/9-3C85-G100	4312 020 4583.	1	E42/21/15-3F3-G200
4312 020 4535.	1	EF32/16/9-3C85-G200	4312 020 4584.	1	E42/21/15-3F3-G500
4312 020 4536.	1	EF32/16/9-3C85-G500	4312 020 4585.	1	E42/21/15-3F3-G800
4312 020 4537.	1	EF32/16/9-3C85-G800	4312 020 4586.	1	E42/21/20-3F3-G100
4312 020 4538.	1	E20/10/5-3C80-G500	4312 020 4587.	1	E42/21/20-3F3-G200
4312 020 4539.	1	E20/10/5-3C85	4312 020 4588.	1	E42/21/20-3F3-G500
4312 020 4540.	1	E20/10/5-3C85-G50	4312 020 4589.	1	E42/21/20-3F3-G800
4312 020 4541.	1	E20/10/5-3C85-G150	4312 020 4590.	1	E55/28/21-3F3
4312 020 4542.	1	E20/10/5-3C85-G500	4312 020 4591.	1	E55/28/21-3F3-G150
4312 020 4543.	1	E30/15/7-3C85	4312 020 4592.	1	E55/28/21-3F3-G450
4312 020 4544.	1	E30/15/7-3C85-G100	4312 020 4593.	1	E55/28/21-3F3-G1200
4312 020 4545.	1	E30/15/7-3C85-G200	4312 020 4594.	1	E65/32/27-3F3
4312 020 4546.	1	E30/15/7-3C85-G500	4312 020 4595.	1	E65/32/27-3F3-G150
4312 020 4547.	1	E30/15/7-3C85-G800	4312 020 4596.	1	E65/32/27-3F3-G450
4312 020 4548.	1	E42/21/15-3C85-G100	4312 020 4597.	1	E65/32/27-3F3-G1250
4312 020 4549.	1	E42/21/15-3C85-G500	4312 020 4600.	1	E42/21/15-3C85-G800

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4312 020 4601.	1	E42/21/20-3C85-G100
4312 020 4602.	1	E42/21/20-3C85-G200
4312 020 4603.	1	E42/21/20-3C85-G500
4312 020 4604.	1	E42/21/20-3C85-G800
4312 020 4605.	1	E55/28/21-3C85-G150
4312 020 4605.	1	E65/32/27-3C11
4312 020 4606.	1	E55/28/21-3C85-G450
4312 020 4607.	1	E55/28/21-3C85-G1200
4312 020 4608.	1	E55/28/25-3C80-G500
4312 020 4609.	1	E55/28/25-3C80-G1500
4312 020 4610.	1	E55/28/25-3C85-G500
4312 020 4611.	1	E55/28/25-3C85-G1500
4312 020 4612.	1	E65/32/27-3C85
4312 020 4613.	1	E65/32/27-3C85-G150
4312 020 4614.	1	E65/32/27-3C85-G450
4312 020 4615.	1	E65/32/27-3C85-G1250
4312 020 4616.	1	EF12.6/7/4-3C80-G50
4312 020 4617.	1	EC35/17-3C80-G250
4312 020 4618.	1	EC35/17-3C80-G750
4312 020 4619.	1	EC35/17-3C85
4312 020 4620.	1	EC35/17-3C85-G250
4312 020 4621.	1	EC35/17-3C85-G750
4312 020 4622.	1	EC41/19-3C85
4312 020 4623.	1	EC41/19-3C85-G500
4312 020 4624.	1	EC41/19-3C85-G1500
4312 020 4625.	1	EC52/24-3C80-G500
4312 020 4626.	1	EC52/24-3C80-G1500
4312 020 4627.	1	EC52/24-3C85
4312 020 4628.	1	EC52/24-3C85-G500
4312 020 4629.	1	EC52/24-3C85-G1500
4312 020 4630.	1	EC70/34-3C80-G1500
4312 020 4631.	1	EC70/34-3C85
4312 020 4632.	1	EC70/34-3C85-G500
4312 020 4633.	1	EC70/34-3C85-G1500
4312 021 2601.	1	CLA-EC35
4312 021 2602.	1	CLA-EC41
4312 021 2603.	1	CLA-EC41-ST
4312 021 2604.	1	CLA-EC52
4312 021 2605.	1	CLA-EC52-ST
4312 021 2606.	1	CLA-EC70
4312 021 2607.	1	CLA-EC70-ST
4312 021 2609.	1	CLA-E55
4312 021 2611.	1	CLA-E65
4312 021 2612.	1	CLA-EF25
4312 021 2613.	1	SPR-E55
4312 021 2614.	1	SPR-E65
4312 021 2615.	1	SPR-EC35
4312 021 2616.	1	SPR-EC41
4312 021 2617.	1	SPR-EC52
4312 021 2618.	1	SPR-EC70
4312 021 2619.	1	SPR-EF25
4312 021 2620.	1	CPH-EF12.6-1S-6P
4312 021 2621.	1	CPH-EF20-1S-8P
4312 021 2622.	1	CPH-EF32-1S-12P
4312 021 2623.	1	CPH-EF16-1S-6P
4312 021 2625.	1	CPV-EF25-1S-6P
4312 021 2626.	1	CPH-EF25-1S-8P
4312 021 2855.	3	CP-E30-1S
4312 021 2862.	4	CP-E42/15-1S
4312 021 2871.	3	CP-E55-1S
4312 021 2872.	3	CP-E65-1S
4313 020 1517.	2	TUB4/2/5-3B1
4313 020 1518.	4	TUB9.5/6.5/17.4-3B1
4313 020 1546.	1	TUB4/1.5/5.5-4B1
4313 020 2057.	4	MHC4-4A11
4313 020 2080.	2	MHC4-3C85
4313 020 2564.	1	EC41/19-3C80-G1500
4313 020 4003.	1	MHC2-6/13-4B1
4313 020 4005.	3	MHC2-6/13-3C85

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PHILIPS 12NC	digit 12	TYPE	PHILIPS 12NC	digit 12	TYPE
4322 020 3206.	1	ROD1.7/14.2-4E1	4322 021 3034.	2	CP-P26/16-2S
4322 020 3209.	1	ROD1.6/28-4B1	4322 021 3035.	3	CP-P26/16-3S
4322 020 3434.	3	TUB2.8/1.2/8.2-3B1	4322 021 3036.	2	CP-P30/19-1S
4322 020 3440.	1	TUB3.7/1.3/3.5-3B1	4322 021 3037.	2	CP-P30/19-2S
4322 020 3442.	1	TUB3.7/1.3/3.5-4B1	4322 021 3038.	2	CP-P30/19-3S
4322 020 3443.	1	TUB3.7/1.5/5-3B1	4322 021 3039.	2	CP-P36/22-1S
4322 020 3675.	1	TUB4.3/2/15.4-3B1	4322 021 3040.	2	CP-P36/22-2S
4322 020 3300.	2	H20-3E25-SET	4322 021 3041.	2	CP-P36/22-3S
4322 020 3302.	2	H7-3E25-SET	4322 021 3042.	1	CP-P42/29-1S
4322 020 3303.	2	H16-3E25-SET	4322 021 3043.	1	CP-P42/29-2S
4322 020 3304.	1	H10-3E25-SET	4322 021 3044.	6	TGP-P14/8
4322 020 3678.	1	TUB4.3/2/25.5-3B1	4322 021 3045.	7	TGP-P18/11
4322 020 5250.	4	EC35/17-3C80	4322 021 3046.	6	TGP-P22/13
4322 020 5251.	4	EC41/19-3C80	4322 021 3047.	5	TGP-P26/16
4322 020 5252.	4	EC52/24-3C80	4322 021 3048.	5	TGP-P30/19
4322 020 5253.	3	EC70/34-3C80	4322 021 3049.	5	TGP-P36/22
4322 020 5421.	2	PH5.6/3.6-3D3	4322 021 3050.	6	TGP-P42/29
4322 020 5451.	1	PH7.4/3.9-3D3	4322 021 3051.	5	CON-P11/7
4322 020 5471.	1	PH9.4/4.8-3D3	4322 021 3052.	3	CON-P14/8
4322 020 5480.	1	PH14/7.5-3H1	4322 021 3053.	5	CON-P18/11
4322 020 5490.	1	PH26/9.2-3H1	4322 021 3054.	4	CON-P22/13
4322 020 9716.	3	RCC6/2-4C65	4322 021 3055.	5	CON-P26/16
4322 020 9717.	3	RCC9/3-4C65	4322 021 3056.	5	CON-P30/19
4322 020 9720.	2	RCC36/15-4C65	4322 021 3057.	5	CON-P36/22
4322 021 2016.	2	CLA-E20	4322 021 3058.	3	CON-P42/29
4322 021 2017.	2	CLA-E30	4322 021 3062.	1	SPR-P11/7
4322 021 2022.	2	SPR-E20	4322 021 3063.	1	SPR-P14/8
4322 021 2023.	3	SPR-E30	4322 021 3064.	1	SPR-P18/11
4322 021 2024.	5	CSH-E20-1S-8P	4322 021 3065.	1	SPR-P22/13
4322 021 2025.	3	CSH-E30-1S-10P	4322 021 3066.	1	SPR-P26/16
4322 021 3004.	2	CON-X22	4322 021 3067.	2	SPR-P30/19
4322 021 3007.	3	CPV-P14/8-1S-4PD	4322 021 3068.	2	SPR-P36/22
4322 021 3009.	3	CPV-P18/11-1S-6PD	4322 021 3069.	2	SPR-P42/29
4322 021 3011.	2	CPV-P22/13-1S-6PD	4322 021 3071.	1	NUT
4322 021 3013.	2	CPV-P26/16-1S-6PD	4322 021 3072.	2	FIB
4322 021 3018.	8	TGP-P11/7	4322 021 3115.	2	COV-X30
4322 021 3021.	1	SPR-X30	4322 021 3116.	2	COV-X35
4322 021 3022.	1	SPR-X35	4322 021 3117.	2	CON-X30/1
4322 021 3023.	1	COV-X22	4322 021 3118.	2	CON-X35/1
4322 021 3024.	2	CP-P11/7-1S	4322 021 3132.	2	CP-P66/56-1S
4322 021 3025.	2	CP-P14/8-1S	4322 021 3170.	1	CP-P9/5-1S
4322 021 3026.	2	CP-P14/8-2S	4322 021 3178.	7	CLI-RM6
4322 021 3027.	2	CP-P18/11-1S	4322 021 3183.	3	CPH-E42-1S-10P
4322 021 3028.	2	CP-P18/11-2S	4322 021 3184.	6	CLI-RM8
4322 021 3029.	2	CP-P18/11-3S	4322 021 3190.	4	CLI-RM4/RM5
4322 021 3030.	2	CP-P22/13-1S	4322 021 3191.	2	CLA-E42/15
4322 021 3031.	2	CP-P22/13-2S	4322 021 3192.	3	SPR-E42/15
4322 021 3032.	2	CP-P22/13-3S	4322 021 3221.	2	CSV-RM4-1S-6P
4322 021 3033.	2	CP-P26/16-1S	4322 021 3287.	2	CSV-X22-1S-8P

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PHILIPS 12NC	digit 12	TYPE	PHILIPS 12NC	digit 12	TYPE
4322 021 3299.	1	CP-P7.4/4.2-1S	4322 021 3449.	1	CSV-RM5-2S-5P
4322 021 3331.	2	CPH-EC35-1S-13P	4322 021 3450.	1	CSV-RM5-2S-6P
4322 021 3332.	1	CPH-EC41-1S-9P	4322 021 3451.	1	CSV-RM6S/R-1S-4P
4322 021 3333.	1	CPH-EC52-1S-11P	4322 021 3452.	1	CSV-RM6S/R-2S-4P
4322 021 3334.	1	CPH-EC70-1S-15P	4322 021 3453.	1	CSV-RM6R-1S-5P
4322 021 3335.	2	CPV-EC41-1S-9P	4322 021 3454.	1	CSV-RM6R-1S-6P
4322 021 3336.	1	CPV-EC52-1S-14P	4322 021 3455.	1	CSV-RM6R-2S-5P
4322 021 3337.	1	CPV-EC70-1S-15P	4322 021 3456.	1	CSV-RM6R-2S-6P
4322 021 3341.	4	CPH-EC35-1S-11P	4322 021 3457.	1	CSV-RM6S-1S-5P
4322 021 3342.	1	CSV-X30-1S-12P	4322 021 3458.	1	CSV-RM6S-1S-6P
4322 021 3343.	1	CSV-X35-1S-16P	4322 021 3459.	1	CSV-RM6S-2S-5P
4322 021 3348.	1	CPH-EC41-1S-12P	4322 021 3460.	1	CSV-RM6S-2S-6P
4322 021 3350.	2	CPH-EC52-1S-14PH	4322 021 3461.	1	CSV-RM7-1S-4P
4322 021 3352.	2	CSH-RM14-1S-10P	4322 021 3462.	1	CSV-RM7-1S-5P
4322 021 3353.	2	CSV-RM14-1S-12P	4322 021 3463.	1	CSV-RM7-1S-8P
4322 021 3355.	1	CP-P5.8/3.3-1S	4322 021 3464.		CSV-RM7-2S-5P
4322 021 3362.	1	CON-X30/2	4322 021 3465.		CSV-RM7-2S-8P
4322 021 3363.	1	CON-X35/2	4322 021 3466.	1	CSV-RM8-1S-5P
4322 021 3370.	1	CP-PH26/9.2-1S	4322 021 3467.	1	CSV-RM8-1S-8P
4322 021 3385.	2	CPH-ETD34-1S-14P	4322 021 3468.	1	CSV-RM8-1S-12P
4322 021 3386.	2	CPH-ETD39-1S-16P	4322 021 3469.	1	CSV-RM8-2S-5P
4322 021 3387.	2	CPH-ETD44-1S-18P	4322 021 3470.	1	CSV-RM8-2S-8P
4322 021 3388.	2	CPH-ETD49-1S-20P	4322 021 3471.	1	CSV-RM8-2S-12P
4322 021 3389.	2	CLI-ETD34	4322 021 3472.	2	CSV-RM10-1S-5P
4322 021 3390.	2	CLI-ETD39	4322 021 3473.	1	CSV-RM10-1S-8P
4322 021 3391.	2	CLI-ETD44	4322 021 3474.	1	CSV-RM10-1S-10P
4322 021 3392.	2	CLI-ETD49	4322 021 3475.	1	CSV-RM10-1S-11P
4322 021 3394.	1	ECLI-ETD34	4322 021 3476.	1	CSV-RM10-1S-12P
4322 021 3395.	1	ECLI-ETD39	4322 021 3477.	1	CSV-RM10-2S-5P
4322 021 3396.	1	ECLI-ETD44	4322 021 3478.	2	CSV-RM10-2S-8P
4322 021 3397.	1	ECLI-ETD49	4322 021 3479.	1	CSV-RM10-2S-10P
4322 021 3403.	1	CP-E20-1S-10P	4322 021 3480.	1	CSV-RM10-2S-11P
4322 021 3404.	1	CPV-RM6S-1S-8PD	4322 021 3481.	1	CSV-RM10-2S-12P
4322 021 3405.	1	CPV-RM8-1S-12PD	4322 021 3486.	1	CSV-RM8-1S-4P
4322 021 3406.	1	CPV-RM10-1S-12PD	4322 021 3491.	1	CLI-RM12/i
4322 021 3407.	2	CPV-RM14-1S-12PD	4322 021 3492.	1	CLI-RM14/i
4322 021 3411.	2	CPV-RM12-1S-12PD	4322 021 3493.		CLI-RM7
4322 021 3423.	1	CSCI-ETD34-1S-7P	4322 021 3503.	1	CSH-EP13-1S-10P
4322 021 3424.	1	CSCO-ETD34-1S-7P	4322 021 3507.	1	CPH-U15/I20-1S-4P
4322 021 3429.	1	CLI-RM4/i/RM5/i	4322 021 3508.	1	CPH-U15/I20-2S-4P
4322 021 3430.	1	CLI-RM6/i	4322 021 3514.	1	CLI-EFD15/5
4322 021 3431.	1	CLI-RM8/i	4322 021 3515.	1	CLI-EFD20/7
4322 021 3432.	1	CLI-RM10/i	4322 021 3516.	1	CLI-EFD25/9
4322 021 3437.	1	CLI-ETD29	4322 021 3517.	1	CLI-EFD30/9
4322 021 3438.	1	CPH-ETD29-1S-13P	4322 021 3520.	1	CSH-EFD15/5-1S-8P
4322 021 3445.	1	CSV-RM5-1S-4P	4322 021 3522.	1	CSH-EFD20/7-1S-10P
4322 021 3446.	1	CSV-RM5-1S-5P	4322 021 3524.	1	CSH-EFD25/9-1S-10P
4322 021 3447.	1	CSV-RM5-1S-6P	4322 021 3525.	1	CSH-EFD30/9-1S-10P
4322 021 3448.	1	CSV-RM5-2S-4P	4322 021 3832.	1	ADJ-P30/RM10-RED

PHILIPS 12NC	digit 12	TYPE	PHILIPS 12NC	digit 12	TYPE
4322 021 3834.	1	ADJ-P30/RM10-YELLOW	4322 021 3981.	2	ADJ-P9/P11-BROWN
4322 021 3838.	2	ADJ-P30/RM10-WHITE	4322 021 3984.	1	ADJ-P9/P11-YELLOW
4322 021 3839.	2	ADJ-P30/RM10-GREY	4322 021 3985.	1	ADJ-P9/P11-GREEN
4322 021 3840.	3	ADJ-P22/RM8-BLACK	4322 021 3989.	2	ADJ-P9/P11-GREY
4322 021 3841.	3	ADJ-P22/RM8-BROWN	4322 022 0120.	1	P11/7-3H1-A1800
4322 021 3842.	1	ADJ-P22/RM8-RED	4322 022 0125.	2	P11/7-3H1-A160
4322 021 3843.	1	ADJ-P22/RM8-ORANGE	4322 022 0126.	2	P11/7-3H1-A250
4322 021 3844.	4	ADJ-P22/RM8-YELLOW	4322 022 0139.	1	P11/7-3D3-A800
4322 021 3845.	1	ADJ-P22/RM8-GREEN	4322 022 0143.	1	P11/7-3D3-A63
4322 021 3848.	3	ADJ-P22/RM8-WHITE	4322 022 0144.	1	P11/7-3D3-A100
4322 021 3849.	3	ADJ-P22/RM8-GREY	4322 022 0150.	1	P11/7-3H3-A1650
4322 021 3860.	2	ADJ-RM6-BLACK	4322 022 0155.	1	P11/7-3H3-A160
4322 021 3861.	2	ADJ-RM6-BROWN	4322 022 0156.	1	P11/7-3H3-A250
4322 021 3862.	1	ADJ-RM6-RED	4322 022 0164.	1	P11/7-3E4-A4100
4322 021 3864.	1	ADJ-RM6-YELLOW	4322 022 0166.	1	P11/7-3E1-A2800
4322 021 3865.	1	ADJ-RM6-GREEN	4322 022 0169.	1	P11/7-3F3-A1550
4322 021 3867.	2	ADJ-RM6-VIOLET	4322 022 0171.	1	P11/7-3F3-A100
4322 021 3868.	2	ADJ-RM6-WHITE	4322 022 0172.	1	P11/7-3F3-A160
4322 021 3869.	2	ADJ-RM6-GREY	4322 022 0173.	1	P11/7-3F3-A250
4322 021 3870.	2	ADJ-RM4/RM5-BLACK	4322 022 0179.	1	P11/7-4C6-A130
4322 021 3871.	2	ADJ-RM4/RM5-BROWN	4322 022 0181.	1	P11/7-4C6-A25
4322 021 3872.	1	ADJ-RM4/RM5-RED	4322 022 0182.	1	P11/7-4C6-A40
4322 021 3875.	1	ADJ-RM4/RM5-GREEN	4322 022 0188.	1	P11/7-3B8-A1800
4322 021 3878.	2	ADJ-RM4/RM5-WHITE	4322 022 0190.	1	P11/7-3B8-A100
4322 021 3879.	2	ADJ-RM4/RM5-GREY	4322 022 0191.	1	P11/7-3B8-A160
4322 021 3924.	1	ADJ-P36/P42-YELLOW	4322 022 0192.	1	P11/7-3B8-A250
4322 021 3928.	1	ADJ-P36/P42-WHITE	4322 022 0321.	1	P14/8-3H1-A2350
4322 021 3929.	2	ADJ-P36/P42-GREY	4322 022 0325.	3	P14/8-3H1-A160
4322 021 3941.	2	ADJ-P26-BROWN	4322 022 0326.	3	P14/8-3H1-A250
4322 021 3942.	1	ADJ-P26-RED	4322 022 0327.	3	P14/8-3H1-A315
4322 021 3945.	1	ADJ-P26-GREEN	4322 022 0328.	3	P14/8-3H1-A400
4322 021 3948.	2	ADJ-P26-WHITE	4322 022 0340.	1	P14/8-3D3-A1000
4322 021 3949.	2	ADJ-P26-GREY	4322 022 0343.	2	P14/8-3D3-A63
4322 021 3960.	2	ADJ-P18-BLACK	4322 022 0344.	2	P14/8-3D3-A100
4322 021 3961.	2	ADJ-P18-BROWN	4322 022 0355.	2	P14/8-3H3-A160
4322 021 3962.	2	ADJ-P18-RED	4322 022 0356.	2	P14/8-3H3-A250
4322 021 3963.	1	ADJ-P18-ORANGE	4322 022 0357.	2	P14/8-3H3-A315
4322 021 3964.	1	ADJ-P18-YELLOW	4322 022 0358.	2	P14/8-3H3-A400
4322 021 3965.	1	ADJ-P18-GREEN	4322 022 0360.	1	P14/8-3H3-A2150
4322 021 3967.	2	ADJ-P18-VIOLET	4322 022 0366.	1	P14/8-3C85-A2150
4322 021 3968.	2	ADJ-P18-WHITE	4322 022 0367.	1	P14/8-3C85-A160
4322 021 3970.	2	ADJ-P14-BLACK	4322 022 0368.	1	P14/8-3C85-A250
4322 021 3971.	2	ADJ-P14-BROWN	4322 022 0369.	1	P14/8-3C85-A315
4322 021 3972.	1	ADJ-P14-RED	4322 022 0370.	1	P14/8-3C85-A400
4322 021 3973.	1	ADJ-P14-ORANGE	4322 022 0377.	1	P14/8-3E4-A5300
4322 021 3974.	2	ADJ-P14-YELLOW	4322 022 0379.	1	P14/8-3E1-A3700
4322 021 3975.	1	ADJ-P14-GREEN	4322 022 0380.	1	P14/8-4C6-A160
4322 021 3978.	2	ADJ-P14-WHITE	4322 022 0381.	2	P14/8-4C6-A25
4322 021 3979.	2	ADJ-P14-GREY	4322 022 0382.	2	P14/8-4C6-A40

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PHILIPS 12NC	digit 12	TYPE	PHILIPS 12NC	digit 12	TYPE
4322 022 0383.	2	P14/8-4C6-A63	4322 022 0727.	2	P22/13-3H1-A315
4322 022 0385.	1	P14/8-3B8-A160	4322 022 0728.	2	P22/13-3H1-A400
4322 022 0386.	1	P14/8-3B8-A250	4322 022 0730.	2	P22/13-3H1-A630
4322 022 0387.	1	P14/8-3B8-A315	4322 022 0740.	1	P22/13-3D3-A1700
4322 022 0388.	1	P14/8-3B8-A400	4322 022 0744.	1	P22/13-3D3-A100
4322 022 0392.	1	P14/8-3F3-A2000	4322 022 0745.	1	P22/13-3D3-A160
4322 022 0393.	1	P14/8-3F3-A160	4322 022 0755.	1	P22/13-3H3-A160
4322 022 0394.	1	P14/8-3F3-A250	4322 022 0756.	1	P22/13-3H3-A250
4322 022 0395.	1	P14/8-3F3-A315	4322 022 0757.	1	P22/13-3H3-A315
4322 022 0396.	1	P14/8-3F3-A400	4322 022 0758.	1	P22/13-3H3-A400
4322 022 0397.	1	P14/8-3B8-A2350	4322 022 0759.	1	P22/13-3H3-A3900
4322 022 0521.	1	P18/11-3H1-A3400	4322 022 0760.	1	P22/13-3H3-A630
4322 022 0525.	3	P18/11-3H1-A160	4322 022 0764.	1	P22/13-3F3-A3550
4322 022 0526.	3	P18/11-3H1-A250	4322 022 0765.	1	P22/13-3F3-A160
4322 022 0527.	3	P18/11-3H1-A315	4322 022 0766.	1	P22/13-3F3-A250
4322 022 0528.	3	P18/11-3H1-A400	4322 022 0767.	1	P22/13-3F3-A315
4322 022 0540.	1	P18/11-3D3-A1400	4322 022 0768.	1	P22/13-3F3-A400
4322 022 0543.	2	P18/11-3D3-A63	4322 022 0769.	1	P22/13-3F3-A630
4322 022 0544.	2	P18/11-3D3-A100	4322 022 0772.	1	P22/13-3E1-A6900
4322 022 0545.	2	P18/11-3D3-A160	4322 022 0773.	1	P22/13-3E4-A9450
4322 022 0547.	1	P18/11-3E1-A5400	4322 022 0777.	1	P22/13-3C85-A3900
4322 022 0550.	1	P18/11-3H3-A3100	4322 022 0779.	1	P22/13-4C6-A250
4322 022 0555.	1	P18/11-3H3-A160	4322 022 0781.	1	P22/13-4C6-A25
4322 022 0556.	2	P18/11-3H3-A250	4322 022 0782.	1	P22/13-4C6-A40
4322 022 0557.	2	P18/11-3H3-A315	4322 022 0783.	1	P22/13-4C6-A63
4322 022 0558.	2	P18/11-3H3-A400	4322 022 0785.	1	P22/13-3C85-A160
4322 022 0566.	1	P18/11-3F3-A2850	4322 022 0786.	1	P22/13-3C85-A250
4322 022 0568.	1	P18/11-3F3-A160	4322 022 0787.	1	P22/13-3C85-A315
4322 022 0569.	1	P18/11-3F3-A250	4322 022 0788.	1	P22/13-3C85-A400
4322 022 0570.	1	P18/11-3F3-A315	4322 022 0789.	1	P22/13-3C85-A630
4322 022 0571.	1	P18/11-3F3-A400	4322 022 0791.	1	P22/13-3B8-A160
4322 022 0577.	1	P18/11-3B8-A3400	4322 022 0792.	1	P22/13-3B8-A250
4322 022 0578.	1	P18/11-3C85-A3100	4322 022 0793.	1	P22/13-3B8-A315
4322 022 0579.	1	P18/11-3E4-A7550	4322 022 0794.	1	P22/13-3B8-A400
4322 022 0580.	1	P18/11-4C6-A210	4322 022 0795.	1	P22/13-3B8-A630
4322 022 0581.	2	P18/11-4C6-A25	4322 022 0797.	1	P22/13-3B8-A4300
4322 022 0582.	2	P18/11-4C6-A40	4322 022 0925.	2	P26/16-3H1-A160
4322 022 0583.	2	P18/11-4C6-A63	4322 022 0926.	2	P26/16-3H1-A250
4322 022 0586.	1	P18/11-3C85-A160	4322 022 0927.	2	P26/16-3H1-A315
4322 022 0587.	1	P18/11-3C85-A250	4322 022 0928.	2	P26/16-3H1-A400
4322 022 0588.	1	P18/11-3C85-A315	4322 022 0930.	2	P26/16-3H1-A630
4322 022 0589.	1	P18/11-3C85-A400	4322 022 0944.	1	P26/16-3D3-A100
4322 022 0590.	1	P18/11-3B8-A315	4322 022 0945.	1	P26/16-3D3-A160
4322 022 0591.	1	P18/11-3B8-A160	4322 022 0946.	1	P26/16-3D3-A250
4322 022 0592.	1	P18/11-3B8-A250	4322 022 0949.	1	P26/16-3D3-A2150
4322 022 0594.	1	P18/11-3B8-A400	4322 022 0950.	1	P26/16-3F3-A4600
4322 022 0720.	1	P22/13-3H1-A4300	4322 022 0951.	1	P26/16-3H3-A5000
4322 022 0725.	2	P22/13-3H1-A160	4322 022 0955.	1	P26/16-3H3-A160
4322 022 0726.	2	P22/13-3H1-A250	4322 022 0956.	1	P26/16-3H3-A250

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PHILIPS 12NC	digit 12	TYPE	PHILIPS 12NC	digit 12	TYPE
4322 022 0957.	1	P26/16-3H3-A315	4322 022 1360.	1	P36/22-3C85-A8000
4322 022 0958.	1	P26/16-3H3-A400	4322 022 1364.	1	P36/22-3C85-A250
4322 022 0960.	1	P26/16-3H3-A630	4322 022 1365.	1	P36/22-3C85-A315
4322 022 0965.	1	P26/16-3E4-A12100	4322 022 1366.	1	P36/22-3C85-A400
4322 022 0967.	1	P26/16-3E1-A9000	4322 022 1367.	1	P36/22-3C85-A630
4322 022 0972.	1	P26/16-3H1-A5550	4322 022 1378.	1	P36/22-3B8-A9000
4322 022 0973.	1	P26/16-3C85-A5000	4322 022 1381.	2	P36/22-3B8-A250
4322 022 0980.	1	P26/16-4C6-A310	4322 022 1382.	2	P36/22-3B8-A315
4322 022 0983.	1	P26/16-4C6-A63	4322 022 1383.	2	P36/22-3B8-A400
4322 022 0984.	1	P26/16-4C6-A100	4322 022 1384.	1	P36/22-3B8-A630
4322 022 0985.	1	P26/16-3B8-A5550	4322 022 1396.	1	P36/22-3E1-A13300
4322 022 0986.	2	P26/16-3B8-A250	4322 022 1397.	1	P36/22-3E4-A19300
4322 022 0987.	1	P26/16-3B8-A315	4322 022 1520.	1	P42/29-3H1-A9500
4322 022 0988.	1	P26/16-3B8-A400	4322 022 1527.	2	P42/29-3H1-A315
4322 022 0989.	1	P26/16-3B8-A630	4322 022 1528.	2	P42/29-3H1-A400
4322 022 1120.	1	P30/19-3H1-A7050	4322 022 1530.	2	P42/29-3H1-A630
4322 022 1126.	2	P30/19-3H1-A250	4322 022 1531.	2	P42/29-3H1-A1000
4322 022 1127.	2	P30/19-3H1-A315	4322 022 1532.	2	P42/29-3H1-A1600
4322 022 1128.	2	P30/19-3H1-A400	4322 022 1580.	1	P42/29-3F3-A7700
4322 022 1130.	2	P30/19-3H1-A630	4322 022 1583.	1	P42/29-3F3-A315
4322 022 1131.	2	P30/19-3H1-A1000	4322 022 1584.	1	P42/29-3F3-A400
4322 022 1132.	1	P30/19-3H1-A1600	4322 022 1585.	1	P42/29-3F3-A630
4322 022 1148.	1	P30/19-3F3-A5750	4322 022 1590.	1	P42/29-3C85-A8500
4322 022 1151.	1	P30/19-3F3-A250	4322 022 1593.	1	P42/29-3C85-A315
4322 022 1152.	1	P30/19-3F3-A315	4322 022 1594.	1	P42/29-3C85-A400
4322 022 1153.	1	P30/19-3F3-A400	4322 022 1595.	1	P42/29-3C85-A630
4322 022 1154.	1	P30/19-3F3-A630	4322 022 1700.	1	P66/56-3E1-A14000
4322 022 1160.	1	P30/19-3C85-A6300	4322 022 1928.	2	X30-3H1-A400
4322 022 1164.	1	P30/19-3C85-A250	4322 022 1930.	2	X30-3H1-A630
4322 022 1165.	1	P30/19-3C85-A315	4322 022 1931.	2	X30-3H1-A1000
4322 022 1166.	1	P30/19-3C85-A400	4322 022 1932.	2	X30-3H1-A1600
4322 022 1167.	1	P30/19-3C85-A630	4322 022 2125.	3	P11/7-3H1-A160/N
4322 022 1182.	1	P30/19-3B8-A7050	4322 022 2126.	3	P11/7-3H1-A250/N
4322 022 1184.	1	P30/19-3B8-A250	4322 022 2143.	2	P11/7-3D3-A63/N
4322 022 1185.	1	P30/19-3B8-A315	4322 022 2144.	2	P11/7-3D3-A100/N
4322 022 1186.	1	P30/19-3B8-A400	4322 022 2155.	1	P11/7-3H3-A160/N
4322 022 1187.	1	P30/19-3B8-A630	4322 022 2156.	1	P11/7-3H3-A250/N
4322 022 1190.	1	P30/19-3E4-A15100	4322 022 2181.	2	P11/7-4C6-A25/N
4322 022 1191.	1	P30/19-3E1-A10300	4322 022 2182.	2	P11/7-4C6-A40/N
4322 022 1320.	1	P36/22-3H1-A9000	4322 022 2325.	5	P14/8-3H1-A160/N
4322 022 1328.	2	P36/22-3H1-A400	4322 022 2326.	5	P14/8-3H1-A250/N
4322 022 1330.	2	P36/22-3H1-A630	4322 022 2327.	5	P14/8-3H1-A315/N
4322 022 1331.	2	P36/22-3H1-A1000	4322 022 2328.	5	P14/8-3H1-A400/N
4322 022 1332.	2	P36/22-3H1-A1600	4322 022 2343.	4	P14/8-3D3-A63/N
4322 022 1350.	1	P36/22-3F3-A7350	4322 022 2344.	4	P14/8-3D3-A100/N
4322 022 1351.	1	P36/22-3F3-A250	4322 022 2355.	4	P14/8-3H3-A160/N
4322 022 1352.	1	P36/22-3F3-A315	4322 022 2356.	4	P14/8-3H3-A250/N
4322 022 1353.	1	P36/22-3F3-A400	4322 022 2357.	4	P14/8-3H3-A315/N
4322 022 1354.	1	P36/22-3F3-A630	4322 022 2358.	4	P14/8-3H3-A400/N

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PHILIPS 12NC	digit 12	TYPE	PHILIPS 12NC	digit 12	TYPE
4322 022 2381.	4	P14/8-4C6-A25/N	4322 022 2984.	3	P26/16-4C6-A100/N
4322 022 2382.	4	P14/8-4C6-A40/N	4322 022 3126.	3	P30/19-3H1-A250/N
4322 022 2383.	4	P14/8-4C6-A63/N	4322 022 3127.	3	P30/19-3H1-A315/N
4322 022 2525.	5	P18/11-3H1-A160/N	4322 022 3128.	3	P30/19-3H1-A400/N
4322 022 2526.	5	P18/11-3H1-A250/N	4322 022 3130.	3	P30/19-3H1-A630/N
4322 022 2527.	5	P18/11-3H1-A315/N	4322 022 3131.	3	P30/19-3H1-A1000/N
4322 022 2528.	5	P18/11-3H1-A400/N	4322 022 3328.	3	P36/22-3H1-A400/N
4322 022 2543.	4	P18/11-3D3-A63/N	4322 022 3330.	3	P36/22-3H1-A630/N
4322 022 2544.	4	P18/11-3D3-A100/N	4322 022 3331.	3	P36/22-3H1-A1000/N
4322 022 2545.	4	P18/11-3D3-A160/N	4322 022 3332.	3	P36/22-3H1-A1600/N
4322 022 2555.	1	P18/11-3H3-A160/N	4322 022 3527.	1	P42/29-3H1-A315/N
4322 022 2556.	4	P18/11-3H3-A250/N	4322 022 3528.	3	P42/29-3H1-A400/N
4322 022 2557.	4	P18/11-3H3-A315/N	4322 022 3530.	3	P42/29-3H1-A630/N
4322 022 2558.	4	P18/11-3H3-A400/N	4322 022 3531.	3	P42/29-3H1-A1000/N
4322 022 2581.	4	P18/11-4C6-A25/N	4322 022 3532.	3	P42/29-3H1-A1600/N
4322 022 2582.	4	P18/11-4C6-A40/N			
4322 022 2583.	4	P18/11-4C6-A63/N			
4322 022 2725.	5	P22/13-3H1-A160/N			
4322 022 2726.	5	P22/13-3H1-A250/N			
4322 022 2727.	5	P22/13-3H1-A315/N			
4322 022 2728.	5	P22/13-3H1-A400/N			
4322 022 2730.	5	P22/13-3H1-A630/N			
4322 022 2744.	4	P22/13-3D3-A100/N			
4322 022 2745.	4	P22/13-3D3-A160/N			
4322 022 2755.	1	P22/13-3H3-A160/N			
4322 022 2756.	1	P22/13-3H3-A250/N			
4322 022 2757.	1	P22/13-3H3-A315/N			
4322 022 2758.	1	P22/13-3H3-A400/N			
4322 022 2760.	1	P22/13-3H3-A630/N			
4322 022 2781.	3	P22/13-4C6-A25/N			
4322 022 2782.	3	P22/13-4C6-A40/N			
4322 022 2783.	3	P22/13-4C6-A63/N			
4322 022 2925.	4	P26/16-3H1-A160/N			
4322 022 2926.	4	P26/16-3H1-A250/N			
4322 022 2927.	4	P26/16-3H1-A315/N			
4322 022 2928.	4	P26/16-3H1-A400/N			
4322 022 2930.	4	P26/16-3H1-A630/N			
4322 022 2944.	3	P26/16-3D3-A100/N			
4322 022 2945.	3	P26/16-3D3-A160/N			
4322 022 2946.	3	P26/16-3D3-A250/N			
4322 022 2955.	1	P26/16-3H3-A160/N			
4322 022 2956.	1	P26/16-3H3-A250/N			
4322 022 2957.	1	P26/16-3H3-A315/N			
4322 022 2958.	1	P26/16-3H3-A400/N			
4322 022 2960.	1	P26/16-3H3-A630/N			
4322 022 2983.	3	P26/16-4C6-A63/N			

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PHILIPS 12NC	digit 12	TYPE	PHILIPS 12NC	digit 12	TYPE
4322 022 3928.	2	X30-3H1-A400/N	4322 022 5020.	1	RM10-3H1-A4250
4322 022 3930.	3	X30-3H1-A630/N	4322 022 5026.	1	RM10-3H1-A250
4322 022 3931.	3	X30-3H1-A1000/N	4322 022 5027.	1	RM10-3H1-A315
4322 022 3932.	3	X30-3H1-A1600/N	4322 022 5028.	1	RM10-3H1-A400
4322 022 4120.	2	P9/5-3H1-A1260	4322 022 5030.	1	RM10-3H1-A630
4322 022 4123.	2	P9/5-3H1-A63	4322 022 5040.	1	RM10/i-3B8-A4950
4322 022 4124.	2	P9/5-3H1-A100	4322 022 5046.	1	RM10/i-3B8-A160
4322 022 4125.	2	P9/5-3H1-A160	4322 022 5048.	2	RM10/i-3B8-A250
4322 022 4140.	1	P9/5-3D3-A630	4322 022 5049.	2	RM10/i-3B8-A315
4322 022 4142.	1	P9/5-3D3-A40	4322 022 5050.	2	RM10/i-3B8-A400
4322 022 4143.	1	P9/5-3D3-A63	4322 022 5052.	1	RM10/i-3B8-A630
4322 022 4179.	1	P9/5-4C6-A100	4322 022 5060.	1	RM10/i-3C85-A4400
4322 022 4180.	1	P9/5-4C6-A16	4322 022 5086.	1	RM10/i-3C85-A250
4322 022 4181.	1	P9/5-4C6-A25	4322 022 5087.	1	RM10/i-3C85-A315
4322 022 4182.	1	P9/5-4C6-A40	4322 022 5088.	1	RM10/i-3C85-A400
4322 022 4520.	1	X22-3H1-A4200	4322 022 5089.	1	RM10/i-3C85-A630
4322 022 4528.	2	X22-3H1-A400	4322 022 5090.	1	RM10/i-3E1-A8000
4322 022 4530.	2	X22-3H1-A630	4322 022 5093.	1	RM10/i-3E4-A11000
4322 022 4531.	2	X22-3H1-A1000	4322 022 5094.	1	RM10/i-3E5-A16000
4322 022 4540.	1	X22-3D3-A1600	4322 022 5099.	1	RM10/i-3C85-A160
4322 022 4560.	1	X22-3B8-A4200	4322 022 5120.	1	RM8-3H1-A3150
4322 022 4580.	1	X22-4C6-A220	4322 022 5126.	1	RM8-3H1-A250
4322 022 4721.	1	RM6/S-3H1-A2300	4322 022 5127.	1	RM8-3H1-A315
4322 022 4725.	6	RM6/S-3H1-A160	4322 022 5128.	1	RM8-3H1-A400
4322 022 4726.	6	RM6/S-3H1-A250	4322 022 5130.	1	RM8-3H1-A630
4322 022 4727.	6	RM6/S-3H1-A315	4322 022 5140.	1	RM8-3D3-A1240
4322 022 4728.	6	RM6/S-3H1-A400	4322 022 5144.	1	RM8-3D3-A100
4322 022 4740.	1	RM6/S-3D3-A950	4322 022 5145.	1	RM8-3D3-A160
4322 022 4743.	3	RM6/S-3D3-A63	4322 022 5146.	1	RM8/i-3B8-A3600
4322 022 4744.	3	RM6/S-3D3-A100	4322 022 5147.	4	RM8/i-3B8-A160
4322 022 4745.	3	RM6/S-3D3-A160	4322 022 5148.	4	RM8/i-3B8-A250
4322 022 4750.	1	RM6/S-3H3-A2100	4322 022 5149.	4	RM8/i-3B8-A315
4322 022 4755.	4	RM6/S-3H3-A160	4322 022 5150.	2	RM8/i-3B8-A400
4322 022 4756.	4	RM6/S-3H3-A250	4322 022 5156.	1	RM8-3H3-A250
4322 022 4757.	4	RM6/S-3H3-A315	4322 022 5157.	1	RM8-3H3-A315
4322 022 4758.	4	RM6/S-3H3-A400	4322 022 5158.	1	RM8-3H3-A400
4322 022 4768.	4	RM6/S-3H3-A200	4322 022 5160.	1	RM8-3H3-A630
4322 022 4772.	1	RM6/S/i-3B8-A63	4322 022 5170.	2	RM8-3H3-A2850
4322 022 4773.	1	RM6/S/i-3B8-A160	4322 022 5181.	1	RM8-4C6-A180
4322 022 4774.	2	RM6/S/i-3B8-A100	4322 022 5182.	1	RM8-4C6-A40
4322 022 4778.	1	RM6/S-4C6-A140	4322 022 5183.	1	RM8-4C6-A63
4322 022 4781.	3	RM6/S-4C6-A25	4322 022 5186.	1	RM8/i-3E1-A5800
4322 022 4782.	3	RM6/S-4C6-A40	4322 022 5187.	1	RM8/i-3E4-A8000
4322 022 4783.	3	RM6/S-4C6-A63	4322 022 5198.	1	RM8/i-3E5-A12500
4322 022 4785.	1	RM6/S/i-3B8-A2600	4322 022 5300.	1	X35-3B8-A6000
4322 022 4786.	1	RM6/S/i-3E1-A4100	4322 022 5320.	1	X35-3H1-A6000
4322 022 4787.	1	RM6/S/i-3E5-A8600	4322 022 5328.	2	X35-3H1-A400
4322 022 4788.	1	RM6/S/i-3B8-A250	4322 022 5330.	2	X35-3H1-A630
4322 022 4793.	1	RM6/S/i-3E4-A5750	4322 022 5331.	2	X35-3H1-A1000

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PHILIPS 12NC	digit 12	TYPE	PHILIPS 12NC	digit 12	TYPE
4322 022 5332.	2	X35-3H1-A1600	4322 022 5948.	1	RM5/i-3B8-A160
4322 022 5520.	1	RM6/R-3H1-A2450	4322 022 5949.	1	RM5/i-3B8-A250
4322 022 5525.	5	RM6/R-3H1-A160	4322 022 5950.	1	RM5/i-3B8-A315
4322 022 5526.	5	RM6/R-3H1-A250	4322 022 5955.	2	RM5-3H3-A160
4322 022 5527.	5	RM6/R-3H1-A315	4322 022 5956.	2	RM5-3H3-A250
4322 022 5528.	5	RM6/R-3H1-A400	4322 022 5957.	2	RM5-3H3-A315
4322 022 5540.	1	RM6/R-3D3-A1000	4322 022 5981.	1	RM5-4C6-A25
4322 022 5543.	4	RM6/R-3D3-A63	4322 022 5982.	1	RM5-4C6-A40
4322 022 5544.	4	RM6/R-3D3-A100	4322 022 5984.	1	RM5-4C6-A120
4322 022 5545.	4	RM6/R-3D3-A160	4322 022 5990.	1	RM5/i-3E1-A3150
4322 022 5555.	2	RM6/R-3H3-A160	4322 022 5991.	1	RM5/i-3E4-A4500
4322 022 5556.	2	RM6/R-3H3-A250	4322 022 5992.	1	RM5/i-3E5-A6700
4322 022 5557.	2	RM6/R-3H3-A315	4322 022 6123.	2	P9/5-3H1-A63/N
4322 022 5558.	2	RM6/R-3H3-A400	4322 022 6124.	2	P9/5-3H1-A100/N
4322 022 5562.	1	RM6/R-3H3-A2200	4322 022 6125.	2	P9/5-3H1-A160/N
4322 022 5566.	1	RM6/R-4C6-A150	4322 022 6142.	1	P9/5-3D3-A40/N
4322 022 5568.	2	RM6/R-3H3-A200	4322 022 6143.	1	P9/5-3D3-A63/N
4322 022 5581.	4	RM6/R-4C6-A25	4322 022 6180.	1	P9/5-4C6-A16/N
4322 022 5582.	4	RM6/R-4C6-A40	4322 022 6181.	1	P9/5-4C6-A25/N
4322 022 5583.	4	RM6/R-4C6-A63	4322 022 6182.	1	P9/5-4C6-A40/N
4322 022 5710.	1	RM4/i-3F3-A950	4322 022 6528.	2	X22-3H1-A400/N
4322 022 5714.	1	RM4/i-3F3-A100	4322 022 6530.	2	X22-3H1-A630/N
4322 022 5715.	1	RM4/i-3F3-A160	4322 022 6531.	2	X22-3H1-A1000/N
4322 022 5716.	1	RM4/i-3F3-A250	4322 022 6725.	7	RM6/S-3H1-A160/N
4322 022 5720.	1	RM4-3H1-A950	4322 022 6726.	7	RM6/S-3H1-A250/N
4322 022 5723.	2	RM4-3H1-A63	4322 022 6727.	7	RM6/S-3H1-A315/N
4322 022 5724.	2	RM4-3H1-A100	4322 022 6728.	7	RM6/S-3H1-A400/N
4322 022 5725.	2	RM4-3H1-A160	4322 022 6743.	4	RM6/S-3D3-A63/N
4322 022 5739.	1	RM4-3D3-A400	4322 022 6744.	4	RM6/S-3D3-A100/N
4322 022 5742.	1	RM4-3D3-A40	4322 022 6745.	4	RM6/S-3D3-A160/N
4322 022 5743.	1	RM4-3D3-A63	4322 022 6755.	4	RM6/S-3H3-A160/N
4322 022 5750.	1	RM4-3H3-A900	4322 022 6756.	4	RM6/S-3H3-A250/N
4322 022 5753.	1	RM4-3H3-A63	4322 022 6757.	4	RM6/S-3H3-A315/N
4322 022 5754.	1	RM4-3H3-A100	4322 022 6758.	4	RM6/S-3H3-A400/N
4322 022 5755.	1	RM4-3H3-A160	4322 022 6768.	4	RM6/S-3H3-A200/N
4322 022 5770.	1	RM4/i-3E1-A1800	4322 022 6781.	3	RM6/S-4C6-A25/N
4322 022 5775.	1	RM4/i-3E5-A3500	4322 022 6782.	3	RM6/S-4C6-A40/N
4322 022 5779.	1	RM4-4C6-A65	4322 022 6783.	3	RM6/S-4C6-A63/N
4322 022 5780.	2	RM4-4C6-A16	4322 022 7026.	2	RM10-3H1-A250/N
4322 022 5781.	2	RM4-4C6-A25	4322 022 7027.	2	RM10-3H1-A315/N
4322 022 5791.	1	RM4/i-3E4-A2500	4322 022 7028.	2	RM10-3H1-A400/N
4322 022 5920.	1	RM5-3H1-A1800	4322 022 7030.	2	RM10-3H1-A630/N
4322 022 5925.	1	RM5-3H1-A160	4322 022 7126.	3	RM8-3H1-A250/N
4322 022 5926.	1	RM5-3H1-A250	4322 022 7127.	3	RM8-3H1-A315/N
4322 022 5927.	1	RM5-3H1-A315	4322 022 7128.	3	RM8-3H1-A400/N
4322 022 5940.	1	RM5-3D3-A800	4322 022 7130.	3	RM8-3H1-A630/N
4322 022 5943.	1	RM5-3D3-A63	4322 022 7144.	3	RM8-3D3-A100/N
4322 022 5944.	1	RM5-3D3-A100	4322 022 7145.	3	RM8-3D3-A160/N
4322 022 5946.	1	RM5/i-3B8-A2000	4322 022 7156.	1	RM8-3H3-A250/N

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4322 022 7157.	1	RM8-3H3-A315/N	4322 025 0046.	1	RM7/i-3C85-A250
4322 022 7158.	1	RM8-3H3-A400/N	4322 025 0060.	1	RM7/i-3B8-A3000
4322 022 7160.	1	RM8-3H3-A630/N	4322 025 0065.	1	RM7/i-3B8-A160
4322 022 7182.	2	RM8-4C6-A40/N	4322 025 0066.	1	RM7/i-3B8-A250
4322 022 7183.	2	RM8-4C6-A63/N	4322 025 0080.	1	RM7/i-3F3-A2500
4322 022 7328.	2	X35-3H1-A400/N	4322 025 0085.	1	RM7/i-3F3-A160
4322 022 7330.	2	X35-3H1-A630/N	4322 025 0086.	1	RM7/i-3F3-A250
4322 022 7331.	2	X35-3H1-A1000/N	4322 025 0090.	1	RM7/i-3E4-A6600
4322 022 7332.	2	X35-3H1-A1600/N	4322 025 0095.	1	RM7/i-3E5-A10000
4322 022 7525.	7	RM6/R-3H1-A160/N	4322 025 0099.	1	RM7/i-3E1-A4750
4322 022 7526.	7	RM6/R-3H1-A250/N	4322 025 0120.	1	RM8/i-3C85-A3250
4322 022 7527.	6	RM6/R-3H1-A315/N	4322 025 0145	1	RM8/i-3C85-A160
4322 022 7528.	7	RM6/R-3H1-A400/N	4322 025 0146.	1	RM8/i-3C85-A250
4322 022 7543.	5	RM6/R-3D3-A63/N	4322 025 0147.	1	RM8/i-3C85-A315
4322 022 7544.	5	RM6/R-3D3-A100/N	4322 025 0148.	1	RM8/i-3C85-A400
4322 022 7545.	5	RM6/R-3D3-A160/N	4322 025 0160.	1	RM8/i-3F3-A3000
4322 022 7555.	3	RM6/R-3H3-A160/N	4322 025 0165.	1	RM8/i-3F3-A160
4322 022 7556.	3	RM6/R-3H3-A250/N	4322 025 0166.	1	RM8/i-3F3-A250
4322 022 7557.	3	RM6/R-3H3-A315/N	4322 025 0167.	1	RM8/i-3F3-A315
4322 022 7558.	3	RM6/R-3H3-A400/N	4322 025 0168.	1	RM8/i-3F3-A400
4322 022 7568.	3	RM6/R-3H3-A200/N	4322 025 0260.	1	RM10/i-3F3-A4050
4322 022 7581.	4	RM6/R-4C6-A25/N	4322 025 0265.	1	RM10/i-3F3-A160
4322 022 7582.	4	RM6/R-4C6-A40/N	4322 025 0266.	1	RM10/i-3F3-A250
4322 022 7583.	4	RM6/R-4C6-A63/N	4322 025 0267.	1	RM10/i-3F3-A315
4322 022 7723.	2	RM4-3H1-A63/N	4322 025 0268.	1	RM10/i-3F3-A400
4322 022 7724.	2	RM4-3H1-A100/N	4322 025 0269.	1	RM10/i-3F3-A630
4322 022 7725.	2	RM4-3H1-A160/N	4322 025 0300.	1	RM14/i-3C85-A6250
4322 022 7742.	1	RM4-3D3-A40/N	4322 025 0316.	1	RM14/i-3C85-A250
4322 022 7743.	1	RM4-3D3-A63/N	4322 025 0317.	1	RM14/i-3C85-A315
4322 022 7753.	1	RM4-3H3-A63/N	4322 025 0318.	1	RM14/i-3C85-A400
4322 022 7754.	1	RM4-3H3-A100/N	4322 025 0320.	1	RM14/i-3C85-A630
4322 022 7755.	1	RM4-3H3-A160/N	4322 025 0321.	1	RM14/i-3C85-A1000
4322 022 7780.	2	RM4-4C6-A16/N	4322 025 0360.	1	RM14/i-3F3-A5700
4322 022 7781.	2	RM4-4C6-A25/N	4322 025 0366.	1	RM14/i-3F3-A250
4322 022 7925.	2	RM5-3H1-A160/N	4322 025 0367.	1	RM14/i-3F3-A315
4322 022 7926.	2	RM5-3H1-A250/N	4322 025 0368.	1	RM14/i-3F3-A400
4322 022 7927.	2	RM5-3H1-A315/N	4322 025 0370.	1	RM14/i-3F3-A630
4322 022 7943.	2	RM5-3D3-A63/N	4322 025 0371.	1	RM14/i-3F3-A1000
4322 022 7944.	2	RM5-3D3-A100/N	4322 025 0380.	1	RM14/i-3B8-A7100
4322 022 7955.	3	RM5-3H3-A160/N	4322 025 0386.	1	RM14/i-3B8-A250
4322 022 7956.	3	RM5-3H3-A250/N	4322 025 0387.	1	RM14/i-3B8-A315
4322 022 7957.	3	RM5-3H3-A315/N	4322 025 0388.	1	RM14/i-3B8-A400
4322 022 7970.	1	RM5-3H3-A1650	4322 025 0390.	1	RM14/i-3B8-A630
4322 022 7981.	2	RM5-4C6-A25/N	4322 025 0391.	1	RM14/i-3B8-A1000
4322 022 7982.	2	RM5-4C6-A40/N	4322 025 0400.	1	RM5/i-3C85-A1800
4322 022 9718.	3	RCC14/5-4C65	4322 025 0404.	1	RM5/i-3C85-A160
4322 022 9719.	3	RCC23/7-4C65	4322 025 0405.	1	RM5/i-3C85-A250
4322 025 0040.	1	RM7/i-3C85-A2700	4322 025 0406.	1	RM5/i-3C85-A315
4322 025 0045.	1	RM7/i-3C85-A160	4322 025 0410.	1	RM5/i-3F3-A1700

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4322 025 0414.	1	RM5/i-3F3-A160	4322 025 3050.	1	P26/16-3F3-A630
4322 025 0415.	1	RM5/i-3F3-A250	4322 025 3100.	1	P5.8/2.5-3H1-A800
4322 025 0416.	1	RM5/i-3F3-A315	4322 025 3200.	1	P5.8/3.3-3H1-A750
4322 025 0500.	1	RM6/S/i-3C85-A2350	4330 030 3008.	1	ROD5/25-4B1
4322 025 0503.	1	RM6/S/i-3C85-A63	4330 030 3025.	2	ROD3.95/25-4B1
4322 025 0504.	1	RM6/S/i-3C85-A100	4330 030 3097.	1	IMP8/3/125-3D3
4322 025 0505.	1	RM6/S/i-3C85-A160	4330 030 3099.	1	IMP10/4.5/170-3D3
4322 025 0506.	1	RM6/S/i-3C85-A250	4330 030 3107.	1	ROD4/45-3C80
4322 025 0511.	1	RM6/S/i-3F3-A1950	4330 030 3108.	1	ROD2.2/16-4B1
4322 025 0513.	1	RM6/S/i-3F3-A63	4330 030 3110.	1	ROD3/20-4B1
4322 025 0514.	1	RM6/S/i-3F3-A100	4330 030 3111.	1	ROD4/21-4B1
4322 025 0515.	1	RM6/S/i-3F3-A160	4330 030 3112.	1	ROD4/25-4B1
4322 025 0516.	1	RM6/S/i-3F3-A250	4330 030 3113.	1	ROD6.5/25-4B1
4322 025 0600.	1	RM12/i-3C85-A5500	4330 030 3118.	1	ROD4/15-3C80
4322 025 0605.	1	RM12/i-3C85-A160	4330 030 3119.	1	IMP6/3/200-3D3
4322 025 0606.	1	RM12/i-3C85-A250	4330 030 3120.	1	IMP14.3/6.5/170-3D3
4322 025 0607.	1	RM12/i-3C85-A315	4330 030 3121.	1	IMP6/3/200-3C85
4322 025 0608.	1	RM12/i-3C85-A400	4330 030 3122.		IMP8/3/200-3C85
4322 025 0620.	1	RM12/i-3F3-A5050	4330 030 3123.	1	IMP10/4.5/200-3C85
4322 025 0625.	1	RM12/i-3F3-A160	4330 030 3124.	1	IMP12/5.5/200-3C85
4322 025 0626.	1	RM12/i-3F3-A250	4330 030 3125.	1	IMP12/5.5/170-3D3
4322 025 0627	1	RM12/i-3F3-A315	4330 030 3126.	1	IMP14.3/6.5/200-3C85
4322 025 0628.	1	RM12/i-3F3-A400	4330 030 3133.	1	ROD2/10-3B1
4322 025 0640.	1	RM12/i-3B8-A6200	4330 030 3134.	1	ROD2/15-3B1
4322 025 0645.	1	RM12/i-3B8-A160	4330 030 3135.	1	ROD3/15-3B1
4322 025 0646.	1	RM12/i-3B8-A250	4330 030 3136.	1	ROD3/20-3B1
4322 025 0647.	1	RM12/i-3B8-A315	4330 030 3137.	1	ROD4/15-3B1
4322 025 0648.	1	RM12/i-3B8-A400	4330 030 3138.	1	ROD4/20-3B1
4322 025 0660.	1	RM12/i-3E4-A13300	4330 030 3139.	1	ROD5/20-3B1
4322 025 0670.	1	RM12/i-3E1-A9200	4330 030 3140.	1	ROD5/25-3B1
4322 025 0700	1	P7.4/4.2-3H1-A970	4330 030 3141.	1	ROD6/30-3B1
4322 025 0703.	1	P7.4/4.2-3H1-A63	4330 030 3142.	1	ROD6/40-3B1
4322 025 0704.	1	P7.4/4.2-3H1-A100	4330 030 3143.	1	ROD8/50-3B1
4322 025 1006.	1	EP13-3C85-A250	4330 030 3144.	1	ROD8/150-3B1
4322 025 1007.	1	EP13-3C85-A315	4330 030 3145.	1	ROD2/20-3B1
4322 025 1014.	1	EP13-3C85-A1800	4330 030 3146.	1	ROD10/200-3B1
4322 025 1033.	1	EP13-3E1-A3150	4330 030 3147.	1	ROD3/25-3B1
4322 025 1077.	1	EP13-3E5-A7200	4330 030 3149.	1	ROD4/25-3B1
4322 025 1080.	1	EP13-3E25-A4500	4330 030 3151.	1	ROD5/30-3B1
4322 025 1090.	1	EP13-3F3-A1700	4330 030 3153.	1	ROD6/50-3B1
4322 025 1300.	1	X30-3H1-A5000	4330 030 3155.	1	ROD8/200-3B1
4322 025 1320.	1	X30-3B8-A5000	4330 030 3210.	1	BD3/0.7/4-3S1
4322 025 3026.	1	P26/16-3C85-A250	4330 030 3211.	2	BD3/0.7/10-3S1
4322 025 3027.	1	P26/16-3C85-A315	4330 030 3212.	2	BD3/1/4-3S1
4322 025 3028.	1	P26/16-3C85-A400	4330 030 3213.	2	BD3/1/10-3S1
4322 025 3030.	1	P26/16-3C85-A630	4330 030 3214.	3	BD5/0.7/4-3S1
4322 025 3046.	1	P26/16-3F3-A250	4330 030 3215.	2	BD5/0.7/10-3S1
4322 025 3047.	1	P26/16-3F3-A315	4330 030 3216.	1	BD5/1.5/4-3S1
4322 025 3048.	1	P26/16-3F3-A400	4330 030 3217.	1	BD5/1.5/10-3S1

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4330 030 3218.	2	BD5/2/4-3S1	4330 030 3376.	1	TUB8/4/40-3C85
4330 030 3219.	2	BD5/2/10-3S1	4330 030 3377.	1	TUB10/4.2/20-3C85
4330 030 3252.		TUB3.7/1.3/5-4B1	4330 030 3378.	1	TUB10/4.2/45-3C85
4330 030 3263.		TUB3.5/1.3/5-4D1	4330 030 3379.	1	TUB10/6.5/20-3C85
4330 030 3265.	1	TUB3.7/1.5/7.5-3B1	4330 030 3405.	1	RC2.5/1-4A11
4330 030 3266.		TUB3.5/1.3/5-4E1	4330 030 3407.	1	RCC4/1.6-3E25
4330 030 3274.	1	MHC3-4B1	4330 030 3422.	1	RCC36/15-3E25
4330 030 3285.	1	TUB2.6/1.2/1.6-4E1	4330 030 3431.	1	RCC36/15-3R1
4330 030 3311.	1	BD3/0.7/4-4S2	4330 030 3436.	1	RCC4/1.1-4A11
4330 030 3312.	1	BD3/1/4-4S2	4330 030 3437.	1	RCC4/1.6-4A11
4330 030 3313.	1	BD5/0.7/4-4S2	4330 030 3438.	1	RCC6/2-4A11
4330 030 3314.	1	BD5/1.5/4-4S2	4330 030 3439.	1	RCC9/3-4A11
4330 030 3315.	1	BD5/2/4-4S2	4330 030 3440.	1	RCC12.5/5-4A11
4330 030 3316.	1	BD8/1.5/4-4S2	4330 030 3441.	1	RCC14/5-4A11
4330 030 3317.	1	BD8/2/4-4S2	4330 030 3442.	1	RCC14/9-4A11
4330 030 3318.	1	BD8/3/4-4S2	4330 030 3443.	1	RCC16/6.3-4A11
4330 030 3319.	1	BD5/2/10-4S2	4330 030 3444.	1	RCC23/7-4A11
4330 030 3320.	1	BD8/3/10-4S2	4330 030 3445.	1	RCC36/15-4A11
4330 030 3321.	1	BD3/1/10-4S2	4330 030 3447.	1	RCC20/7-3C85
4330 030 3322.	1	BD5/1.5/10-4S2	4330 030 3448.	1	RCC25/10-3C85
4330 030 3323.	1	BD8/2/10-4S2	4330 030 3449.	1	RCC31.5/12.5-3C85
4330 030 3324.	1	BD3/0.7/10-4S2	4330 030 3450.	1	RCC10/4-3C11
4330 030 3325.	1	BD8/1.5/10-4S2	4330 030 3451.	1	RCC20/7-3C11
4330 030 3326.	1	BD5/0.7/10-4S2	4330 030 3452.	1	RCC25/10-3C11
4330 030 3333.	1	BDW4.9/10-3S1	4330 030 3453.	1	RCC31.5/12.5-3C11
4330 030 3345.	1	TUB8/4/200-3C85	4330 030 3458.	1	RCC10/4-3E25
4330 030 3346.	1	TUB10/5/200-3C85	4330 030 3459.	1	RCC20/7-3E25
4330 030 3354.	1	TUB3.5/1.2/5-3B1	4330 030 3460.	1	RCC25/10-3E25
4330 030 3355.	1	TUB3.5/1.2/15-3B1	4330 030 3461.	1	RCC31.5/12.5-3E25
4330 030 3356.	1	TUB4/1.6/15-3B1	4330 030 3466.		RCC10/4-3E5
4330 030 3357.	1	TUB4/1.6/40-3B1	4330 030 3469.	1	RCC4/1.1-4C65
4330 030 3358.	1	TUB5/2/15-3B1	4330 030 3470.	1	RCC4/1.6-4C65
4330 030 3359.	1	TUB5/2/50-3B1	4330 030 3471.	1	RCC36/10-4C65
4330 030 3360.	1	TUB6/3/20-3B1	4330 030 3472.	1	RC2.5/1-4C65
4330 030 3361.	1	TUB6/3/30-3B1	4330 030 3478.	1	RCC4/1.6-3F3
4330 030 3362.	1	TUB8/4/20-3B1	4330 030 3479.	1	RCC6.3/2.5-4C65
4330 030 3363.	1	TUB8/4/40-3B1	4330 030 3480.	1	RCC10/4-4C65
4330 030 3364.	1	TUB10/4.2/20-3B1	4330 030 3481.	1	RCC12.5/5-4C65
4330 030 3365.	1	TUB10/4.2/45-3B1	4330 030 3482.	1	RCC20/7-4C65
4330 030 3366.	1	TUB10/6.5/20-3B1	4330 030 3487.	1	RCC6.3/2.5-4A11
4330 030 3367.	1	TUB3.5/1.2/5-3C85	4330 030 3488.	1	RCC10/4-4A11
4330 030 3368.	1	TUB3.5/1.2/15-3C85	4330 030 3491.	1	RCC19/10-3C85
4330 030 3369.	1	TUB4/1.6/15-3C85	4330 030 3492.	1	RCC12.5/5-3C11
4330 030 3370.	1	TUB4/1.6/40-3C85	4330 030 3494.	1	RCC6.3/2.5-3E25
4330 030 3371.	1	TUB5/2/15-3C85	4330 030 3496.		RCC6.3/2.5-3E5
4330 030 3372.	1	TUB5/2/50-3C85	4330 030 3497.	1	RCC6.3/2.5-3F3
4330 030 3373.	1	TUB6/3/20-3C85	4330 030 3498.	1	RCC10/4-3F3
4330 030 3374.	1	TUB6/3/30-3C85	4330 030 3499.	1	RCC23/7-3F3
4330 030 3375.	1	TUB8/4/20-3C85	4330 030 3500.	1	RCC25/10-3F3

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4330 030 3501.	1	RCC31.5/12.5-3F3	4330 030 3789.	1	RCC4/1.1-3F3
4330 030 3502.	1	RCC36/15-3F3	4330 030 3790.	1	RCC6/2-3F3
4330 030 3513.		RC2.5/1-3F3	4330 030 3791.	1	RCC9/3-3F3
4330 030 3514.		RC2.5/1-3E5	4330 030 3792.	1	RCC12.5/5-3F3
4330 030 3708.	1	RCC6/2-3E25	4330 030 3793.	1	RCC14/5-3F3
4330 030 3709.	1	RCC9/3-3E25	4330 030 3794.	1	RCC14/9-3F3
4330 030 3710.	1	RCC12.5/5-3E25	4330 030 3795.	1	RCC16/6.3-3F3
4330 030 3711.	1	RCC14/5-3E25	4330 030 3810.	2	BDW3.5/6-3S2
4330 030 3712.	1	RCC14/9-3E25	4330 030 3811.	1	BDW4/11-3D3
4330 030 3713.	1	RCC16/6.3-3E25	4330 030 3873.	1	BDW3.5/4.5-4S2
4330 030 3714.	1	RCC19/15-3E25	4330 030 3874.	1	BDW3.5/6-4S2
4330 030 3716.	1	RCC23/7-3E25	4330 030 3875.	1	BDW3.5/6.7-4S2
4330 030 3717.	1	RCC26/10-3E25	4330 030 3876.	1	BDW3.5/7.6-4S2
4330 030 3718.	1	RCC16/6.3-3C11	4330 030 3877.	1	BDW3.5/8.9-4S2
4330 030 3719.	1	RC2.5/1-3E25	4330 030 3881.	1	BDW3.5/3.2-4S2
4330 030 3734.	1	RCC19/10-3E25	4330 030 4021.	1	ROD2/10-4B1
4330 030 3735.	1	RCC4/1.1-3E25	4330 030 4022.	1	ROD2/15-4B1
4330 030 3745.	1	RCC14/5-3C85	4330 030 4023.	1	ROD3/15-4B1
4330 030 3746.	1	RCC14/5-3C11	4330 030 4024.	1	ROD3/20-4B1
4330 030 3747.	1	RCC19/10-3C11	4330 030 4025.	1	ROD4/15-4B1
4330 030 3748.	1	RCC19/15-3C85	4330 030 4026.	1	ROD4/20-4B1
4330 030 3749.	1	RCC19/15-3C11	4330 030 4027.	1	ROD5/20-4B1
4330 030 3750.	1	RCC23/7-3C85	4330 030 4028.	1	ROD5/25-4B1
4330 030 3751.	1	RCC23/7-3C11	4330 030 4029.	1	ROD6/30-4B1
4330 030 3752.	1	RCC26/10-3C11	4330 030 4030.	1	ROD6/40-4B1
4330 030 3753.	1	RCC26/20-3C11	4330 030 4031.	1	ROD8/50-4B1
4330 030 3754.	1	RCC26/20-3E25	4330 030 4032.	1	ROD8/150-4B1
4330 030 3755.	1	RCC36/10-3C11	4330 030 4033.	1	TUB3.5/1.2/5-4B1
4330 030 3756.	1	RCC36/15-3C11	4330 030 4034.	1	TUB3.5/1.2/15-4B1
4330 030 3758.	1	RCC29/7.5-3C11	4330 030 4035.	1	TUB4/1.6/15-4B1
4330 030 3760.	1	RCC4/1.6-3E5	4330 030 4036.	1	TUB4/1.6/40-4B1
4330 030 3761.	1	RCC4/1.1-3E5	4330 030 4037.	1	TUB5/2/15-4B1
4330 030 3762.		RCC6/2-3E5	4330 030 4038.	1	TUB5/2/50-4B1
4330 030 3763.		RCC9/3-3E5	4330 030 4039.	1	TUB6/3/20-4B1
4330 030 3764.		RCC12.5/5-3E5	4330 030 4040.	1	TUB6/3/30-4B1
4330 030 3765.		RCC14/5-3E5	4330 030 4041.	1	TUB8/4/20-4B1
4330 030 3766.		RCC14/9-3E5	4330 030 4042.	1	TUB8/4/40-4B1
4330 030 3767.		RCC16/6.3-3E5	4330 030 4043.	1	TUB10/4.2/20-4B1
4330 030 3768.	1	RCC9/3-3R1	4330 030 4044.	1	TUB10/4.2/45-4B1
4330 030 3769.	1	RCC14/5-3R1	4330 030 4045.	1	TUB10/6.5/20-4B1
4330 030 3770.	1	RCC23/7-3R1	4330 030 4054.	1	ROD2/20-4B1
4330 030 3779.	1	RCC12.5/5-3C85	4330 030 4055.	1	ROD3/25-4B1
4330 030 3780.	1	RCC14/9-3C85	4330 030 4056.	1	ROD4/25-4B1
4330 030 3781.	1	RCC16/6.3-3C85	4330 030 4057.	1	ROD5/30-4B1
4330 030 3783.	1	RCC26/10-3C85	4330 030 4058.	1	ROD6/50-4B1
4330 030 3784.	1	RCC26/20-3C85	4330 030 4059.	1	ROD8/200-4B1
4330 030 3785.	1	RCC29/7.5-3C85	4330 030 4060.		ROD10/200-4B1
4330 030 3786.	1	RCC36/10-3C85	4330 030 6001.	1	RCC7.5/3-2P40
4330 030 3787.	1	RCC36/15-3C85	4330 030 6002.	1	RCC12.3/4.4-2P40

Soft ferrites

Code number overview

PHILIPS 12NC	digit 12	TYPE	PHILIPS 12NC	digit 12	TYPE
4330 030 6003.	1	RCC17.1/4.4-2P40			
4330 030 6004.	1	RCC19.9/6-2P40			
4330 030 6005.	1	RCC23.5/7.5-2P40			
4330 030 6006.	1	RCC26.5/10.7-2P40			
4330 030 6007.	1	RCC32.3/10.7-2P40			
4330 030 6008.	1	RCC7.5/3-2P50			
4330 030 6009.	1	RCC12.3/4.4-2P50			
4330 030 6010.	1	RCC17.1/4.4-2P50			
4330 030 6011.	1	RCC19.9/6-2P50			
4330 030 6012.	1	RCC23.5/7.5-2P50			
4330 030 6013.	1	RCC26.5/10.7-2P50			
4330 030 6014.	1	RCC32.3/10.7-2P50			
4330 030 6015.	1	RCC7.5/3-2P65			
4330 030 6016.	1	RCC12.3/4.4-2P65			
4330 030 6017.	1	RCC17.1/4.4-2P65			
4330 030 6018.	1	RCC19.9/6-2P65			
4330 030 6019.	1	RCC23.5/7.5-2P65			
4330 030 6020.	1	RCC26.5/10.7-2P65			
4330 030 6021.	1	RCC32.3/10.7-2P65			
4330 030 6022.	1	RCC7.5/3-2P80			
4330 030 6023.	1	RCC12.3/4.4-2P80			
4330 030 6024.	1	RCC17.1/4.4-2P80			
4330 030 6025.	1	RCC19.9/6-2P80			
4330 030 6026.	1	RCC23.5/7.5-2P80			
4330 030 6027.	1	RCC26.5/10.7-2P80			
4330 030 6028.	1	RCC32.3/10.7-2P80			
4330 030 6029.	2	RCC7.5/3-2P90			
4330 030 6030.	2	RCC12.3/4.4-2P90			
4330 030 6031.	2	RCC17.1/4.4-2P90			
4330 030 6032.	2	RCC19.9/6-2P90			
4330 030 6033.	2	RCC23.5/7.5-2P90			

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DATA HANDBOOK SYSTEM

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PASSIVE COMPONENTS*

PROFESSIONAL COMPONENTS**

MAGNETIC PRODUCTS*

LIQUID CRYSTAL DISPLAYS

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S4a	**SC05**	**Low-frequency power transistors and hybrid IC power modules**
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	SC09	**RF power modules**
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S11	**SC15**	**Microwave transistors**
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C22	**PA05***	**Film capacitors**
C15	**PA06***	**Ceramic capacitors**
C9	**PA07***	**Piezoelectric quartz devices**
C13	**PA08**	**Fixed resistors**

* Not yet issued with the new code in this series of handbooks.

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T12	PC07	Vidicon and Newvicon camera tubes and deflection units
T13	PC08	Image intensifiers
T15	PC09	Dry-reed switches
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