AVX
A KYOCERA GROUP COMPANY

# TPC
# Soft Ferrites

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## Introduction / Product Safety

### TPC, A DIVISION OF AVX CORPORATION...

TPC, the 1998 AVX acquisition, increases the vast array of passive components offered by the leader of this market. TPC technologies, particularly in film, ferrite and protection materials, enhance AVX ability to address these future market needs by adding to its materials and production capability. The merger of TPC and AVX clearly provides many benefits for you, because these new products combine with AVX global logistics, worldwide inventory access, and a world class network of sales and technical support.

*"Provide worldwide an innovative range of components and effective solutions on the needs of customers and the evolution of market applications."*

*"Ensure the growth of the company and the satisfaction of shareholders and personnel through joint successes with our customers."*

TPC has made these outlines the fundamental basis of its worldwide operations. They foster our excellence, in terms of customer service, quality and technical know-how.

Our worldwide sales network and our ferrite operations in Beaune (France) and Hsin-Chu (Taiwan) provide TPC customers with global support. Our ISO 9000 certification highlights the importance we attach to continuously improved quality. With our initiative, Total Quality Management, we focus on service and customer satisfaction from the earliest stages of design up to delivery.

TPC is committed to providing its customers with performing solutions using state-of-the-art technologies in ferrite.

### PRODUCT SAFETY

Every day, it is becoming more important to protect the environment. Therefore, it is one of the basic priorities and a duty of the company in front of its employees, neighbors, customers and the next generation.

Our environmental policy is based on simple principles:

- Respect of the law and regulation in force in that area;
- Implementation of a pollution prevention plan;
- Continuous efforts for reducing the impact of our activity on the environment by giving priority to atmospheric rejects, water treatment and selective sorting out of our wastes;
- Awareness and training program for all AVX employees: all of us are involved, all of us are responsible;
- Implementation of progress plans with our main suppliers and subcontractors.

This policy is implemented within an environmental management system according to **ISO 14001 standard.**

On a regular basis, the General Manager reviews the annual action plans, the results and the resources that are needed.

This environmental policy is an integral part of the strategy of both TPC and AVX Corporation.

It is communicated to our customers, suppliers and local partners.

# Soft Ferrites

## Contents

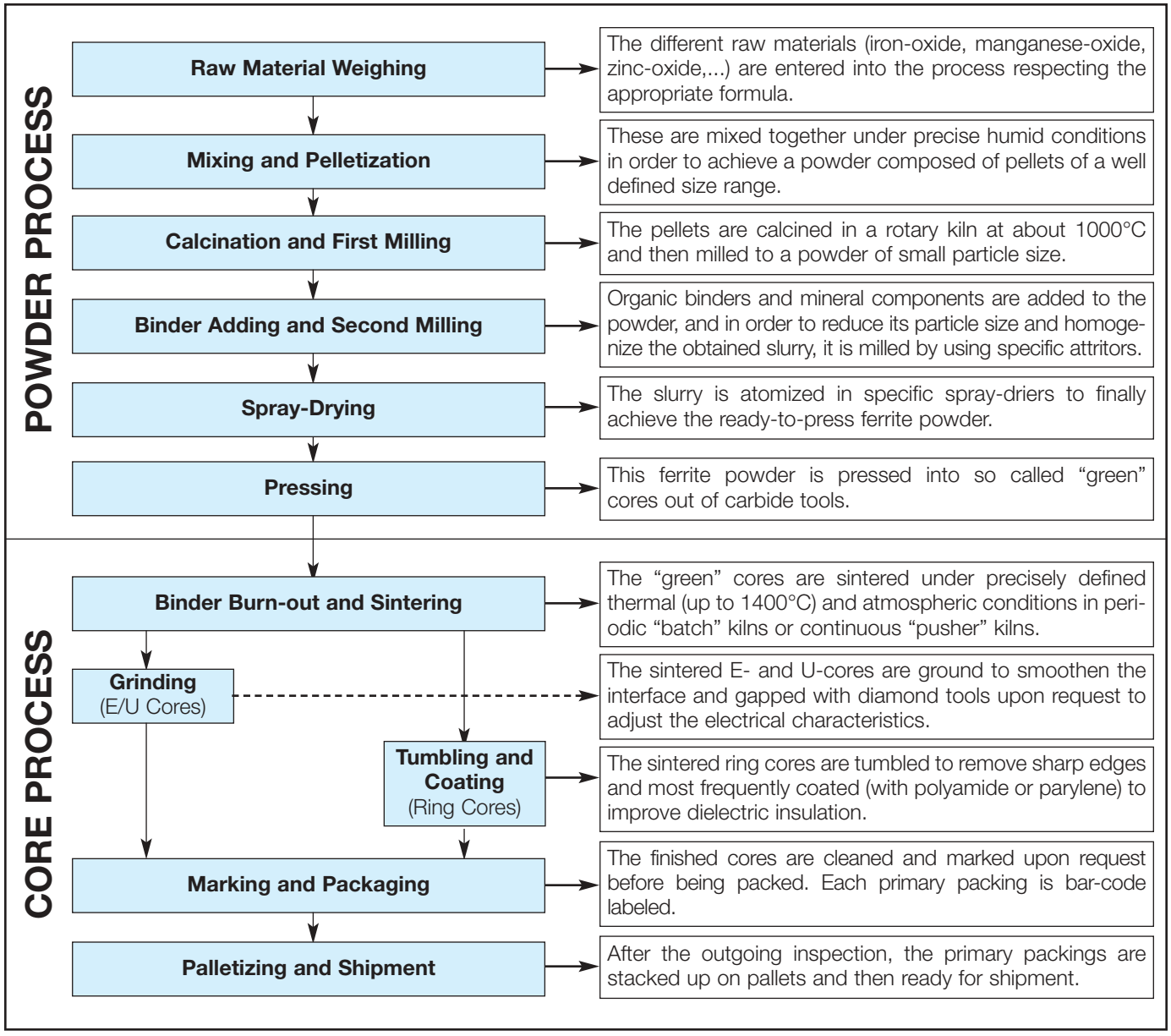
# Soft Ferrites

## Symbols and Terms

| Symbols | Definitions | Units |
|---|---|---|
| $A_e$ | Effective area of magnetic path | $mm^2$ |
| $A_L$ | Nominal inductance factor per turn | nH |
| B | Flux density | mT ($10^{-3}$ T) |
| $B_r$ | Residual flux density - remanence | mT |
| $B_S$ | Saturation flux density | mT |
| $\hat{B}$ | Flux density peak value | mT |
| c | Magnetic circuit permeance factor | nH |
| $C_1$ | Core factor ($C_1 = \Sigma \frac{\ell}{A}$) | $mm^{-1}$ |
| d | Density (or specific weight) | $g/cm^3$ |
| f | Frequency | Hz ($s^{-1}$) |
| $f_c$ | Cut-off frequency | Hz ($s^{-1}$) |
| $\hat{H}$ | Magnetic field strength (peak value) | $A.m^{-1}$ |
| $H_c$ | Coercive field | $A.m^{-1}$ |
| $H_0$ | Superimposed D.C. field | $A.m^{-1}$ |
| i | RMS value of the current in the coil | A |
| Is | D.C. current intensity | A |
| L | Coil inductance with ferrite core | H |
| $\ell$ | Length of a core portion with a constant section | mm |
| $l_e$ | Effective magnetic path length | mm |
| N | Number of turns | 1 |
| $P_L$ | Power losses at high induction level | $mW/cm^3$ |

| Symbols | Definitions | Units |
|---|---|---|
| Q | Q-factor at low induction level | 1 |
| $R_s$ | Resistance of coil with a ferrite core | Ω |
| $R_t$ | Resistance equivalent to total losses | Ω |
| $S_b$ | Available winding area | $mm^2$ |
| U | RMS voltage value on coil terminals | V |
| $V_e$ | Effective magnetic volume | $mm^3$ |
| δ | Loss angle at low induction level | Radian |
| ε | Airgap length | mm |
| $\eta_B$ | Hysteresis constant | $T^{-1}$ |
| T | Temperature | °C |
| $T_C$ | Curie temperature | °C |
| $\lambda_S$ | Saturation magnetostriction coefficient | 1 |
| $\mu_a$ | Amplitude permeability (core without airgap) | 1 |
| $\mu_e$ | Effective permeability | 1 |
| $\mu_i$ | Initial permeability | 1 |
| $\mu_0$ | Absolute vacuum permeability ($4\pi \times 10^{-7}$ H/m) | $H.m^{-1}$ |
| $\mu_{rev}$ | Reversible permeability | 1 |
| $\overline{\mu}$ | Complex permeability | 1 |
| $\mu'_s$, $\mu''_s$ | Complex permeability factors expressed in series elements | 1 |
| ρ | Resistivity | Ω × cm |
| Z | Impedance | Ω |

## General Characteristics Process Flow Chart



## 1. MAGNETIC CIRCUIT CHARACTERISTICS

**• Core Factor**

This parameter is defined as the sum of $\frac{\ell}{A}$ values of the various parts along the magnetic path:

$$C_1 = \sum \frac{\ell}{A} \ (mm^{-1}) \qquad (1)$$

where:

$\ell$ = magnetic length in mm of each portion with constant cross section.

A = area in $mm^2$ of the cross section of each portion.

**• Permeance Factor**

In order to calculate the electromagnetic characteristics, the core permeance factor, c, is preferred to core factor, C1, by most designers (see $A_L$ value calculation).

It is defined as:

$$c = \frac{\mu_0}{C_1} \times 10^6 \ (nH) \qquad (2)$$

where: $\mu_0$ = absolute vacuum permeability.

**• Other Effective Parameters**

• Effective area of magnetic path: $A_e = \frac{\sum \frac{\ell}{A}}{\sum \frac{\ell}{A^2}}$ (3)

• Effective magnetic path length: $l_e = A_e \times \sum \frac{\ell}{A}$ (4)

• Effective magnetic volume: $V_e = A_e \times l_e$ (5)

**Note:** These values are useful for core selection and calculation of hysteresis losses.

## 2. PERMEABILITY

The magnetic flux density inside a ferrite core can be described by the formula:

$$B = \mu_0 \bullet H + J \qquad (6)$$

where:

$\mu_0$ = absolute vacuum permeability
J = magnetic polarization of ferrite material

This relation introduces the relative permeability μ of a ferrite material which may be defined as:

$$\mu = \frac{1}{\mu_0} \times \frac{B}{H} \qquad (7)$$

• Inductance Formula

The inductance value of a magnetic circuit may be calculated as follows:

$$L = \mu.c.N^2 \qquad (8)$$

with L in nH, c in nH and N the number of turns.

• Inductance Factor: $A_L$

Inductance factor is given for most magnetic circuits. It is defined as:

$$A_L = \frac{L}{N^2} = \mu \bullet c \ (nH) \qquad (9)$$

## 2.1 INITIAL PERMEABILITY: $\mu_i$

It is defined as the ratio between the flux density variation and the field variation corresponding to the origin of the first magnetization curve within a closed ring. This applies only to a very low amplitude of the A.C. field.

$$\mu_i = \frac{1}{\mu_0} \times \frac{\Delta B}{\Delta H} \text{ for small } \Delta H \text{ values} \qquad (10)$$

The initial permeabilities listed on the material characteristics tables are measured on reference toroids (rectangular toroids of 35 × 12 × 18mm), with an A.C. field amplitude attaining peak value of ΔB = 1mT.

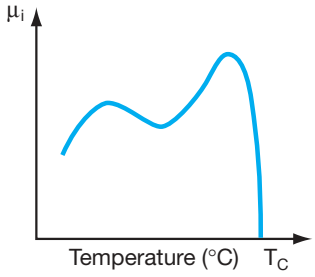



*Figure 1*

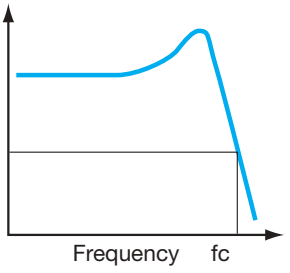



*Figure 2*

**Notes:** Curie temperature $T_c$ (Figure 1) is the temperature at which the material looses its ferromagnetic properties. For FERRINOX materials, this phenomenon is completely reversible, i.e., cores cooled below the curie point recover their magnetic properties, when brought back to room temperature.

The cut-off frequency (Figure 2) is defined as the frequency at which the permeability is half the initial permeability at 1-10 kHz.

## 2.2 AMPLITUDE PERMEABILITY: $\mu_a$

In the case of magnetization by a large amplitude sine field, permeability μa is defined as the ratio between the inductance peak value B and the field peak value H, with no D.C. magnetic field applied.

$$\mu_a = \frac{1}{\mu_0} \bullet \frac{\hat{B}}{\hat{H}} \qquad (11)$$

Amplitude permeability variation versus B or H is given for each FERRINOX material in the FERRITE MATERIALS section.

## 2.3 EFFECTIVE PERMEABILITY: $\mu_e$

If a small airgap is created in a closed magnetic circuit, manufactured from material with a permeability μ, the resulting permeability will be smaller than μ due to the reluctance increase in the airgap. This permeability of the magnetic circuit system is called effective permeability.

In more general terms, it is the permeability that an homogeneous hypothetical material must have in order to get the same total reluctance as a core manufactured with several materials where the magnetic leakage flux is negligible (the same dimensions are assumed).

thus:
$$\mu_e = \frac{1}{\mu_0} \bullet \frac{L}{N^2} \bullet \sum \frac{\ell}{A} \; 10^3 \quad (12)$$

or
$$\mu_e = \frac{\sum \frac{\ell}{A}}{\sum \frac{\ell}{\mu . A}} \quad (13)$$

(μ is the permeability of each material constituting the magnetic circuit).

An interesting specific case is that of an average length and constant section circuit made of a material of permeability μ and an airgap length of $\varepsilon << l_e$ (valid for $\varepsilon < 0.005\ l_e$ ).

Equation (13) becomes:
$$\frac{l}{\mu_e} = \frac{l}{\mu} + \frac{\varepsilon}{l_e} \quad (14)$$

**Note:** For a given core, when μe decreases, the acceptable peak value of magnetic field increases (Figure 3).

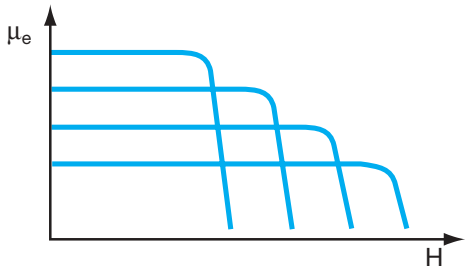



*Figure 3*

Two types of $\mu_e$ may be calculated:

The effect permeability for low level (corresponding to $\Delta B < 1mT$, $\mu = \mu_i$):

$$\frac{l}{\mu_e} = \frac{l}{\mu_i} + \frac{\varepsilon}{l_e} \quad (15)$$

The effective permeability for a high amplitude A.C. field ($\mu = \mu_a$):

$$\frac{l}{\mu_e} = \frac{l}{\mu_a} + \frac{\varepsilon}{l_e} \quad (16)$$

**Note:** These formulas are valid only when the magnetic flux section in the airgap remains roughly the same as in the magnetic core. Conversely, when the air-gap length ε is no longer negligible, it is necessary to take into account a factor β, which corresponds to the flux expansion in this airgap.

**Note for designers:** Useful $A_L$ versus airgap curves are given for E, U, RM and FM cores.

## 2.4 REVERSIBLE PERMEABILITY: $\mu_{rev}$

$\mu_{rev}$ is defined as the ratio between the flux density variation ΔB and the corresponding field variation for a very low amplitude A.C. field and a superimposed D.C. field $H_0$:

$$\mu_{rev} = \frac{1}{\mu_0} \bullet \left[\frac{\Delta B}{\Delta H}\right]_{H_0} \quad (17)$$

This permeability $\mu_{rev}$ can therefore be compared, to initial permeability $\mu_i$ or to the effective permeability $\mu_e$ corresponding a low level A.C. field. But the difference arises from the fact that for measurement of $\mu_i$ or $\mu_e$ the core must not previously have been subjected to the influence of any large amplitude field while for the measurement of $\mu_{rev}$ the core is assumed to have been previously magnetized.

## 3. HYSTERESIS LOOP

The static hysteresis loop, (BH) curves (Figure 4), are obtained by measuring the resulting flux density B inside the core under test for increasing values of H field until saturation.

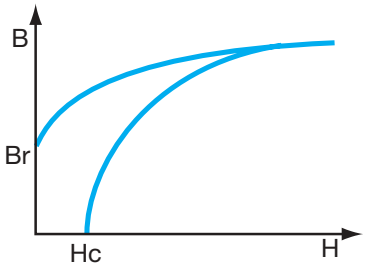



*Figure 4*

**Notes:** For each FERRINOX material, measurements were made on reference toroids (previously demagnetized) at 25°C and 100°C.

Remanent flux density Br is defined as the intersection of the hysteresis loop with B axis (H = 0). Br is an important factor for unipolar operating systems.

Coercive force Hc is the intersection of the hysteresis loop with H axis (B = 0). It is representative of static hysteresis loss of the considered material, which is recorded in the FERRITE MATERIALS section.

## 3.1 PLOTTING THE CURVES B=$f$(H)

The static B(H) (Figure 5) curves are given on the specific sheets pertaining to the characteristics of the various FERRINOX materials. They are obtained by measuring the induction B with an analog integrator on the reference toroid (30 x 20 x 8mm) at temperature of 25°C and 100°C.

The first magnetization curves are established on previously demagnetized toroids and for increasing values of field H.

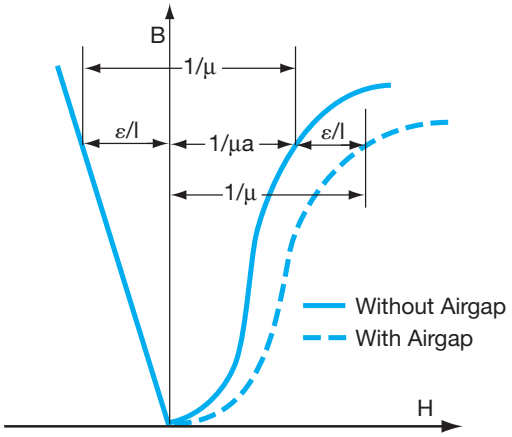



*Figure 5*

## 3.2 SATURATION INDUCTION

Induction B in the magnetic circuit is given by the conventional formula:

$$B = \mu_0 \bullet H + J$$

J being the magnetic moment per unit of volume.

The term $4\pi J$ comes from the magnetic material. As soon as it reaches saturation, $4\pi J$ becomes constant and equal to $4\pi J_s$, which correspond to the saturation induction $B_S$.

However, as the value of $B_S$ is only obtained with a very important field H, we give in the FERRINOX MATERIALS section THE VALUES OF B corresponding to a rather high specified field, this in order to give an idea of the inductions which can be obtained in practice.

Saturation magnetization varies with temperature and becomes zero at the Curie point. In the FERRINOX MATERIALS section the values of B are given for 25°C and 100°C, which correspond to the normal temperature range of utilization of transformers.

## 4. LOSSES

Only losses caused by ferrite magnetic core will be considered here.

When the core flux density is low enough (e.g., several mT), the series resistance, equivalent to the total losses Rt in the core, can be reduced to a sum of three terms $R_F$, $R_h$ and $R_r$, corresponding respectively to the loss resistance caused by:

- Eddy currents,
- Hysteresis,
- Magnetic drag (residual losses)

$$R_t = R_F + R_h + R_r \qquad (18)$$

In this case, it is also possible to define loss coefficients F, h and r by using the Jordan formulas.

$$R_t = F \bullet \frac{f^2}{800^2} \bullet L + h \bullet \frac{Ni}{\ell} \bullet \frac{f}{800} \bullet L + r \bullet \frac{f}{800} \bullet L \qquad (19)$$

L Inductance in henrys

$f$ Frequency in hertz

i RMS current intensity (in amperes) in the coil

$\ell$ Length of the line of mean force

N Number of turns of the coil

F, h, r Loss coefficients due to eddy currents, hysteresis, and residual losses for a frequency of 800 Hz and measured at a specify frequency, field and temperature.

For gapped cores, with μe effective permeability, the preceding formula becomes:

$$R_t = \frac{F}{\mu_i} \bullet \mu_e \bullet \frac{f^2}{800^2} \bullet L + \frac{h}{\mu_i^2} \bullet \mu_e^2 \bullet \frac{Ni}{\ell} \bullet \frac{f}{800} \bullet L + \frac{r}{\mu_i} \bullet \mu_e \bullet \frac{f}{800} \bullet L \qquad (20)$$

## 4.1 LOSSES AT LOW INDUCTION LEVEL

**• Loss angle δ and loss angle tangent**

The phase shift angle between induction and field within a closed magnetic circuit is designated by δ. This applies to low values of the magnetic field, assumed to be sinusoidal.

$$\text{tg}\delta = \frac{R_{ts}}{L_S \omega} \qquad (21)$$

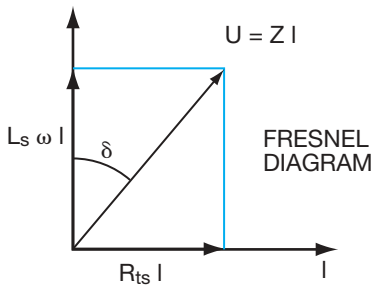



*Figure 6*

Considering the series configuration (Figure 6), a coil including a ferrite core may be represented by an ideal inductance $L_S$ (without losses) and by a resistance $R_{ts}$ corresponding to the total losses in the core.

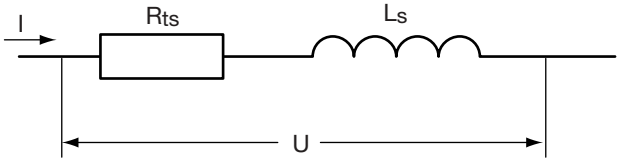



*Figure 7*

The representation suggests that the material permeability must be considered as a complex value called complex permeability $\bar{\mu}$:

$$\bar{\mu} = \mu's - j\mu"s$$

with $\mu's$ = real permeability ($\mu_i$ or $\mu_e$) (22)

$\mu"s$ = imaginary permeability due to loss resistance.

For each FERRINOX material used for noise suppression filters, $\mu's$ and $\mu"s$ curves versus frequency are given in the FERRINOX MATERIALS section.

Consequently, the resulting impedance of the coil may be expressed by the following formula (if copper losses negligible):

$$Z = R_{ts} + jL_s\omega = J\ \omega\ \bar{\mu}\ c\ N^2 \quad (23)$$

$$= j\ c\ N^2\ \omega\ (\mu's - j\mu"s) \quad (24)$$

thus $$= \mu"s\ c\ N^2\ \omega + j\ \mu's\ c\ N^2\ \omega \quad (25)$$

$$Ls = \mu's\ c\ N^2 \quad (26)$$

$$R_{ts} = \mu"s\ c\ N^2\ \omega \quad (27)$$

($\omega = 2\ \pi\ f$ = pulsation)

Figure 8 shows an example of Z curve versus frequency.

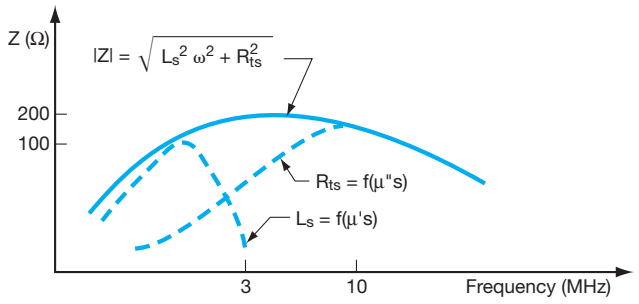



*Figure 8*

**• Loss Factor: tgδ/μ**

The loss factor is reduced by an airgap based on the ratio of permeabilities before and after airgap presence: consequently for small airgap cores, the ratio tgδ/μ factor or loss factor does not depend on the airgap (under constant magnetic induction).

Depending on frequency, tgδ/μ versus f curves are given for each FERRINOX material in FERRINOX MATERIALS section. The maximum practical operating frequency of a selected material is almost entirely controlled by the rapid increase of the loss factor.

This factor is, therefore, ideal for assessing a material under high frequencies.

Calculation of the loss factor of a gapped circuit is done merely by multiplying the material loss factor by the actual permeability of the circuit.

$$tg\delta_e = \frac{tg\delta}{\mu} \bullet \mu_e \quad (28)$$

**• Quality Factor: Q**

It is given by the inverse of the loss angle tangent:

$$Q = \frac{1}{tg\delta} \quad (29)$$

It should be noted that this quality factor is only equal to that measured on the system including a winding associated to a ferrite magnetic circuit if the losses resulting from the winding itself (ohmic resistance, eddy currents in the wire, distributed capacity) are negligible, conversely, the latter should be taken into account.

## 4.2 LOSSES AT HIGH FLUX DENSITY LEVEL

In SMPS application, mainly for power transformer design, approximate total ferrite losses at the working point need to be known by the designer in order to:

- Integrate them into the efficiency coefficient calculation,
- Take into consideration for heat dissipation (i.e., cooling systems).

Generally, power losses are characterized by three parameters:

- Peak induction level $\hat{B}$
- Frequency f
- Temperature T

Approximate $P_L$ may be obtained by the following formula (valid only for specified typical operating range):

$$P_L = K \bullet f^m \bullet B^n$$

where K is the material factor (depending on temperature T)

$$1.3 < m < 1.6$$
$$2 < n < 2.6$$

**Notes for designers:** The total losses curves (in Watts) of the magnetic circuit are given at different temperature, frequency and flux density for E, U, RM and FM cores. Please refer to CORE DATA in CORES FOR POWER APPLICATION section.

The power losses curves (in mW/cm³) of power ferrite materials are given at different temperature, frequency and flux density in the FERRINOX MATERIALS section.

## 5. OTHER CHARACTERISTICS

**• Density**

Between 4 and 5 depending on the material grades. FERRINOX A and B materials generally have values between 4.7 and 4.9 (see Materials Characteristics tables).

**• Specific Heat**

From 20°C to 300°C, specific heat ranges between 0.5 and 0.8 Joule/g/°C (0.12 and 0.2 cal/g/°C). For example, FERRINOX B1 specific heat is about 0.75 J/g/°C.

**• Linear Expansion Factor**

From 20°C to 300°C, the increase of any of the core dimensions by unit of length and by the ratio $\frac{\Delta\ell}{\ell\Delta\theta}$ ranges between 7.5 to 10 × $10^{-6}K^{-1}$.

## General Characteristics

**• Mechanical Properties**

| | |
|---|---|
| Young's modulus of elasticity | 80 to 150.$10^9$ N/m$^2$ |
| Ultimate tensile strength | 30 to 70.$10^6$ N/m$^2$ |
| Ultimate compressive strength | 200 to 800.$10^6$ N/m$^2$ |

**• Resistivity**

FERRINOX materials are high resistivity, non metallic, ferromagnetic substances which are developed in response to the unacceptably high losses due to eddy currents, occurring at high frequencies in ferromagnetic materials.

This resistivity varies with applied field, temperature, and frequency. Generally, for FERRINOX materials B, it decreases slightly as frequency increases.

In practice, FERRINOX cores behave like semiconductors. With D.C. current, their resistivity varies with the measuring voltage (decreases slightly under constant voltage).

An accurate measurement of a core resistivity cannot be done without prior metallization (with silver, or preferably, with indium-gallium alloy) due to the difficulty in achieving a perfect contact between the electrodes and the core.

It is also recommended to carefully lap the faces before metallization in order to lay bare the core of the material before depositing the metal layer. Actually, after noticeable firing in some case, the resistivity of the rough surface of a core differs from that of the inside. This is particularly true for FERRINOX B due to slight superficial oxidation.

The characteristic tables of the materials indicate the mean resistivity values for the various FERRINOX materials measured at low frequency and with a low field.

**• Dielectric Constant (or permittivity)**

The relative permittivity value for FERRINOX B materials is high at low frequencies and generally decreases as frequency increases. Thus for these materials permittivity is between 1 - 1.5 × $10^5$ at 1 kHz; at 1 MHz its value can still exceed 0.5 × $10^5$. At high frequency for all materials, it reaches a value between 10 and 20.

**• Magnetostriction**

Magnetostriction is an elastic deformation phenomenon which accompanies magnetization.

Linear magnetostriction is defined as the relative variation of the part length under the influence of magnetic field. When the variation is measured in the magnetization direction, we have longitudinal magnetostriction.

$$\lambda = \frac{\Delta \ell}{\ell}$$

Generally, this coefficient is negative for all FERRINOX materials, i.e., these materials contract in the magnetization direction. The absolute value increase with magnetization (at the beginning $\lambda$ is more or less proportional to the square of magnetization) up to a maximum value $\lambda_S$ corresponding to saturation.

The value of $\lambda_S$ for the various FERRINOX materials is generally very low, between 0 and -1 × $10^6$ for B materials. Magnetostriction effects appear in power transformer as an audible hum, particularly in U shaped cores without airgaps. It is, therefore, recommended to secure the cores tightly and to use cores with airgaps whenever possible.

**• Thermal Conductivity**

It is equal to about 10 × $10^3$ cal/cm/s/°C or 4W/m/°C.

# Soft Ferrites

## Applications


High Power | SMPS | Lighting | TV & Monitors | Filtering

Shapes of magnetic cores depend on applications:

• E cores and RM cores:

They are used in computer, radio communication, interference suppression, SMPS for wide-band transformers, power transformers, pulse transformers.

• U cores:

They are used in TV applications, industrial and professional applications for wide-band transformers and high voltage transformer.

Soft ferrite cores are used in a large band of applications, with different shapes and adapted materials. Today the main application areas are:

■ Power Application

■ Filtering Application

## I. POWER APPLICATION

**• High Power**

A power transformer transmits energy, transforms voltage to the required level and provides galvanic separation. It operates under conditions which require special power ferrites with low losses and high saturation levels.

**• SMPS**

The following table summarize the structures of a SMPS circuit.

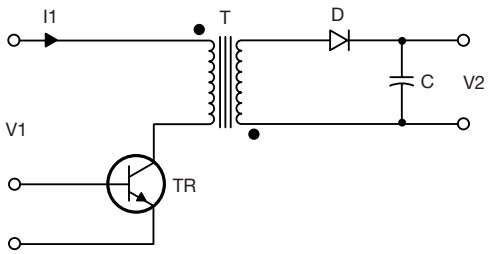
Three principle structures of a switched mode power supply circuits are:

A - Flyback Converters
B - Forward Converters
C - Push-Pull Converters

### A - FLYBACK CONVERTERS

In a flyback converter, all the energy to be transferred to the output capacitor and load is, at first, stored in the inductor.

*HOW DOES IT WORK?*




During “TR” on: “D” is blocked and primary energy is stored in the transformer “T”.

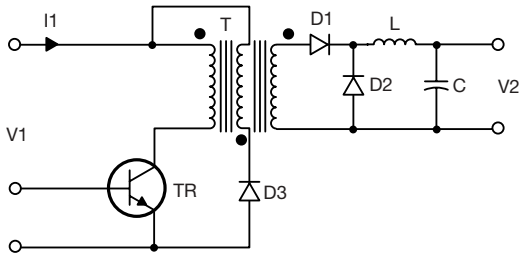
During “TR” off: “D” is opened and energy is returned to the load.

Remark: an important airgap is needed in the magnetic circuit in order to prevent saturation.

| APPLICATIONS | ADVANTAGES | DRAWBACKS |
|---|---|---|
| Low power range (200W) Output current < 10A | Simples topology - low cost | Poor current form factor |
| | Multi-output capability | Max operating frequency: 80kHz |
| | | Typ. efficiency: 65 to 80% |

### B - FORWARD CONVERTERS

*HOW DOES IT WORK?*




During “TR” on: “D1” is opened and the primary energy is directly transferred to the secondary through the transformer “T” and stored in choke “L”.

During “TR” off: “D2” is opened and energy stored in “L” is returned to load.

Remark: an important airgap is needed in the choke but low or no airgap is required in the transformer (low magnetizing energy returned to the input by the way of the auxiliary winding and “D3”).

| APPLICATIONS | ADVANTAGES | DRAWBACKS |
|---|---|---|
| Power range typ.:100 to 300W output current > 7A | Low ripple output (built in filter LC) | Not optimized for multi-outputs |
| | High frequency capability | |
| | High efficiency: up to 90% | |

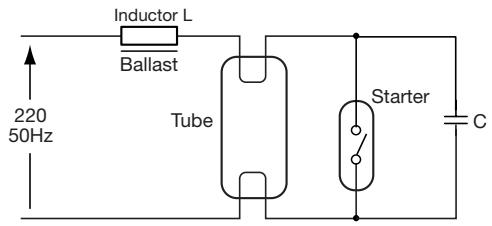
### C - PUSH-PULL CONVERTERS

The push-pull converter is an arrangement of two forward converters operating in antiphase. For the same operating conditions and power throughput, its design can use a smaller transformer core.

**• Ballast**

Ballast are used for fluorescent lamps. It limits the current and works like coil. Ballast resistance is calculated to obtain the arc voltage of the lamp and the right current to run with right conditions.

For the best efficiency, dimensional and electromagnetic parameters of ferrite cores transmit the exact value of cathode current, lamp voltage and lamp current.



## II. FILTERING APPLICATION

High permeability materials represent soft ferrites used in the filtering application like EMI suppression, telecommunication, tuning, etc...

**• EMI Suppression**

Electronic equipment development pollutes the environment of electromagnetic waves. For the best working of devices, laws will become more stringent in the near future.

To avoid this problem, inductive components are very effective, especially at high frequency. With high permeability material, inductors has high impedance for the interfering unwanted signal.

**• Telecommunication**

Most important applications in telecommunication, are filter coils and "pulse and signal transformer". For those applications, a high quality factor (Q) is needed. Good wideband characteristics transmit analog signals or digital pulses without much distortion.

## III. FERRINOX MATERIAL: QUICK SELECTION GUIDE

A complete description of power ferrite materials is presented pages 18 to 34.

The following table summarize the typical applications.

### MATERIAL FOR POWER APPLICATIONS

| MATERIAL | MAIN FEATURES | APPLICATION | CORE TYPE |
|---|---|---|---|
| **B2** | Low losses for low frequency (25 to 150 kHz) | Power transformers DC/DC converters | E, U Cores and Toroids |
| **F1** | Very low losses for medium frequency (50 to 250 kHz) and high flux density | Power transformers DC/DC converters | E, U, PQ, EP and RM Cores, Toroids |
| **F2** | Very low losses for high frequency (100 to 500 kHz) | Power transformers DC/DC converters | E, U, RM and Planar Cores |
| **F4** | Very low losses for high frequency (500 to 1.5 MHz) | Power transformers DC/DC converters | E and Planar Cores |

### MATERIAL FOR TV TRANSFORMERS AND FLYBACK TRANSFORMERS

| MATERIAL | MAIN FEATURES | APPLICATION | CORE TYPE |
|---|---|---|---|
| **B3** | High flux density and negative power loss temperature slope at high temperature | Noise suppression Chokes Broadband transformers Drivers | Small E and U Cores |
| **B5** | High flux density and low losses at high temperature (32 kHz) | General purpose power Transformers Drivers | E and U Cores Toroids |

## IV. DC BIAS CORE SELECTION CURVES $LI^2$ $V_S$ $A_L$

To prevent saturation of the magnetic circuit in a choke, the following curves provide the $A_L$ limit before saturation of most E, U, RM and FM cores (corresponding to a 20% inductance drop) at 25°C and 100°C operating temperatures.

- Draw a horizontal line at the Y axis coordinate corresponding to the required $LI^2$ max value:

  L : Inductance required (mH)

  Imax : Peak current
- Any core whose line intersects with this horizontal line may be used.
- Draw a vertical line at this intersection to get the $A_L$ value.

In the same way, the following curves provide the maximum applicable ampere turns on a core before saturation:

- Draw a vertical line at the X axis coordinate corresponding to the required $A_L$ value
- The intersection with the $LI^2$ line of the required core indicates NI max value by calculating:

$$NI\ max = \sqrt{(LI^2 / A_L)}$$

**Notes:**

1. These graphs are valid for B1, B2, F1.
2. Increase by about 10% the $LI^2$ max value for B3, B5.
3. The lower and upper core limits correspond to the optimum effective permeability range: $54 \leq \mu e \leq 300$.

## V. DC BIASED INDUCTANCE

- $A_L$ versus N x $I_S$ curves are given for the following cores in the U-core section:

  UR3513B - UR3513D - UR3513H - UR3915A
  UR4014A - UR4022A - UR4316A - UR4916A

**Note:** These graphs are valid with a specific coil for each core only.

## Applications

(please see the respective curves at the end of this section)

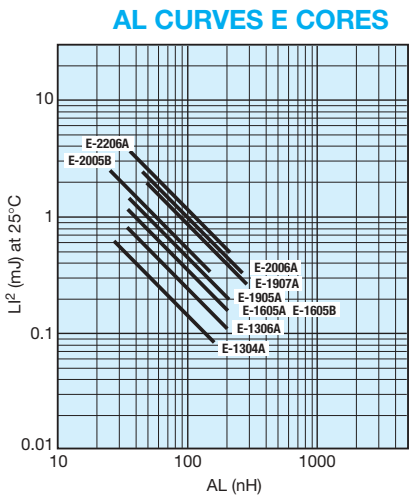



*Figure 1*

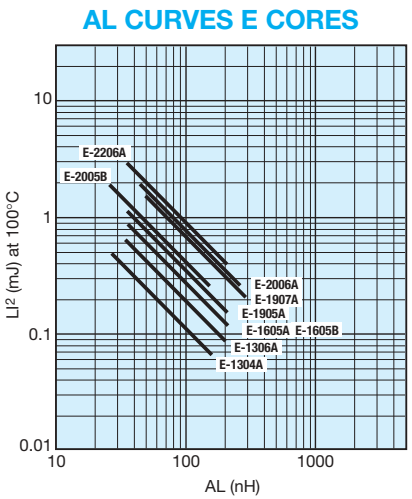



*Figure 2*

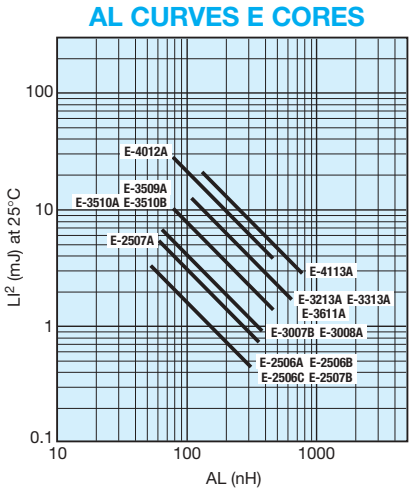



*Figure 3*

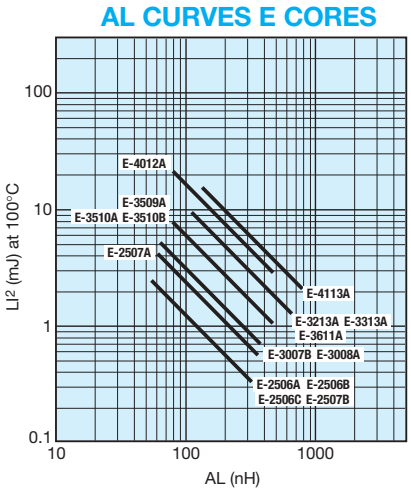



*Figure 4*

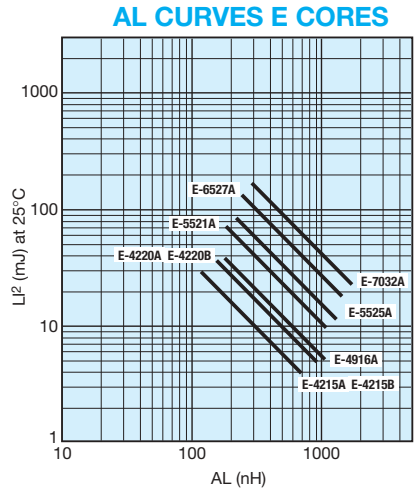



*Figure 5*

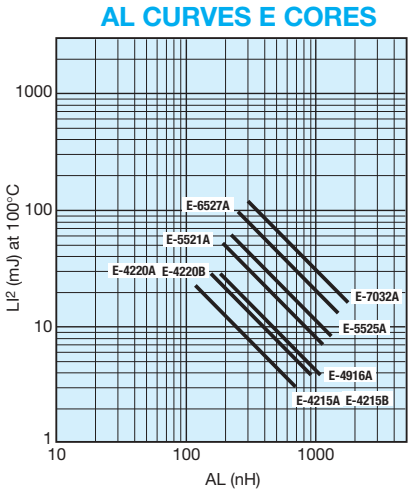



*Figure 6*

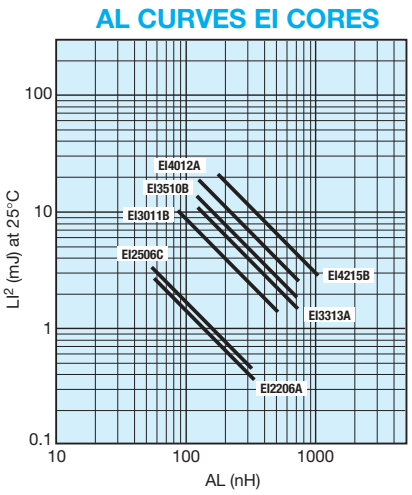



*Figure 7*

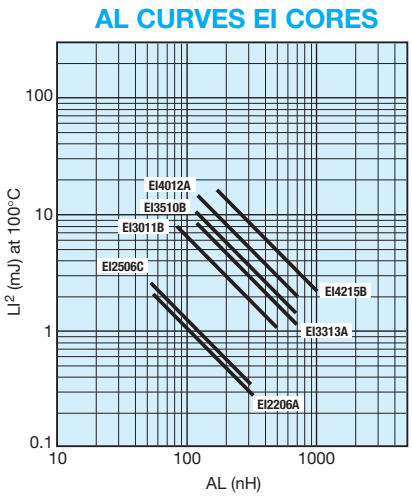



*Figure 8*

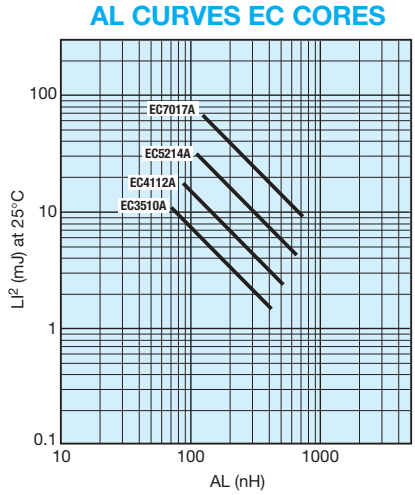



*Figure 9*

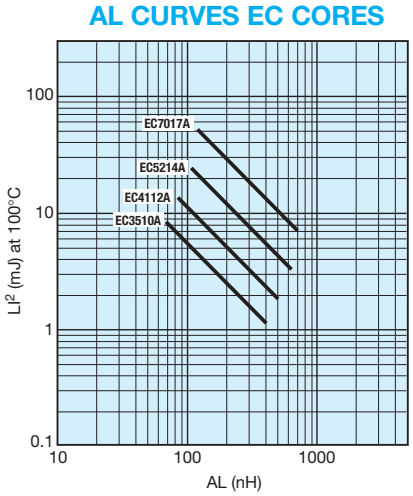



*Figure 10*

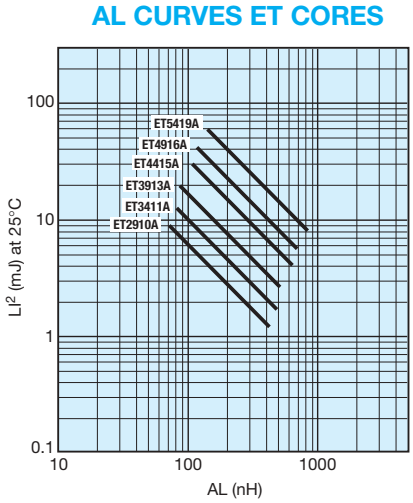



*Figure 11*

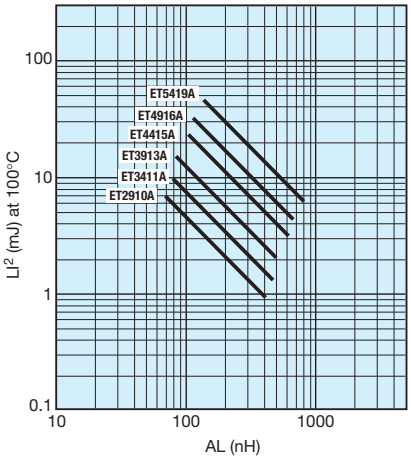



*Figure 12*

### AL CURVES ER CORES

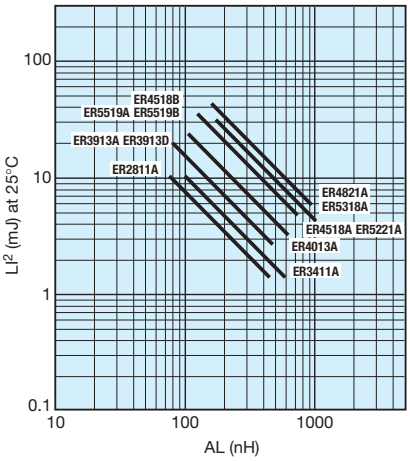



*Figure 13*

### AL CURVES ER CORES

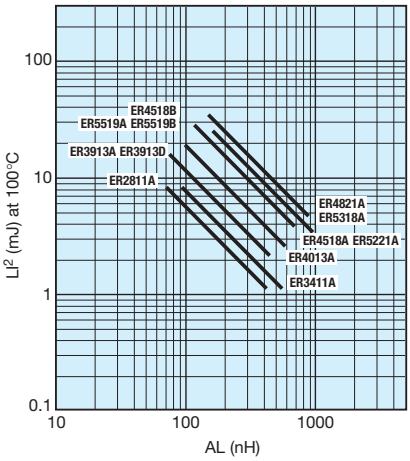



*Figure 14*

### AL CURVES RM - FM CORES

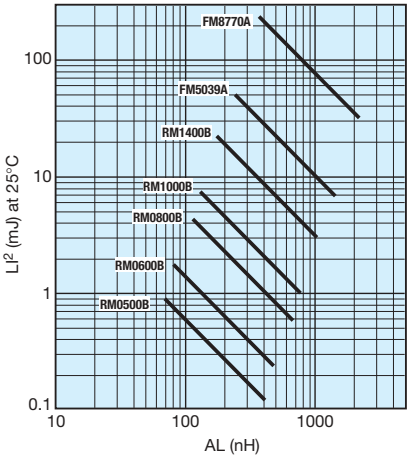



*Figure 15*

### AL CURVES RM - FM CORES

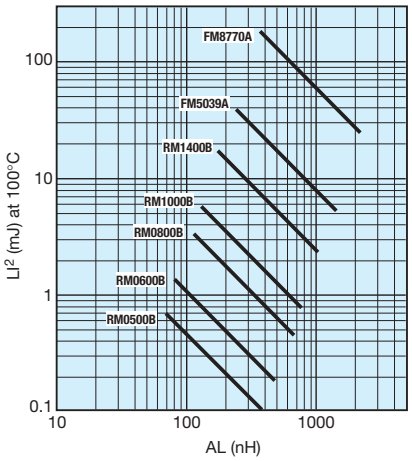



*Figure 16*

### AL CURVES U CORES

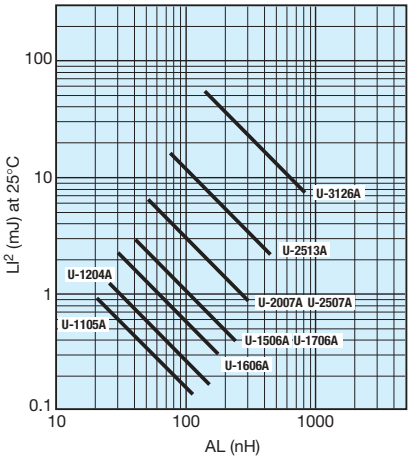



*Figure 17*

### AL CURVES U CORES

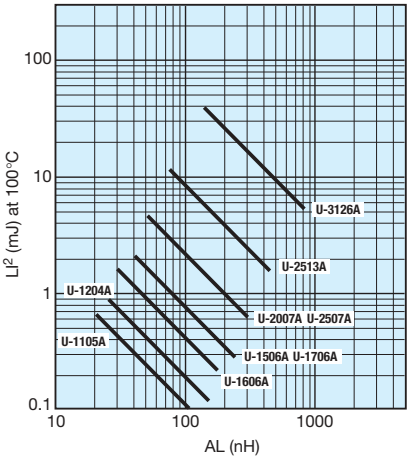



*Figure 18*

### AL CURVES U CORES

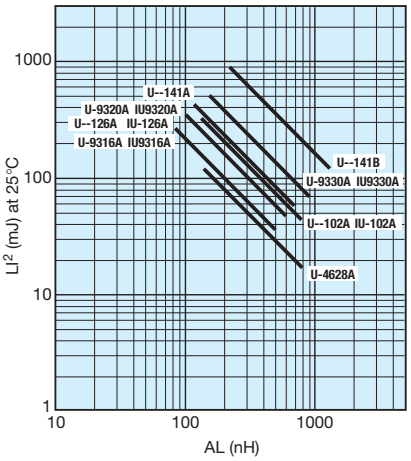



*Figure 19*

### AL CURVES U CORES

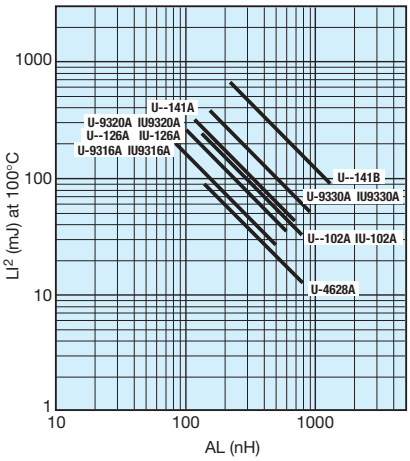



*Figure 20*

# Quality

The mass production of high quality ferrite cores requires a fundamental knowledge of processing rules dedicated to each material and the use of advanced production techniques to achieve dimensional and electromagnetic specifications.

Existing product specifications are met mainly by the implementation of a reliable Quality Assurance System applicable to every manufacturing steps from raw material incoming inspection to finished product packaging and shipment.

## 1. STANDARDS AND SPECIFICATIONS

Most of our ferrite cores are manufactured and tested in accordance with CENELEC (European Committee for Electronical Standardization), and IEC (International Electrotechnical Commission) available standards.

- **CENELEC Standards (European norms)**

  **EN125000 (GS)**: Cores made of ferrite materials.

- **IEC Standards (Worldwide)**

  **IEC 60424-1**: Ferrite Cores - Guide on the limits of surface irregularities – Part 1 = Generic specification.

  **IEC 60424-2**: Ferrite Cores - Guide on the limits of surface irregularities – Part 2 = RM Cores.

  **IEC 60424-3**: Ferrite Cores - Guide on the limits of surface irregularities – Part 3 = ETD and E Cores.

  **IEC 60424-4**: Ferrite Cores - Guide on the limits of surface irregularities – Part 4 = Ring Cores.

  **IEC 60431**: Dimensions of square cores (RM Cores) made of magnetic oxides and associated parts.

  **IEC 60647**: Dimensions for magnetic oxide cores intended for use in power supplies (EC Cores).

  **IEC 61185**: Magnetic oxide cores (ETD Cores) intended for use in power supply applications - Dimensions.

  **IEC 61246**: Magnetic oxide cores (E Cores) of rectangular cross-section and associated parts - Dimensions.

  **IEC 61247**: PM Cores made of magnetic oxides and associated parts - Dimensions.

  **IEC 61332**: Soft Ferrite material classification.

  **IEC 61333**: Marking on U and E ferrite cores.

## 2. QUALITY ASSURANCE

### 2.1 QUALITY SYSTEM AND ISO 9000 CERTIFICATION

Since 1992, a quality assurance system has been implemented in accordance with ISO 9000 requirements. Therefore, TPC quality policy is defined in the quality manual available in each ferrite production site.

In the ferrite product line, both production sites have been certified since 1994 by an accredited certification body:

- **TPC Beaune / ISO 9001** applicable to the design and manufacturing of ready to press powders and ferrite cores E, U, toroids made of Mn-Zn materials.
- **TPC FT (TPC Ferrites Taiwan Ltd) / ISO 9002** applicable to the manufacturing of ferrite cores.

Since certification, each production site is followed every six months by a certification body according to a surveillance program.

Ahead, TPC quality policy is based on AVX quality management system described in QV2000 (Quality Vision) implementation guide taking into account continuous improvement as a key principle of Total Quality Management. Results and performance are measured periodically through Quality Operating System (QOS) applied to key variables vital to achieve customer satisfaction.

### 2.2 PRODUCT QUALITY PLAN

Our general control plan is split into three major parts:

**A. Incoming Inspection of Raw Materials**

In case of qualified supplier, a Lot Approval Sheet (LAS) is checked by QA people at incoming inspection. Only statistical controls are carried out on critical parameters defined for each type of raw material.

**B. Process Monitoring / Capability Follow-up**

For each process step, QA inspections performed on Capability Qualifying Components are defined. The relevant test vehicles could be powder samples or test cores designed especially for quality assessment or semi-finished ferrite parts in production. Each important process step is followed by a Quality Control Approval (QCA) where the decision is taken to continue or stop the batch if unacceptable distortion is found on some parameters (nonconformity management procedures).

On the other hand, results from one step can be used in order to monitor the following one i.e., results on powder could be used to monitor the pressing conditions of relevant batch; see as example typical flow chart relevant to U and E core (*Table 4*).

**C. Outgoing Inspection**

Each lot must pass through a final outgoing inspection before entrance into the finished product warehouse. During this inspection, all results collected on relevant lot are checked, some samples are tested and the Lot Acceptance Sheet is printed (*Table 4*).

## 3. QUALITY ASSESSMENT

### 3.1 CLASSIFICATION OF DEFECTS

A ferrite core set is considered defective if it does not comply with relevant TPC standard specification. Two levels of defects have been defined:

- **Major Defects:** may lead to an operating malfunction in the final wound component or mounting problems.
- **Minor Defects:** do not affect the operation or mounting of the wound component. They are generally mechanical and visual irregularities such as cracks and chips.

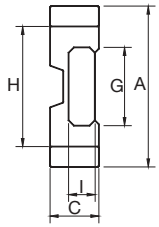
**Table 1: Major or Minor Defects?**
(versus the type of product and applications)

| Core Type | Application | Parameters | |
|---|---|---|---|
| | | Major Defects | Minor Defects |
| E-Cores<br>U-Cores<br>RM Cores<br>Toroids<br>FM | **Power Conversion**<br>• High power<br>• SMPS<br>• Consumer TV<br>• Electronic ballast | • AL or airgap<br>• Primary dimensions | • Power loss<br>• Amplitude permeability<br>• Secondary dimensions<br>• Strength |
| Toroids<br>E-Cores<br>U-Cores | **Filtering**<br>• EMI suppression | • AL<br>• Primary dimensions | • Loss factor<br>• Secondary dimensions<br>• Breakdown voltage on coated parts |

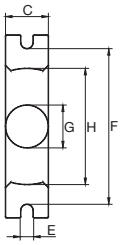
**Table 2: Major and Minor Defects Related to Primary and Secondary Dimensions**
(Please refer to the core drawing for the coding of dimensions)

**E-Cores**

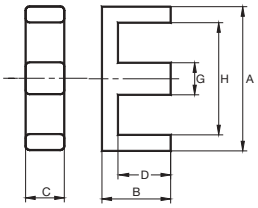
**EF**



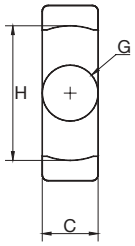

**EC**




**E-**

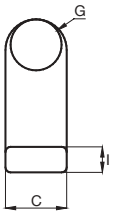



**ET/ER**

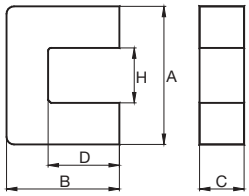



**U-Cores**

**UR**

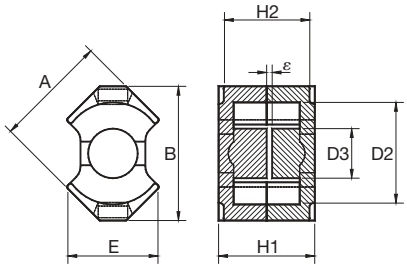



**U-**

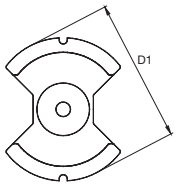



**RM Cores**

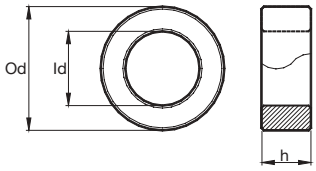
**RM**




**FM**




**Toroids (T-, TE or TR)**




| E & U Cores | |
|---|---|
| **Major Defects** | **Minor Defects** |
| A Max. | A Min. |
| B Max. | B Min. |
| C Max. | C Min. |
| D Min. | D Max. |
| ε (gap) tolerances | |
| G Max. | G Min. |
| H Min. | H Max. |
| I Max. | I Min. |

| RM Cores | |
|---|---|
| **Major Defects** | **Minor Defects** |
| H1 tolerances | A tolerances |
| H2 Min. | B tolerances |
| D1 Max. | C tolerances |
| D2 Min. | H2 Max. |
| D3 Max. | D1 Min. |
| A tolerance | D2 Max. |
| X tolerance | D3 Min. |
| ε (gap) tolerances | |

| | |
|---|---|
| **Major Defects** | **Minor Defects** |
| Od Max. | Od Min. |
| Id Min. | Id Max. |
| H Max. | H Min. |

**• Lot Acceptance Criteria**

Quality assessment relevant to each lot of product manufactured is based on inspection plan specified in related quality plans available per product family.

Inspection results are recorded on worksheets and each lot is released after checking the LAS (Lot Acceptance Sheet) issued at outgoing control.

Standard acceptance criteria about LAS parameters are:

- Cpk ≥ 1.33 on AL value or airgap
- Cpk ≥ 1.0 on dimensions

If Cpk levels are not met, additional measurements are performed or 100% sorting applied to the lot before release.

## 3.2. MAGNETIC PROPERTIES/ TEST CONDITIONS

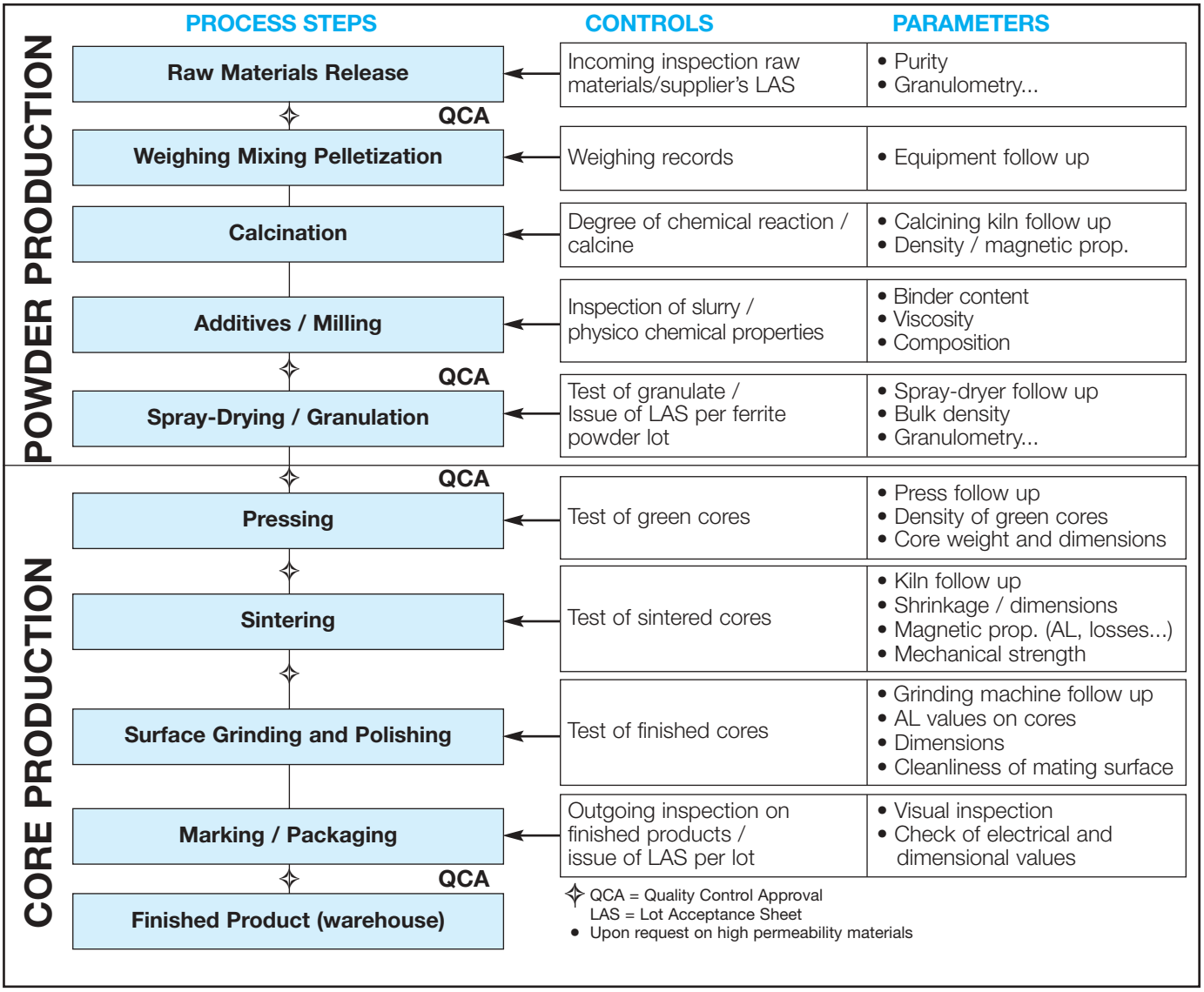
The following typical test conditions relevant to magnetic parameters are summarized in Table 3:

**Table 3: Typical Test Conditions**

| Tested Parameters | Test Conditions | | | |
|---|---|---|---|---|
| | Frequency (kHz) | Flux Density (mT) | Temperature (°C) | Number of Turns |
| $A_L$ value | 10 (or 1) | 1 mT Max. (peak value) | 25 ± 3 | 100 or 10 or single turn (when applicable) |
| tg δ/μ | 10 to 10000 depending on material | 1 mT (peak value) | 25 ± 3 | 15/pot cores 10/toroids |
| $\mu_a$ | 1 | 320/330/ 340/360 depending on mat. (peak value) | 100 ± 3 | 40 |
| Power Loss $P_L$ | 16-1000 (according to material) | 50 to 200 (peak value) | (25 ± 3) 100 ± 3 | 10 to 40 |

**Note:** AL value measurement is generally performed under a constant clamping force of 10 N in case of U and E-Cores.

**Table 4: U and E Core Typical Flow Chart**

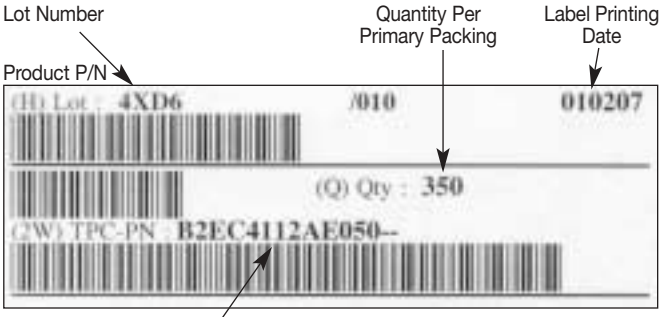


## 4. TRACEABILITY AND PACKAGING

### 4.1 TRACEABILITY

Each lot of finished products is identified through a bar code label stuck on each primary packing.

An example of a standard label is given below:




**NOTE:** Upon request, customer P/N can be printed also on the label.

A four digit lot number gives full traceability information from raw material till finished products.

### 4.2 PACKAGING

Our product packaging types ensure maximum protection against damage during transportation. Three main types are currently used:

- Polyfoam trays
- Carton trays and boxes
- Skin pack

**• Polyfoam Trays**

Currently polystyrene tray is the standard packing for most of E and U core types. Ferrite cores are generally set into individual cavities or large cavities for rows of products. Primary packing is composed of 3 to 10 trays depending on the height and weight relevant tray. Then packing is covered with cardboard and wrapped with plastic film or set into a carton box. Label is stuck on side of upper tray or on side of carton box to remain visible after pallet arrangement. Weight per packing must not exceed 16 kg.

**• Carton Trays and Boxes**

Carton trays have been designed for main large cores packaging (E/U and Toroids). Cores are loaded into individual cavity on a tray and several trays are set into a protection carton box (main size is 530 × 205mm).

**• Skin Pack**

Skin pack is used either for sampling or for packaging low profile cores such as planar core series. Main dimensions of cardboard support are 345 × 245mm. Then skin pack units are loaded in carton boxes.

**• Pallet Arrangement**

Deliveries are generally made through 800 × 1200mm Europallet type. Standard pallet loading is limited either to 850 kg weight or to 1350mm height to reduce potential handling damage.

Then pallet is covered with shrinked polyethylene film and protected by carton casing upon request.

## KEY APPLICATIONS

- EMI Suppression
- High Power
- SMPS
- TV & Monitors
- Lighting

# Soft Ferrites

## Materials

## POWER APPLICATIONS

| Symbols | Units | Test Conditions | B2 | B3 | B5 | F1 | F2 | *F4 |
|---|---|---|---|---|---|---|---|---|
| | | | Standard IEC 1332 | | | | | |
| | | | PW3b | PW1b | PW2a / PW2b | PW3b | PW4b | PW5b |
| $\mu_i$ | | 25°C | 1900 ± 25% | 1900 ± 25% | 1800 ± 25% | 2300 ± 25% | 1900 ± 25% | 1100 ± 25% |
| B at H (nominal values) | mT | 400 A/m 25°C | 460 | 470 | 470 | 450 | 420 | 390 |
| | | 400 A/m 100°C | 360 | 380 | 380 | 340 | 320 | 310 |
| | | 1600 A/m 25°C | 490 | 500 | 500 | 480 | 450 | 420 |
| | | 1600 A/m 100°C | 380 | 400 | 400 | 370 | 350 | 330 |
| $H_c$ | A/m | 25°C | 16 | 16 | 16 | 16 | 15 | 15 |
| | | 100°C | 10 | 10 | 10 | 10 | 10 | 10 |
| $T_c$ | °C | | > 250 | > 250 | > 250 | > 230 | > 200 | > 200 |
| $P_{L\ typ}$ | mW/cm$^3$ | 16 kHz - 100°C 200 mT | | < 80 | | | | |
| | | 25 kHz - 100°C 200 mT | < 150 | < 150 | | < 85** | <50** | |
| | | 32 kHz - 100°C 200 mT | | < 200 | < 140 | | | |
| | | 50 kHz - 100°C 200 mT | | | | | | |
| | | 60 kHz - 100°C 200 mT | < 340 | | < 350 | < 280 | | |
| | | 100 kHz - 100°C 100 mT | < 150 | | | < 85** | <50** | |
| | | 100 kHz - 100°C 200 mT | | | < 700 | < 580 | | |
| | | 300 kHz - 100°C 50 mT | | | | | < 100 | |
| | | 500 kHz - 100°C 50 mT | | | | | < 230 | < 180 |
| | | 1 MHz - 100°C 50 mT | | | | | | < 560 |
| | | 1.5 MHz - 100°C 50 mT | | | | | | < 1300 |
| r | Ω x m | | 6 | 6 | 6 | 6 | 6 | 6 |
| Density | g/cm$^3$ | | 4.8 | 4.8 | 4.8 | 4.8 | 4.6 | 4.8 |
| Core Shapes | | | E, U, RM Cores | E, U Cores for consumer application | ER, UR Cores | E, UR Cores, EP Cores | E, FP and RM Cores Planar Cores EP Cores | E, FP and RM Cores Planar Cores |

Values measured on ∅ 35 X ∅ 12x18 reference toroid.
*Values measured on ∅ 21.7 X ∅ 13.8x11 reference toroid.
**Typical values for large cores

## FILTERING APPLICATIONS

| Symbols | Units | Test Conditions | A0* | A1* | A2 | A3 | A4 | A5 | A6 | A9 | T9 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Class (IEC 1332) | | | | | | | | |
| | | | CL12 | CL11 | CL11 | CL10 | CL9 | CL9 | CL9 | CL7 | CL7 |
| μi | | 25°C | 15000 ± 30% | 12000 ± 30% | 10000 ± 30% | 7500 ± 25% | 6000 ± 25% | 5000 ± 25% | 4000 ± 25% | 2500 ± 25% | 2500 ± 25% |
| $\hat{B}$ at $\hat{H}$ | mT | 25°C | 330 | 330 | 330 | 330 | 350 | 350 | 410 | 480 | 480 |
| | | 100°C | 200 | 200 | 200 | 200 | 250 | 250 | 310 | 370 | 370 |
| | A/m | | 800 | 800 | 800 | 800 | 800 | 800 | 800 | 1600 | 1600 |
| $H_c$ | A/m | 25°C | 6.2 | 6.2 | 6.2 | 6.2 | 6.4 | 6.4 | 12 | 12 | 12 |
| | | 100°C | 3.1 | 3.1 | 3.1 | 3.1 | 4.8 | 4.8 | 8 | 10 | 9.6 |
| $T_C$ | °C | | > 110 | > 110 | > 120 | > 120 | > 140 | > 140 | > 160 | > 200 | > 200 |
| $f_C$ | MHz | 25°C | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.5 | 0.6 | 1.5 | Df : M ≈ 5 x10$^{-6}$ $\alpha_f$ : M ≈ 2 x10$^{-6}$ / °C |
| tgδ /μ | x10-6 | 25°C | < 9 <25 | < 7 < 25 | < 6 < 60 | < 7 | < 9 | < 6 | < 9 | < 8 | <8 |
| at f | kHz | | 10 30 | 10 30 | 10 100 | 10 | 10 | 10 | 30 | 100 | 100 |
| ρ | Ω x m | | 0.3 | 0.3 | 0.3 | 0.3 | 0.5 | 0.5 | 0.5 | 1 | 1 |
| Density | g/cm$^3$ | | 4.9 | 4.9 | 4.9 | 4.9 | 4.8 | 4.8 | 4.7 | 4.8 | 4.8 |
| Core Shapes | | | Toroids, ST and SQ Cores RM, EP Cores | Toroids, ST and SQ Cores RM, EP Cores | Toroids, ST and SQ Cores RM, EP Cores | Toroids, ST and SQ Cores E and U Cores | Toroids, ST, SQ, E and U Cores | Toroids | Toroids, E and U Cores | Toroids | FP, FC, RM |

*New high permeability materials
Values measured on ∅ 21 X ∅ 14x10 reference toroid.

For special shape or application, please refer to individual core specification.
Due to technical enhancement, data subject to change without notice.

$\mu_i$ Initial permeability
B Flux density (RMS value)
$\hat{B}$ Flux density (peak value)
$\hat{H}$ Magnetic field strength (peak value)
Hc Coercive field
fc Cut-off frequency
Tc Curie point
$P_L$ Power losses
ρ Resistivity

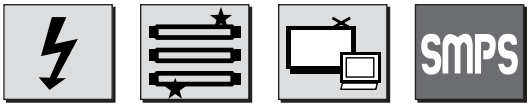
1 mT = 10 G
1 A/m = 1.26 x 10$^{-2}$ oe
1 A/cm = 1.25 oe
1 oe = 80 A/m

# Soft Ferrites

## B2 Material

## APPLICATION

B2 is a “low loss ferrite material”. It offers low losses above 70ºC. This characteristic makes it particularly suitable for modern designs up to 150 kHz frequency.




## MAIN CHARACTERISTICS

| | | |
|---|---|---|
| $\mu_i$ | 25°C | : 1900 ± 25% |
| $\hat{B}$ at 400 A/m | 25°C | : 460 mT |
| | 100°C | : 360 mT |
| Losses $P_L$ 100 mT, 100°C, | 100 kHz | : < 150 mW/cm³ |
| 200 mT, 100ºC, | 60 kHz | : < 340 mW/cm³ |
| Curie Temperature | | : > 250°C |

## AVAILABLE CORE SHAPES

E, U, RM cores, Toroids.

**Hysteresis Loop**

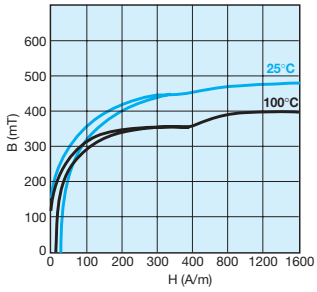



*Figure B2-1*

**Permeability ($\mu_i$) vs Temperature**

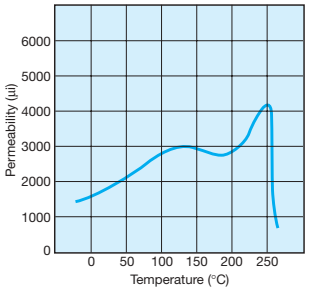



*Figure B2-2*

**Permeability (μa) vs Flux Density ($\hat{B}$)**

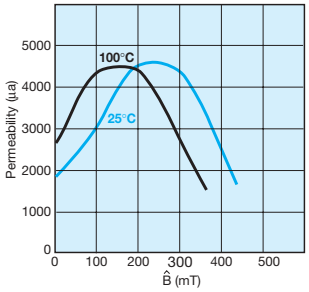



*Figure B2-3*

**Permeability ($\mu_i$) vs Frequency**

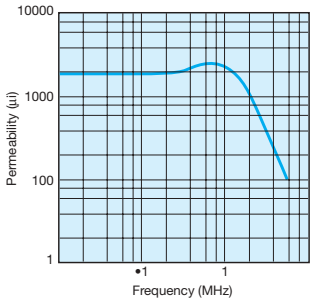



*Figure B2-4*

**Flux Density ($\hat{B}$) at 400 A/m vs Temperature**

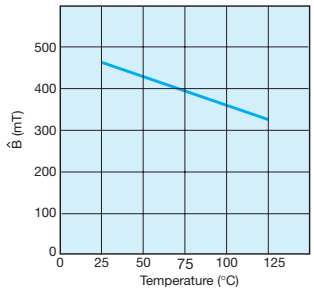



*Figure B2-5*

**Power Losses ($P_L$) vs Frequency**

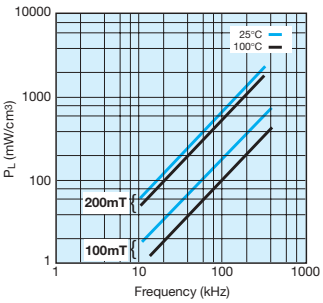



*Figure B2-6*

**Power Losses ($P_L$) vs Temperature at 50 kHz**

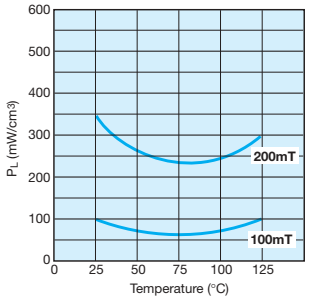



*Figure B2-7*

**Power Losses ($P_L$)vs Temperature at 100 kHz**

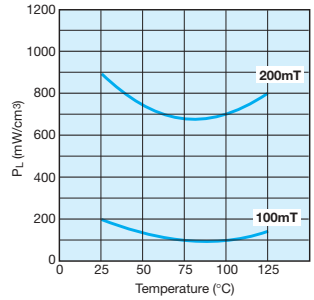



*Figure B2-8*

# Soft Ferrites

## B3 Material

## APPLICATION

B3 is a “low frequency and high flux density” ferrite material. It offers superior saturation flux density at high temperature. This characteristic makes it particularly suitable for high saturation applications in TV sets and chockes.

## MAIN CHARACTERISTICS

| | | |
|---|---|---|
| $\mu_i$ | 25°C | : 1900 ± 25% |
| $\hat{B}$ at 400 A/m | 25°C | : 470 mT |
| | 100°C | : 380 mT |
| Losses $P_L$ 200 mT, 100°C, | 16 kHz | : < 80 mW/cm³ |
| | 25 kHz | : < 150 mW/cm³ |
| | 32 kHz | : < 200 mW/cm³ |
| Curie Temperature | | : > 250°C |

## AVAILABLE CORE SHAPES

E, U cores.

**Hysteresis Loop**

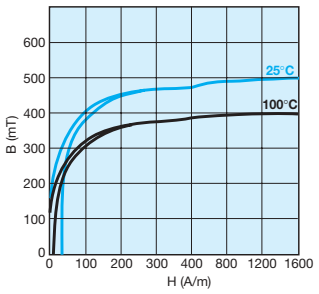



*Figure B3-1*

**Permeability ($\mu_i$) vs Temperature**

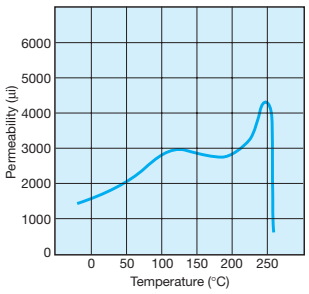



*Figure B3-2*

**Permeability (μa) vs Flux Density ($\hat{B}$)**

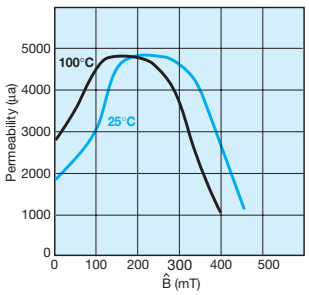



*Figure B3-3*

**Permeability ($\mu_i$) vs Frequency**

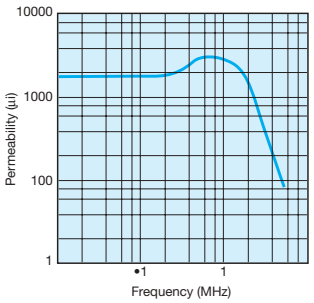



*Figure B3-4*

**Flux Density ($\hat{B}$) at 400 A/m vs Temperature**

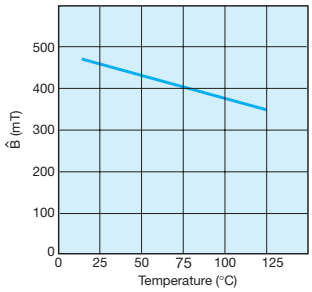



*Figure B3-5*

**Power Losses ($P_L$) vs Frequency**

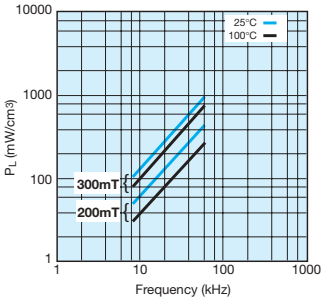



*Figure B3-6*

**Power Losses ($P_L$) vs Temperature at 16 kHz**

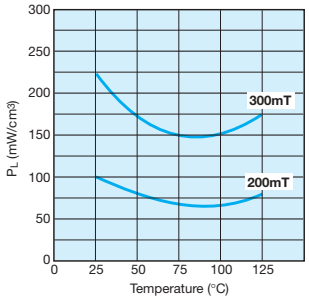



*Figure B3-7*

**Power Losses ($P_L$) vs Temperature at 32 kHz**

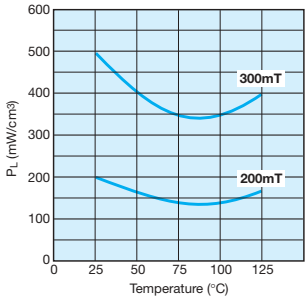



*Figure B3-8*

# Soft Ferrites

## B5 Material

## APPLICATION

B5 is a “low frequency and high flux density” ferrite material. It offers superior saturation flux density at high temperature. This characteristic makes it particularly suitable for high saturation applications in height end TV sets and chockes.

## MAIN CHARACTERISTICS

| | | |
|---|---|---|
| $\mu_i$ | 25°C | : 1800 ± 25% |
| $\hat{B}$ at 400 A/m | 25°C | : 470 mT |
| | 100°C | : 380 mT |
| Losses $P_L$ 200 mT, 100°C, | 32 kHz | : < 140 mW/cm³ |
| | 60 kHz | : < 350 mW/cm³ |
| | 100 kHz | : < 700 mW/cm³ |
| Curie Temperature | | : > 250°C |

## AVAILABLE CORE SHAPES

E, U cores.

**Hysteresis Loop**

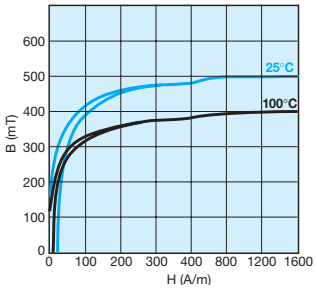



*Figure B5-1*

**Permeability ($\mu_i$) vs Temperature**

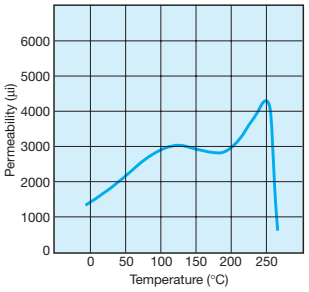



*Figure B5-2*

**Permeability (μa) vs Flux Density ($\hat{B}$)**

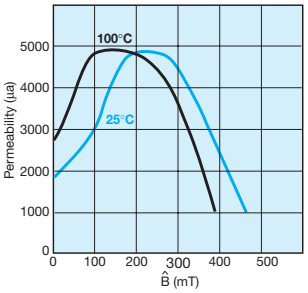



*Figure B5-3*

**Permeability ($\mu_i$) vs Frequency**

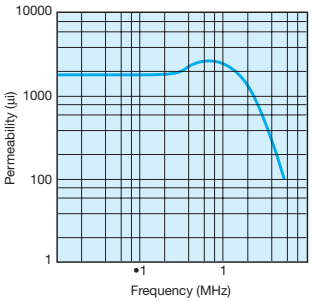



*Figure B5-4*

**Flux Density ($\hat{B}$) at 400 A/m vs Temperature**

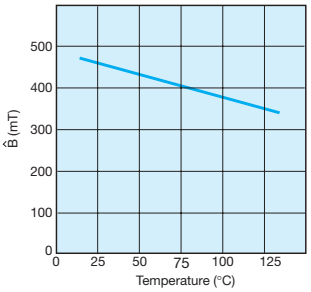



*Figure B5-5*

**Power Losses ($P_L$) vs Frequency**

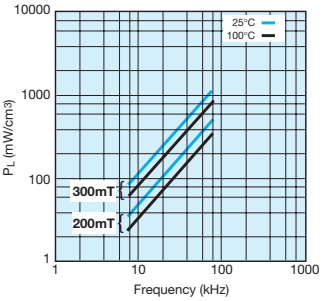



*Figure B5-6*

**Power Losses ($P_L$) vs Temperature at 32 kHz**

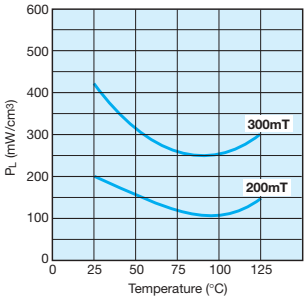



*Figure B5-7*

**Power Losses ($P_L$) vs Temperature at 50 kHz**

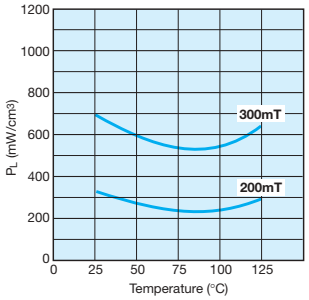



*Figure B5-8*

# Soft Ferrites

## F1 Material

## APPLICATION

F1 is a very low loss ferrite material for frequencies up to 250 kHz. Losses have been optimized in high temperature range, 80 to 100ºC.

## MAIN CHARACTERISTICS

| | | | |
|---|---|---|---|
| $\mu_i$ | 25°C | : 2300 ± 25% | |
| $\hat{B}$ at 400 A/m | 25°C | : 450 mT | |
| | 100°C | : 340 mT | |
| Losses $P_L$ 200 mT, 100°C, | 60 kHz | : < 280 mW/cm³ | Typical Value for Large Cores: |
| | 100 kHz | : < 580 mW/cm³ | 25 kHz - 200 mT : < 85 mW/cm³ |
| Curie Temperature | | : > 230°C | 100 kHz - 100 mT : < 85 mW/cm³ |

## AVAILABLE CORE SHAPES

E, U cores.

**Hysteresis Loop**

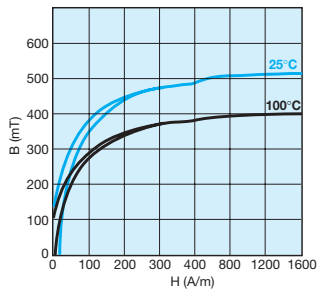



*Figure F1-1*

**Permeability ($\mu_i$) vs Temperature**

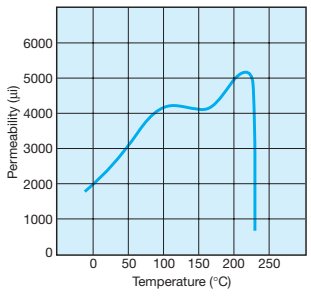



*Figure F1-2*

**Permeability ($\mu_i$) vs Frequency**

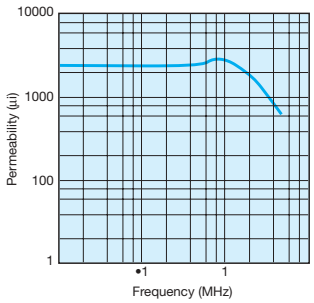



*Figure F1-3*

**Power Losses ($P_L$) vs Frequency at 200 mT**

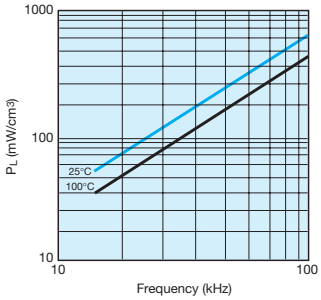



*Figure F1-4*

**Power Losses ($P_L$) vs Temperature at 200 mT**

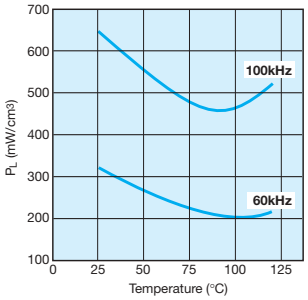



*Figure F1-5*

# Soft Ferrites

## F2 Material

## APPLICATION

F2 is a high frequency application ferrite material for 100 to 500 kHz frequencies range. Losses have been optimized in high temperature range, 80 to 100ºC.

SMPS

## MAIN CHARACTERISTICS

| | | |
|---|---|---|
| $\mu_i$ | 25°C | : 1900 ± 25% |
| $\hat{B}$ at 400 A/m | 25°C | : 420 mT |
| | 100°C | : 320 mT |
| Losses $P_L$ 50 mT, 100°C, | 300 kHz | : < 100 mW/cm³ |
| | 500 kHz | : < 230 mW/cm³ |
| Curie Temperature | | : > 200°C |

Typical Value for Large Cores:

25 kHz - 200 mT : < 50 mW/cm³

100 kHz - 200 mT : < 50 mW/cm³

## AVAILABLE CORE SHAPES

E, U, RM and FP cores.

**Hysteresis Loop**

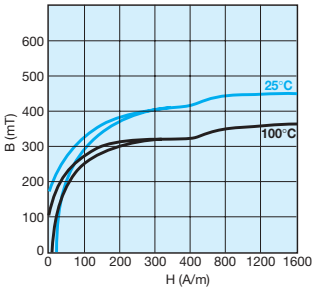



*Figure F2-1*

**Permeability ($\mu_i$) vs Temperature**

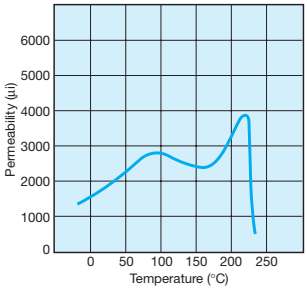



*Figure F2-2*

**Permeability (μa) vs Flux Density ($\hat{B}$)**

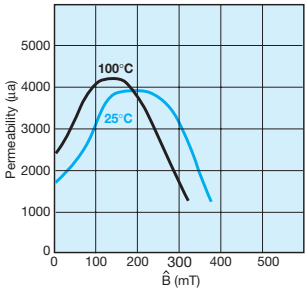



*Figure F2-3*

**Permeability ($\mu_i$) vs Frequency**

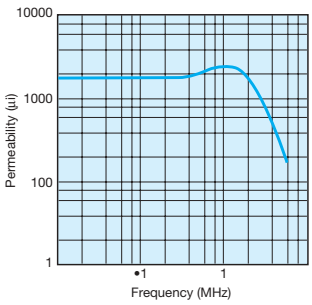



*Figure F2-4*

**Flux Density ($\hat{B}$) at 400 A/m vs Temperature**

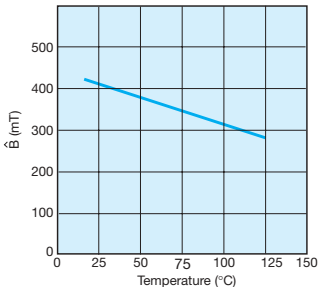



*Figure F2-5*

**Power Losses ($P_L$) vs Frequency**

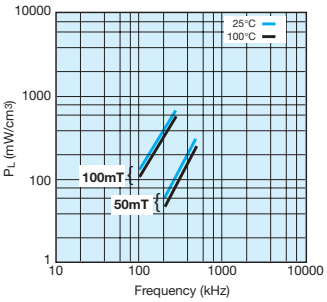



*Figure F2-6*

**Power Losses ($P_L$) vs Temperature at 300 kHz**

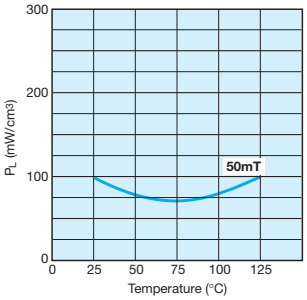



*Figure F2-7*

# Soft Ferrites

## F4 Material

## APPLICATION

F4 is a very low loss ferrite material for 300 to 1.5 MHz frequency range.

SMPS

## MAIN CHARACTERISTICS

| | | |
|---|---|---|
| $\mu_i$ | 25°C | : 1100 ± 25% |
| $\hat{B}$ at 400 A/m | 25°C | : 390 mT |
| | 100°C | : 310 mT |
| Losses $P_L$ 50 mT, 100°C, | 500 kHz | : < 180 mW/cm³ |
| 50 mT, 100°C, | 1 MHz | : < 560 mW/cm³ |
| 50 mT, 100°C, | 1.5 MHz | : < 1300 mW/cm³ |
| Curie Temperature | | : > 200°C |

## AVAILABLE CORE SHAPES

Upon request.

**Hysteresis Loop**

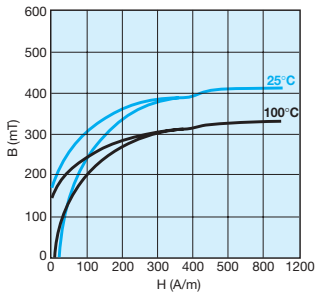



*Figure F4-1*

**Permeability ($\mu_i$) vs Temperature**

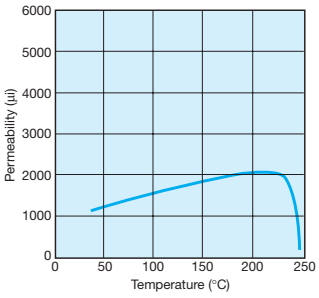



*Figure F4-2*

**Permeability (μa) vs Flux Density ($\hat{B}$)**

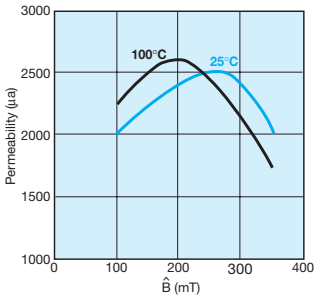



*Figure F4-3*

**Permeability ($\mu_i$) vs Frequency**

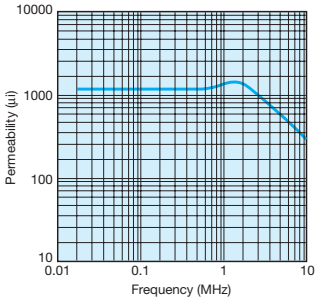



*Figure F4-4*

**Flux Density ($\hat{B}$) at 400 A/m vs Temperature**

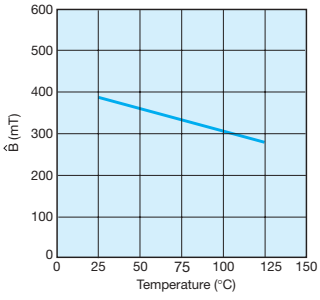



*Figure F4-5*

**Power Losses ($P_L$) vs Frequency**

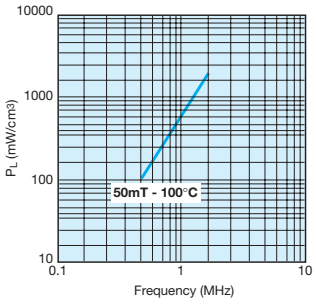



*Figure F4-6*

**Power Losses ($P_L$) vs Temperature at 1 MHz - 50 mT**

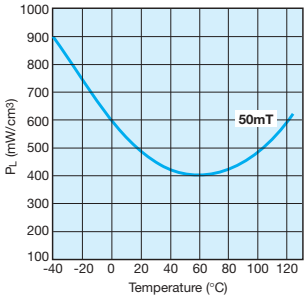
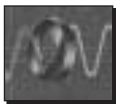



*Figure F4-7*

# Soft Ferrites

## A2 Material

### APPLICATION



A2 is a high permeability material especially designed for noise suppression applications.

### MAIN CHARACTERISTICS

| | | |
|---|---|---|
| $\mu_i$ | 25°C | : 10,000 ± 30% |
| $\hat{B}$ at 400 A/m | 25°C | : 330 mT |
| | 100°C | : 200 mT |
| Curie Temperature | | : > 120°C |

### AVAILABLE CORE SHAPES

Small toroids, EP and RM pot cores.

**Permeability ($\mu_i$) vs Temperature**

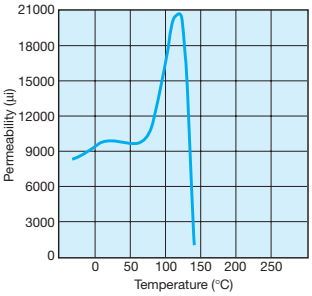



*Figure A2-1*

**Hysteresis Loop**

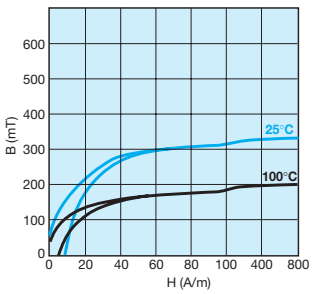



*Figure A2-2*

**Loss Factor (Tgδ/μ) vs Frequency**

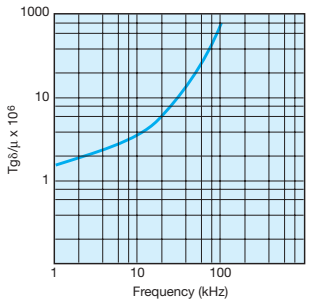



*Figure A2-3*

**Complex Permeability (μ's, μ"s) vs Frequency**

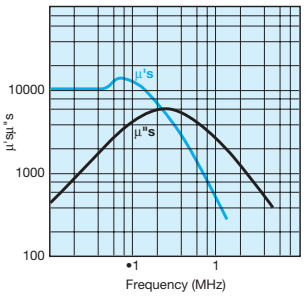


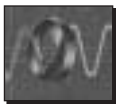

*Figure A2-4*

# Soft Ferrites

## A3 Material

## APPLICATION

A3 is a high permeability material especially designed for noise suppression applications.



## MAIN CHARACTERISTICS

| | | |
|---|---|---|
| $\mu_i$ | 25°C | : 7500 ± 25% |
| $\hat{B}$ at 800 A/m | 25°C | : 330 mT |
| | 100°C | : 200 mT |
| Curie Temperature | | : > 120°C |

## AVAILABLE CORE SHAPES

Toroids, small E and U cores.

**Permeability ($\mu_i$) vs Temperature**

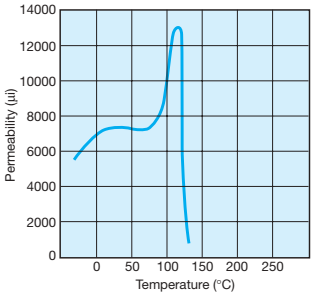



*Figure A3-1*

**Hysteresis Loop**

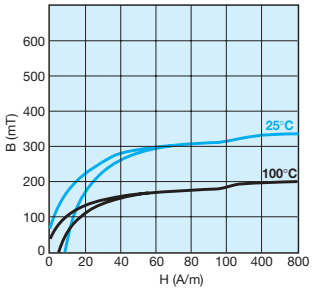



*Figure A3-2*

**Loss Factor (Tgδ/μ) vs Frequency**

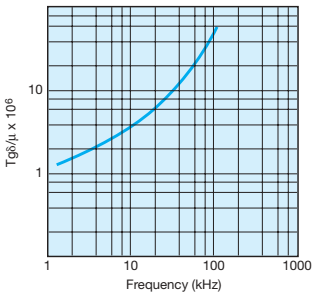



*Figure A3-3*

**Complex Permeability (μ's, μ"s) vs Frequency**

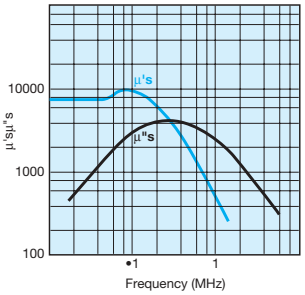
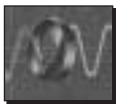



*Figure A3-4*

# Soft Ferrites

## A4 Material

### APPLICATION



A4 is a high permeability material especially designed for noise suppression applications.

### MAIN CHARACTERISTICS

| | | |
|---|---|---|
| $\mu_i$ | 25°C | : 6000 ± 25% |
| $\hat{B}$ at 400 A/m | 25°C | : 350 mT |
| | 100°C | : 250 mT |
| Curie Temperature | | : > 140°C |

### AVAILABLE CORE SHAPES

Toroids and small E and U cores.

**Permeability ($\mu_i$) vs Temperature**

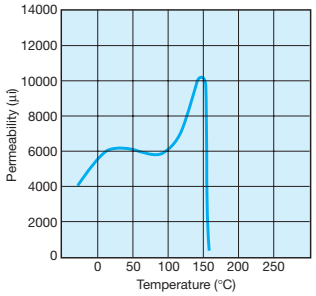



*Figure A4-1*

**Hysteresis Loop**

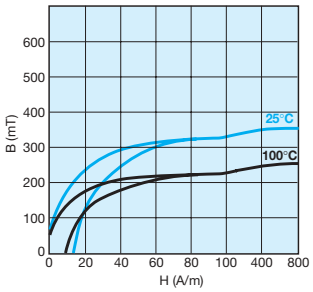



*Figure A4-2*

**Loss Factor (Tgδ/μ) vs Frequency**

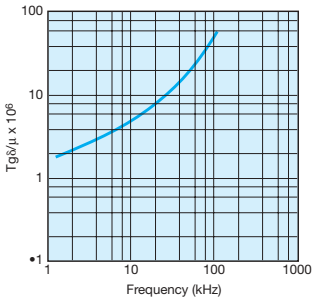



*Figure A4-3*

**Complex Permeability (μ's, μ"s) vs Frequency**

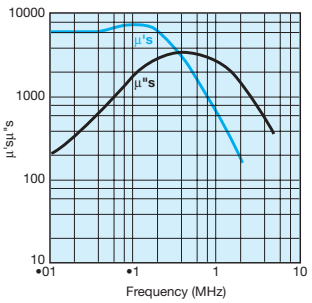
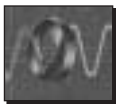



*Figure A4-4*

# Soft Ferrites

## A5 Material

## APPLICATION



A5 is a high permeability material especially designed for noise suppression applications.

## MAIN CHARACTERISTICS

| | | |
|---|---|---|
| $\mu_i$ | 25°C | : 5000 ± 25% |
| $\hat{B}$ at 400 A/m | 25°C | : 350 mT |
| | 100°C | : 250 mT |
| Curie Temperature | | : > 140°C |

## AVAILABLE CORE SHAPES

Toroids.

**Permeability ($\mu_i$) vs Temperature**

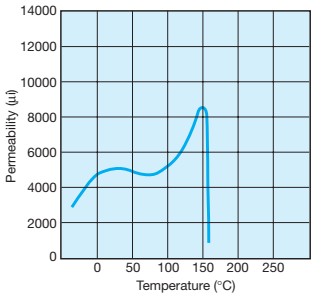



*Figure A5-1*

**Hysteresis Loop**

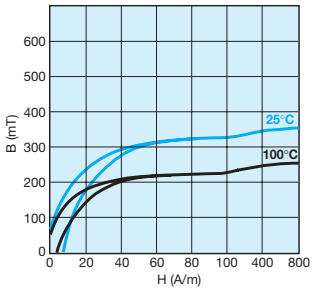



*Figure A5-2*

**Loss Factor (Tgδ/μ) vs Frequency**

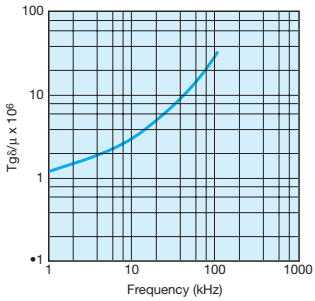



*Figure A5-3*

**Complex Permeability (μ's, μ"s) vs Frequency**

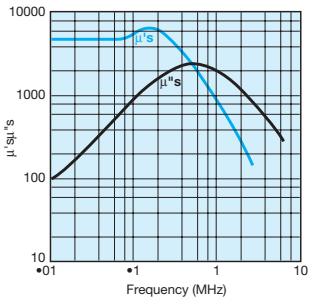
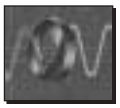



*Figure A5-4*

# Soft Ferrites

## A6 Material

### APPLICATION



A6 is a high permeability material especially designed for noise suppression applications.

### MAIN CHARACTERISTICS

| | | |
|---|---|---|
| $\mu_i$ | 25°C | : 4000 ± 25% |
| $\hat{B}$ at 400 A/m | 25°C | : 410 mT |
| | 100°C | : 310 mT |
| Curie Temperature | | : > 160°C |

### AVAILABLE CORE SHAPES

Toroids and small E and U cores.

**Permeability ($\mu_i$) vs Temperature**

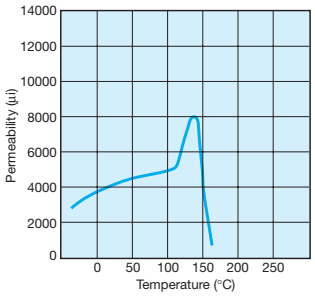



*Figure A6-1*

**Hysteresis Loop**

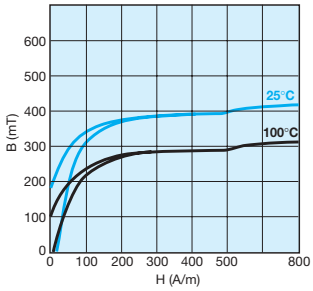



*Figure A6-2*

**Loss Factor (Tgδ/μ) vs Frequency**

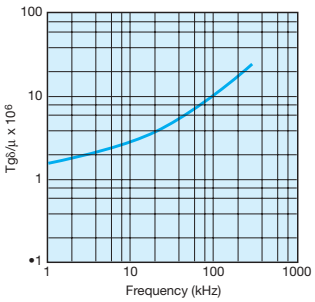



*Figure A6-3*

**Complex Permeability (μ's, μ"s) vs Frequency**

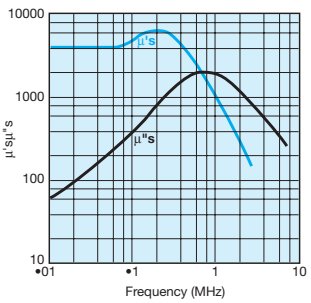
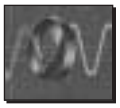



*Figure A6-4*

# Soft Ferrites

## A9 Material

## APPLICATION



A9 is designed for noise suppression. Maximum frequency application is greater application than 3.5 MHz. Other applications include sensors and crossover networks in HI-FI systems.

## MAIN CHARACTERISTICS

| | | |
|---|---|---|
| $\mu_i$ | 25°C | : 2500 ± 25% |
| $\hat{B}$ at 400 A/m | 25°C | : 480 mT |
| | 100°C | : 370 mT |
| Curie Temperature | | : > 200°C |

## AVAILABLE CORE SHAPES

Toroids.

**Permeability ($\mu_i$) vs Temperature**

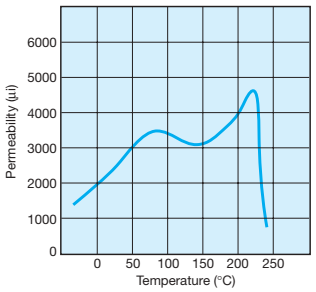



*Figure A9-1*

**Hysteresis Loop**

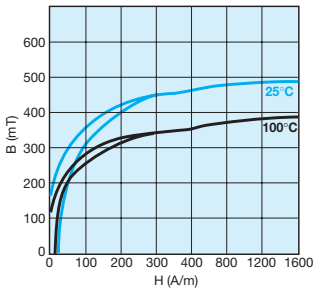



*Figure A9-2*

**Loss Factor (Tgδ/μ) vs Frequency**

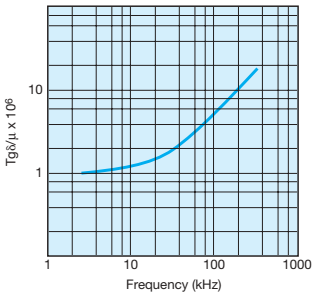



*Figure A9-3*

**Complex Permeability (μ's, μ"s) vs Frequency**

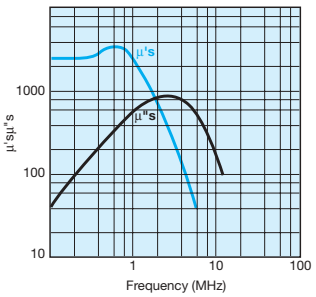
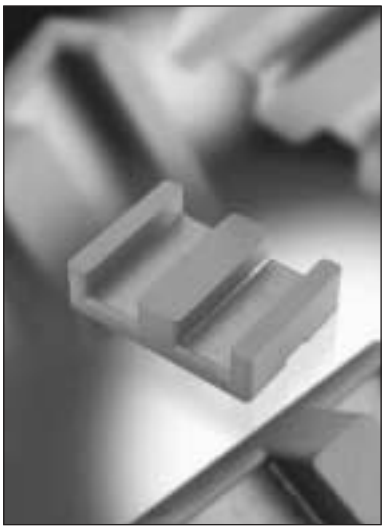



*Figure A9-4*

# Soft Ferrites

## Planar Cores

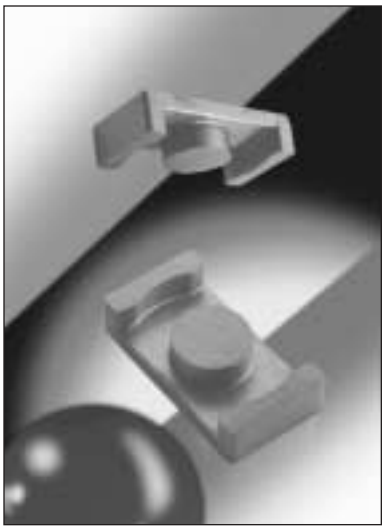


E- Cores

AVX/TPC introduces a new range of Ferrite products with high frequency materials for power conversion.

Planar cores can be glued or assembled with clamps in order to reduce the size of converter.

These cores are also designed with different heights upon request. For specific requirements on design or materials, please contact your local representative.



ER Cores

## KEY APPLICATIONS

- **SMPS**


## HOW TO ORDER

| F 2 | E - | 1 8 1 0 | B | A 1 6 0 | R | – |
|---|---|---|---|---|---|---|
| Material | Model | Shape Code | Form Factor | Finishing | | |

**Finishing**
Gapped cores can be ordered as:
- Mechanical Gap (gap value + tol. in mm)
- Electrical Gap ($A_L$ value + tol. in %)
- Contact your local representative

**R** : for cores with notches
**–** : for cores without notch

**I** : E gapped core measured with I
**E** : E gapped core measured with E
**–** : E ungapped core measured with E

| F 2 | I E | 1 8 1 0 | B | – – – – | R | – |
|---|---|---|---|---|---|---|

Identical to E cores

**R** : for cores with notches
**–** : for cores without notch

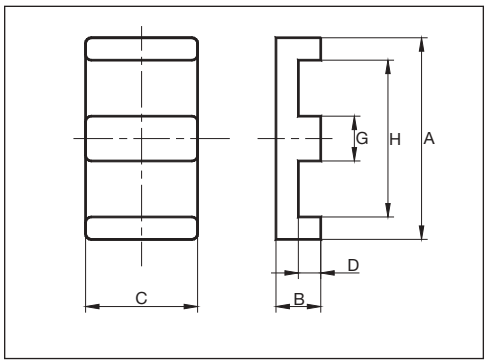



*Figure 1 – E- Planar Cores without notch*

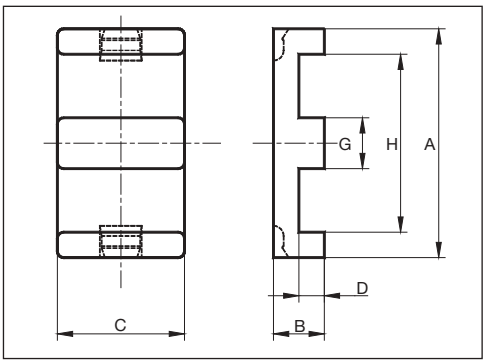



*Figure 2 – E- Planar Cores with notches*

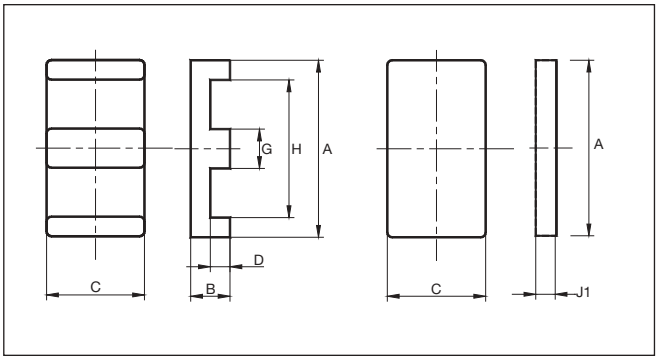



*Figure 3 – E- and IE Planar Cores without notch*

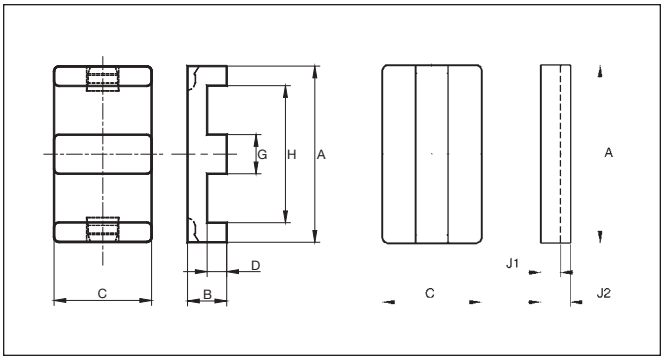
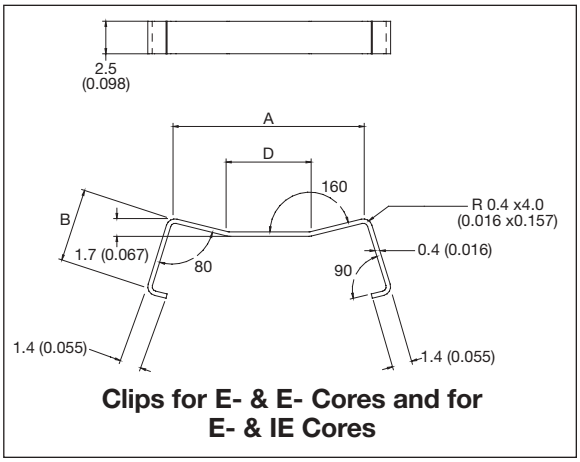



*Figure 4 – E- and IE Planar Cores with notches*

## PLANAR CLIPS




**Clips for E- & E- Cores and for E- & IE Cores**

| P/N | P/N Clips | A mm (inches) | B mm (inches) | D mm (inches) |
|---|---|---|---|---|
| **E-1405B + E-1405B** | **--JP1405BEE----** | 14.6 (0.575) | 8.0 (0.315) | 5.75 (0.226) |
| **E-1810B + E-1810B** | **--JP1801BEE----** | 18.4 (0.724) | 9.0 (0.354) | 9.55 (0.376) |
| **E-2216B + E-2216B** | **--JP2216BEE----** | 22.1 (0.870) | 11.7 (0.460) | 13.25 (0.522) |
| **E-1405B + IE1405B** | **--JP1405BEI----** | 14.6 (0.575) | 5.95 (0.234) | 5.75 (0.226) |
| **E-1810B + IE1810B** | **--JP1810BEI----** | 18.4 (0.724) | 6.95 (0.274) | 9.55 (0.376) |
| **E-2216B + IE2216B** | **--JP2216BEI----** | 22.1 (0.870) | 8.4 (0.331) | 13.25 (0.522) |

# Soft Ferrites

## E- Planar Cores

### DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | F | | G | | H | | J1 (without notch) | | J2 (with notches) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **E-1405B** | 14.0 (0.551) | 0.30 (0.012) | 3.50 (0.138) | 0.10 (0.004) | 5.00 (0.197) | 0.10 (0.004) | 2.00 (0.078) | 0.10 (0.004) | | | 3.00 (0.118) | 0.05 (0.002) | 11.0 (0.433) | 0.25 (0.010) | | | | |
| **E-1810B** | 18.0 (0.708) | 0.35 (0.014) | 4.00 (0.157) | 0.10 (0.004) | 10.0 (0.394) | 0.20 (0.008) | 2.00 (0.078) | 0.10 (0.004) | | | 4.00 (0.157) | 0.10 (0.004) | 14.0 (0.551) | 0.30 (0.012) | | | | |
| **E-2216B** | 21.8 (0.858) | 0.40 (0.016) | 5.70 (0.224) | 0.10 (0.004) | 15.8 (0.622) | 0.30 (0.012) | 3.20 (0.126) | 0.10 (0.004) | | | 5.00 (0.197) | 0.10 (0.004) | 16.8 (0.661) | 0.40 (0.016) | | | | |
| **E-1405B + IE1405B** | 14.0 (0.551) | 0.30 (0.012) | 3.50 (0.138) | 0.10 (0.004) | 5.00 (0.197) | 0.10 (0.004) | 2.00 (0.078) | 0.10 (0.004) | | | 3.00 (0.118) | 0.05 (0.002) | 11.0 (0.433) | 0.25 (0.010) | 1.50 (0.708) | 0.10 (0.004) | 1.80 (0.070) | 0.10 (0.004) |
| **E-1810B + IE1810B** | 18.0 (0.708) | 0.35 (0.014) | 4.00 (0.157) | 0.10 (0.004) | 10.0 (0.394) | 0.20 (0.008) | 2.00 (0.078) | 0.10 (0.004) | | | 4.00 (0.157) | 0.10 (0.004) | 14.0 (0.551) | 0.30 (0.012) | 2.00 (0.078) | 0.10 (0.004) | 2.40 (0.094) | 0.10 (0.004) |
| **E-2216B + IE2216B** | 21.8 (0.858) | 0.40 (0.016) | 5.70 (0.224) | 0.10 (0.004) | 15.8 (0.622) | 0.30 (0.012) | 3.20 (0.126) | 0.10 (0.004) | | | 5.00 (0.197) | 0.10 (0.004) | 16.8 (0.661) | 0.40 (0.016) | 2.50 (0.098) | 0.10 (0.004) | 2.90 (0.114) | 0.10 (0.004) |

### EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor C (nH) | Core Constant C $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume Ve $mm^3$ ($in.^3$) | Weight Per Set W g (oz.) |
|---|---|---|---|---|---|---|---|
| **E-1405B** | 0.87 | 1.45 (36.34) | 20.7 (0.814) | 14.3 (0.058) | 13.9 (0.054) | 296 (0.116) | 1.58 (0.055) |
| **E-1810B** | 2.03 | 0.62 (16) | 24.3 (0.956) | 39.3 (0.153) | 38.9 (0.154) | 955 (0.376) | 5 (0.175) |
| **E-2216B** | 3.03 | 0.41 (10.65) | 32.5 (1.28) | 78.3 (0.308) | 77.9 (0.306) | 2540 (1) | 13.1 (0.46) |
| **E-1405B + IE1405B** | 1.09 | 1.15 (29.2) | 16.7 (0.657) | 14.5 (0.057) | 13.9 (0.054) | 242 (0.095) | 1.32 (0.046) |
| **E-1810B + IE1810B** | 2.45 | 0.51 (12.95) | 20.3 (0.8) | 39.5 (0.155) | 38.9 (0.153) | 805 (0.317) | 4.22 (0.147) |
| **E-2216B + IE2216B** | 3.79 | 0.33 (8.38) | 26.2 (1.027) | 78.5 (0.309) | 77.9 (0.306) | 2050 (0.807) | 10.7 (0.374) |

### MATERIALS

| P/N | F2 | | F4 | |
|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (300kHz-50mT) | **Al** (nH) ±25% | Loss **W** (1000kHz-50mT) |
| **E-1405B** | 1050 | <0.035 | 800 | <0.21 |
| *codif. without notch* | F2E1405B------ | | F4E-1405B------ | |
| *codif. with notches* | F2E1405B----R- | | F4E-1405B----R- | |
| **E-1810B** | 2550 | 0.11 | 1950 | <0.65 |
| *codif. without notch* | F2E-1810B------ | | F4E-1810B------ | |
| *codif. with notches* | F2E-1810B----R- | | F4E-1810B----R- | |
| **E-2216B** | 4150 | <0.30 | 3150 | <1.80 |
| *codif. without notch* | F2E-2216B------ | | F4E-2216B------ | |
| *codif. with notches* | F2E-2216B----R- | | F4E-2216B----R- | |
| **E-1405B + IE1405B** | 1200 | <0.028 | 940 | <0.17 |
| *codif. without notch* | F2E-1405B------ + F2IE1405B------ | | F4E-1405B------ + F4IE1405B------ | |
| *codif. with notches* | F2E-1405B----R- + F2IE1405B----R- | | F4E-1405B----R- + F4IE1405B----R- | |
| **E-1810B + IE1810B** | 2900 | <0.093 | 2250 | <0.55 |
| *codif. without notch* | F2E-1810B------ + F2IE-1810B------ | | F4E-1810B------ + F4IE-1810B------ | |
| *codif. with notches* | F2E-1810B----R- + F2IE-1810B----R- | | F4E-1810B----R- + F4IE-1810B----R- | |
| **E-2216B + IE2216B** | 4900 | <0.24 | 3700 | <1.40 |
| *codif. without notch* | F2E-2216B------ + F2IE-2216B------ | | F4E-2216B------ + F4IE-2216B------ | |
| *codif. with notches* | F2E-2216B----R- + F2IE-2216B----R- | | F4E-2216B----R- + F4IE-2216B----R- | |

# Soft Ferrites

## E- Planar Cores

## DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | | J1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P/N | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) |
| E-3220A | 31.75 (1.250) | 0.65 (0.025) | 6.35 (0.250) | 0.15 (0.006) | 20.32 (0.800) | 0.41 (0.016) | 3.20 (0.126) | 0.20 (0.008) | 6.35 (0.250) | 0.15 (0.006) | 25.5 (1.004) | 0.60 (0.023) | | |
| E-3825A | 38.10 (1.500) | 0.80 (0.031) | 8.25 (0.325) | 0.15 (0.006) | 25.40 (1.000) | 0.55 (0.022) | 4.45 (0.175) | 0.15 (0.006) | 7.60 (0.299) | 0.20 (0.008) | 30.8 (1.212) | 0.60 (0.023) | | |
| E-4328A | 43.20 (1.700) | 0.90 (0.035) | 9.50 (0.374) | 0.15 (0.006) | 27.90 (1.098) | 0.60 (0.024) | 5.40 (0.213) | 0.15 (0.006) | 8.10 (0.319) | 0.20 (0.008) | 35.5 (1.398) | 0.80 (0.031) | | |
| E-5838A | 58.40 (2.300) | 1.20 (0.047) | 10.55 (0.415) | 0.15 (0.006) | 38.10 (1.500) | 0.80 (0.031) | 6.50 (0.256) | 0.15 (0.006) | 8.10 (0.319) | 0.20 (0.008) | 51.10 (2.012) | 1.10 (0.043) | | |
| E-6450A | 64.00 (2.520) | 1.30 (0.051) | 10.20 (0.402) | 0.15 (0.006) | 50.80 (2.000) | 1.10 (0.043) | 5.10 (0.201) | 0.15 (0.006) | 10.20 (0.402) | 0.20 (0.008) | 53.60 (2.110) | 1.10 (0.043) | | |
| E-3220A + IE3220A | 31.75 (1.250) | 0.65 (0.025) | 6.35 (0.250) | 0.15 (0.006) | 20.32 (0.800) | 0.41 (0.016) | 3.20 (0.126) | 0.20 (0.008) | 6.35 (0.250) | 0.15 (0.006) | 25.5 (1.004) | 0.60 (0.023) | 3.15 (0.124) | 0.15 (0.006) |
| E-3825A + IE3825A | 38.10 (1.500) | 0.80 (0.031) | 8.25 (0.325) | 0.15 (0.006) | 25.40 (1.000) | 0.55 (0.022) | 4.45 (0.175) | 0.15 (0.006) | 7.60 (0.299) | 0.20 (0.008) | 30.8 (1.212) | 0.60 (0.023) | 3.80 (0.150) | 0.15 (0.006) |
| E-4328A + IE4328A | 43.20 (1.700) | 0.90 (0.035) | 9.50 (0.374) | 0.15 (0.006) | 27.90 (1.098) | 0.60 (0.024) | 5.40 (0.213) | 0.15 (0.006) | 8.10 (0.319) | 0.20 (0.008) | 35.50 (1.398) | 0.80 (0.031) | 4.10 (0.161) | 0.15 (0.006) |
| E-5838A + IE5838A | 58.40 (2.300) | 1.20 (0.047) | 10.55 (0.415) | 0.15 (0.006) | 38.10 (1.500) | 0.80 (0.031) | 6.50 (0.256) | 0.15 (0.006) | 8.10 (0.319) | 0.20 (0.008) | 51.10 (2.012) | 1.10 (0.043) | 4.05 (0.160) | 0.20 (0.008) |
| E-6450A + IE6450A | 64.00 (2.520) | 1.30 (0.051) | 10.20 (0.402) | 0.15 (0.006) | 50.80 (2.000) | 1.10 (0.043) | 5.10 (0.201) | 0.15 (0.006) | 10.20 (0.402) | 0.20 (0.008) | 53.60 (2.110) | 1.10 (0.043) | 5.10 (0.200) | 0.15 (0.006) |

## EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set W g (oz.) |
|---|---|---|---|---|---|---|---|
| E-3220A | 3.95 | 0.32 (8.128) | 41.4 (1.623) | 130 (0.201) | 128 (0.198) | 5390 (0.329) | 27.5 (0.971) |
| E-3825A | 4.65 | 0.27 (6.858) | 52.4 (2.062) | 194 (0.300) | 192 (0.298) | 10200 (0.622) | 51.5 (1.818) |
| E-4328A | 4.71 | 0.27 (6.858) | 61.1 (2.405) | 229 (0.355) | 225 (0.349) | 14000 (0.854) | 70.3 (2.481) |
| E-5838A | 4.83 | 0.26 (6.604) | 80.7 (3.177) | 310 (0.480) | 308 (0.477) | 25000 (1.525) | 123 (4.342) |
| E-6450A | 8.17 | 0.15 (3.81) | 79.9 (3.145) | 519 (0.804) | 518 (0.803) | 41500 (2.531) | 210 (7.413) |
| E-3220A + IE3220A | 4.66 | 0.27 (6.858) | 35.1 (1.382) | 130 (0.201) | 128 (0.198) | 4560 (0.278) | 23.6 (0.833) |
| E-3825A + IE3825A | 5.59 | 0.22 (5.588) | 43.5 (1.712) | 194 (0.300) | 192 (0.298) | 8440 (0.515) | 43.4 (1.532) |
| E-4328A + IE4328A | 5.72 | 0.22 (5.588) | 50.4 (1.984) | 229 (0.355) | 225 (0.349) | 11500 (0.701) | 58.9 (2.079) |
| E-5838A + IE5838A | 5.75 | 0.22 (5.588) | 67.7 (2.665) | 310 (0.480) | 308 (0.477) | 21000 (1.281) | 105 (3.706) |
| E-6450A + IE6450A | 9.36 | 0.13 (3.302) | 69.7 (2.744) | 519 (0.804) | 518 (0.803) | 36200 (2.208) | 185 (6.530) |

## MATERIALS

| P/N | F1 | | F2 | |
|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) | **Al** (nH) ±25% | Loss **W** (300kHz-50mT) |
| **E-3220A** | 6500 | < 3.2 | 5700 | < 0.62 |
| *codif.* | F1E-3220A------ | | F2E-3220A------ | |
| **E-3825A** | 7700 | < 6 | 6700 | <1.2 |
| *codif.* | F1E-3825A------ | | F2E-3825A----- | |
| **E-4328A** | 8100 | < 8.2 | 7000 | <1.7 |
| *codif.* | F1E-4328A------ | | F2E-4328A----- | |
| **E-5838A** | 8800 | < 15 | 7600 | < 2.9 |
| *codif.* | F1E-5838A------ | | F2E-5838A------ | |
| **E-6450A** | 13000 | < 25 | 13000 | < 4.8 |
| *codif.* | F1E-6450A------ | | F2E-6450A----- | |
| **E-3220A + IE3220A** | 7300 | < 2.7 | 6400 | <0.63 |
| *codif.* | F1E-3220A------ + F1IE3220A------ | | F2E-3220A------ + F2IE3220A------ | |
| **E-3825A + IE3825A** | 6700 | < 4.9 | 7800 | <0.98 |
| *codif.* | F1E-3825A------ + F1IE3825A------ | | F2E-3825A------ + F2IE3825A------ | |
| **E-4328A + IE4328A** | 9300 | < 6.7 | 8100 | <1.4 |
| *codif.* | F1E-4328A------ + F1IE4328A------ | | F2E-4328A------ + F2IE4328A------ | |
| **E-5838A + IE5838A** | 10000 | < 13 | 8700 | <2.5 |
| *codif.* | F1E-5838A------ + F1IE5838A------ | | F2E-5838A------ + F2IE5838A------ | |
| **E-6450A + IE6450A** | 16500 | < 21 | 14500 | <4.2 |
| *codif.* | F1E-6450A------ + F1IE6450A------ | | F2E-6450A------ + F2IE6450A------ | |

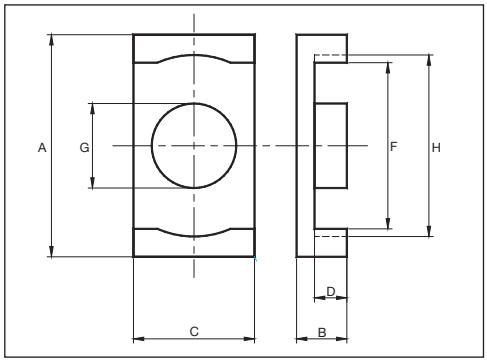



*Figure 5 – ER Planar Cores*

## DIMENSIONS

**millimeters (inches)**

| | A | | B | | C | | D | | F | | G | | H | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **ER0905A** | 9.35 (0.368) | 0.20 (0.008) | 2.45 (0.096) | 0.07 (0.003) | 4.90 (0.192) | 0.10 (0.004) | 1.68 (0.066) | 0.07 (0.003) | 7.20 (0.283) | 0.20 (0.008) | 3.40 (0.133) | 0.15 (0.006) | 7.63 (0.300) | 0.12 (0.005) |
| **ER1106A** | 10.83 (0.426) | 0.17 (0.007) | 2.45 (0.096) | 0.07 (0.003) | 5.90 (0.232) | 0.10 (0.004) | 1.58 (0.062) | 0.07 (0.003) | 8.10 (0.318) | 0.20 (0.008) | 4.12 (0.162) | 0.12 (0.005) | 8.85 (0.348) | 0.15 (0.006) |
| **ER1507A** | 14.5 (0.570) | 0.20 (0.008) | 2.95 (0.116) | 0.10 (0.004) | 6.70 (0.263) | 0.10 (0.004) | 1.65 (0.065) | 0.10 (0.004) | 11.8 (0.464) | 0.20 (0.008) | 4.70 (0.185) | 0.10 (0.004) | 11.8 (0.464) | 0.20 (0.008) |

## EFFECTIVE CORE PARAMETERS

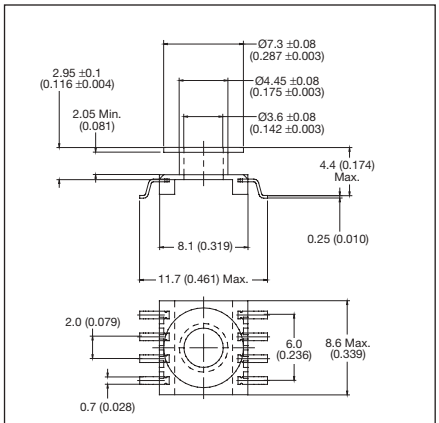
**millimeters (inches)**

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set W g (oz.) |
|---|---|---|---|---|---|---|---|
| **ER0905A** | 0.81 | 1.54 (39.11) | 13.6 (0.535) | 8.81 (0.034) | 7.6 (0.03) | 120 (0.047) | 0.67 (0.023) |
| **ER1106A** | 1.10 | 1.14 (28.95) | 14.1 (0.555) | 12.4 (0.048) | 10.3 (0.04) | 174 (0.006) | 1.08 (0.037) |
| **ER1507A** | 1.26 | 0.99 (25.14) | 18.2 (0.716) | 18.3 (0.072) | 17.3 (0.068) | 333 (0.131) | 1.85 (0.064) |

## MATERIALS

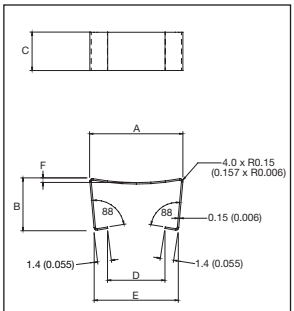
| P/N | F2 | | F4 | |
|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (300kHz-50mT) | **Al** (nH) ±25% | Loss **W** (1000kHz-50mT) |
| **ER0905A** | 810 | <0.014 | 650 | <0.09 |
| *codif.* | F2ER0905A------ | | F4ER0905A------ | |
| **ER1106A** | 1100 | <0.021 | 895 | <0.12 |
| *codif.* | F2ER1106A------ | | F4ER1106A----- | |
| **ER1507A** | 1450 | <0.039 | 1100 | <0.23 |
| *codif.* | F2ER1507A------ | | F4ER1507A------ | |

| Codification Bobbin |
|---|
| --HC0905AES10-- |



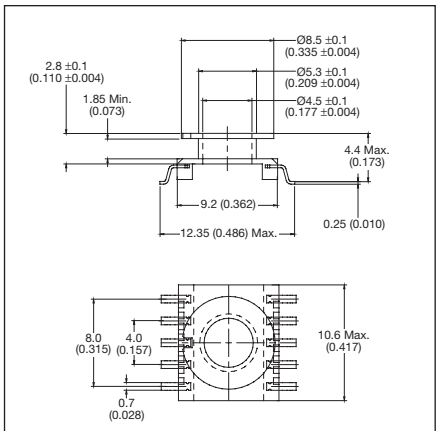

**Bobbins for ER0905A Cores**

| Codification Clip | A | B | C | D |
|---|---|---|---|---|
| --JP0905AES---- | 9.80 (0.386) | 5.50 (0.217) | 4.00 (0.157) | 6.00 (0.236) |



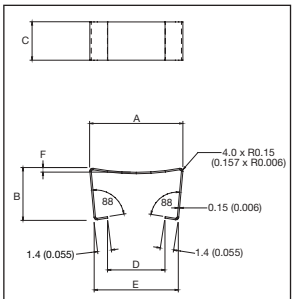

**Clips for ER Cores**

| Codification Bobbin |
|---|
| --HC1106AE10-- |



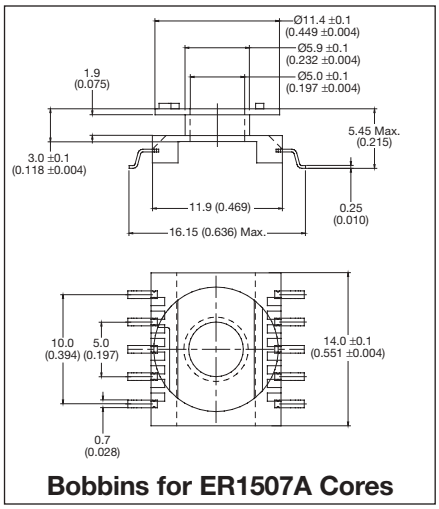

**Bobbins for ER1106A Cores**

| Codification Clip | A | B | C | D |
|---|---|---|---|---|
| --JP01106AES---- | 11.50 (0.453) | 5.60 (0.220) | 4.40 (0.173) | 7.50 (0.295) |



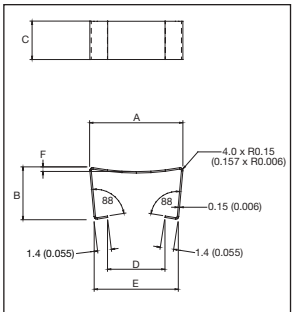

**Clips for ER Cores**

| Codification Bobbin |
|---|
| --HC1507AES10-- |




**Bobbins for ER1507A Cores**

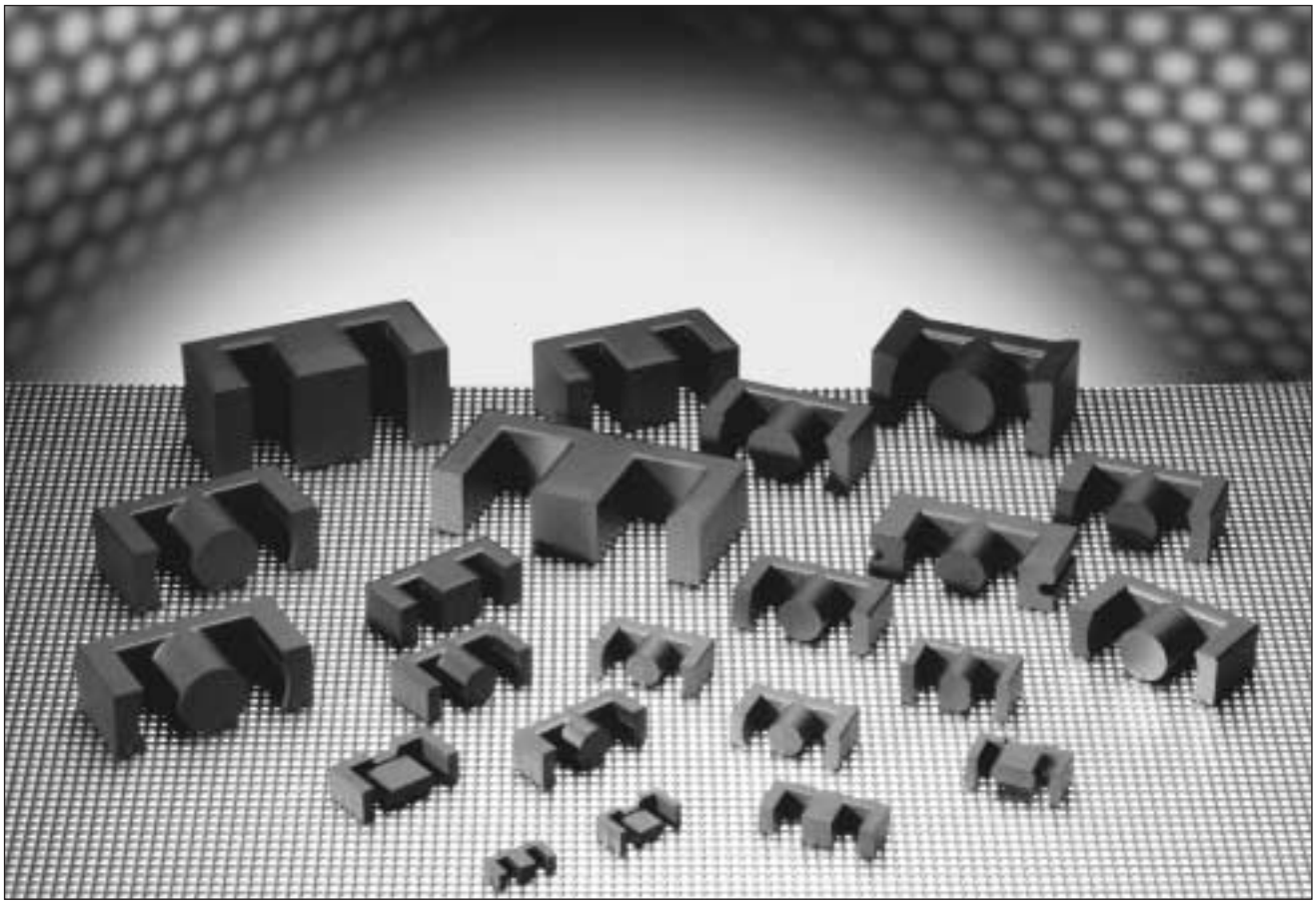
| Codification Clip | A | B | C | D |
|---|---|---|---|---|
| --JP01507AES---- | 15.00 (0.591) | 6.90 (0.272) | 5.50 (0.217) | 11.00 (0.433) |




**Clips for ER Cores**

# Soft Ferrites

## E Cores



### KEY APPLICATIONS

- EMI Suppression
- High Power
- SMPS
- TV & Monitors
- Lighting

### HOW TO ORDER

| B 2 | E - | 4 2 1 5 | A | E 1 0 0 – – |
|---|---|---|---|---|
| Material | Model | Shape Code | Form Factor | Finishing |

**Finishing**
Gapped cores can be ordered as:
- Mechanical Gap (gap value + tol. in mm)
- Electrical Gap ($A_L$ value + tol. in %)
- Contact your local representative

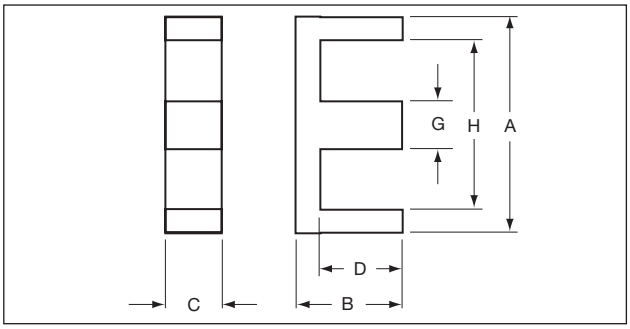



*Figure 6 – E- Cores*

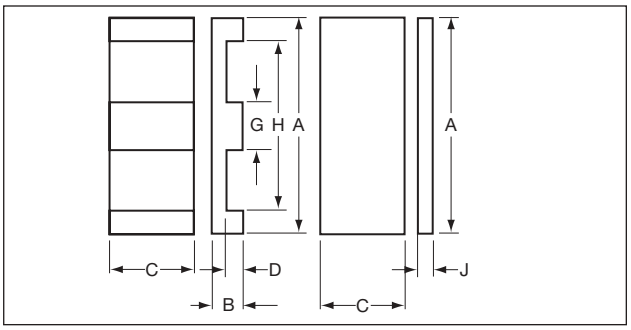



*Figure 7 – EI Cores*

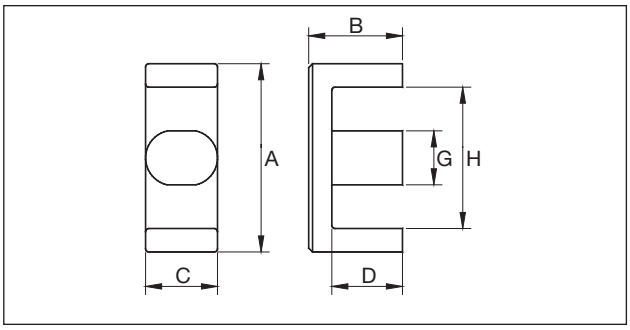



*Figure 8 – ED Cores*

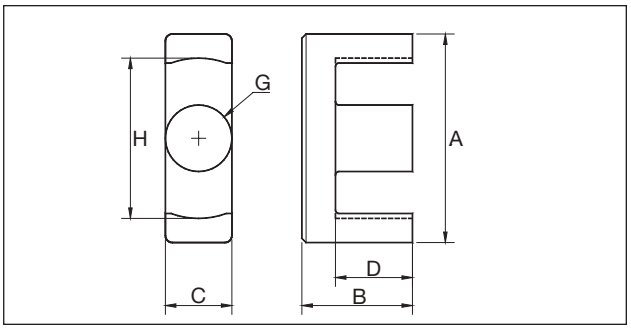



*Figure 9 – ET/ER Cores*

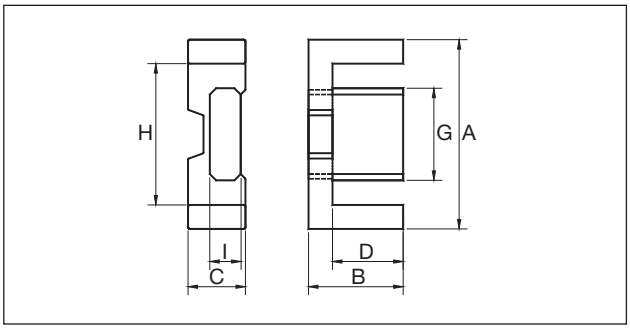



*Figure 10 – EF Cores*

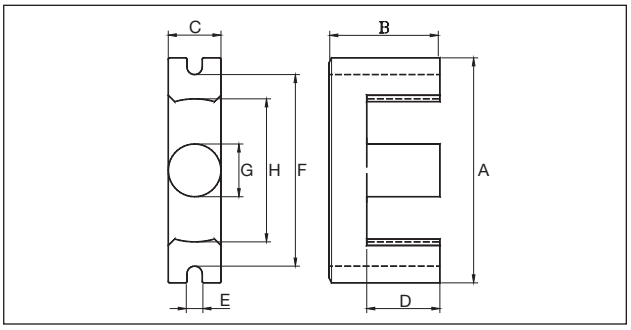



*Figure 11 – EC Cores*

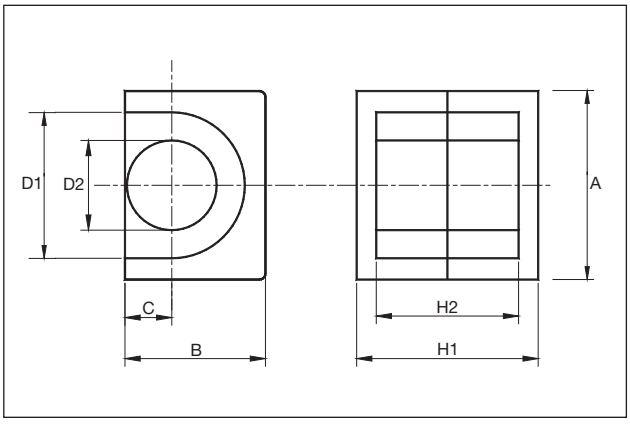



*Figure 12 – EP Cores*

**BOBBINS ARE AVAILABLE UPON REQUEST**

# Soft Ferrites

## E- Cores

## DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P/N | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) |
| E-0502A | 5.26 (0.207) | 0.10 (0.004) | 5.26 (0.207) | 0.07 (0.003) | 1.96 (0.077) | 0.10 (0.004) | 2.00 (0.079) | 0.07 (0.003) | 1.35 (0.053) | 0.10 (0.004) | 3.81 (0.150) | min. |
| E-1304A | 12.8 (0.504) | 0.20 (0.008) | 6.40 (0.252) | 0.10 (0.004) | 3.55 (0.140) | 0.15 (0.006) | 4.65 (0.183) | 0.15 (0.006) | 3.55 (0.140) | 0.15 (0.006) | 9.20 (0.362) | 0.30 (0.012) |
| E-1306A | 13.0 (0.512) | 0.45 (0.018) | 6.00 (0.236) | 0.20 (0.008) | 6.15 (0.242) | 0.20 (0.008) | 4.65 (0.183) | 0.15 (0.006) | 2.78 (0.109) | 0.18 (0.007) | 10.48 (0.413) | 0.25 (0.010) |
| E-1605A | 16.0 (0.630) | 0.50 (0.020) | 7.15 (0.281) | 0.20 (0.008) | 4.90 (0.193) | 0.20 (0.008) | 5.10 (0.201) | 0.20 (0.008) | 4.00 (0.157) | 0.15 (0.006) | 12.0 (0.472) | 0.25 (0.010) |
| E-1605B | 16.0 (0.630) | 0.50 (0.020) | 12.25 (0.482) | 0.20 (0.008) | 4.85 (0.191) | 0.20 (0.008) | 10.25 (0.404) | 0.25 (0.010) | 4.00 (0.157) | 0.20 (0.008) | 12.0 (0.472) | 0.30 (0.012) |
| E-1605C | 16.1 (0.634) | 0.60 (0.024) | 8.05 (0.317) | 0.15 (0.006) | 4.50 (0.177) | 0.20 (0.008) | 5.90 (0.232) | 0.20 (0.008) | 4.55 (0.179) | 0.15 (0.006) | 11.6 (0.457) | 0.30 (0.012) |
| E-1905A | 19.15 (0.754) | 0.50 (0.020) | 7.90 (0.311) | 0.25 (0.010) | 4.80 (0.189) | 0.20 (0.008) | 5.60 (0.220) | 0.15 (0.006) | 4.65 (0.183) | 0.15 (0.006) | 14.75 (0.581) | 0.30 (0.012) |
| E-1907A | 19.15 (0.754) | 0.50 (0.020) | 7.90 (0.311) | 0.25 (0.010) | 6.65 (0.262) | 0.25 (0.010) | 5.60 (0.220) | 0.15 (0.006) | 4.65 (0.183) | 0.15 (0.006) | 14.75 (0.581) | 0.30 (0.012) |
| E-2005B | 19.5 (0.768) | 0.40 (0.016) | 13.55 (0.533) | 0.20 (0.008) | 5.00 (0.197) | 0.25 (0.010) | 11.15 (0.439) | 0.20 (0.008) | 4.55 (0.179) | 0.15 (0.006) | 14.0 (0.551) | 0.30 (0.012) |
| E-2006A | 20.0 (0.787) | 0.40 (0.016) | 9.95 (0.392) | 0.15 (0.006) | 5.70 (0.224) | 0.20 (0.008) | 7.15 (0.281) | 0.15 (0.006) | 5.75 (0.226) | 0.15 (0.006) | 14.4 (0.567) | 0.30 (0.012) |

## EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor C (nH) | Core Constant $C_1$ $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume Ve $mm^3$ ($in.^3$) | Weight Per Set W g (oz.) |
|---|---|---|---|---|---|---|---|
| E-0502A | 0.26 | 4.81 (122.17) | 12.6 (0.496) | 2.62 (0.004) | 2.55 (0.004) | 33.1 (0.002) | 0.2 (0.007) |
| E-1304A | 0.53 | 2.40 (60.20) | 29.8 (1.17) | 12.6 (0.020) | – | 376 (0.0229) | 1.8 (0.06) |
| E-1306A | 0.67 | 1.87 (47.50) | 30.5 (1.20) | 16.3 (0.025) | – | 498 (0.030) | 2.3 (0.08) |
| E-1605A | 0.71 | 1.76 (44.70) | 34.8 (1.37) | 19.8 (0.031) | – | 687 (0.042) | 3.5 (0.12) |
| E-1605B | 0.44 | 2.85 (72.39) | 55.3 (2.18) | 19.4 (0.030) | – | 1072 (0.065) | 5.1 (0.18) |
| E-1605C | 0.67 | 1.87 (47.50) | 37.6 (1.48) | 20.1 (0.031) | 19.30 (0.030) | 753 (0.046) | 3.9 (0.14) |
| E-1905A | 0.69 | 1.82 (46.23) | 39.6 (1.56) | 21.8 (0.034) | – | 865 (0.053) | 4.6 (0.16) |
| E-1907A | 0.95 | 1.33 (33.78) | 40 (1.57) | 30 (0.047) | – | 1200 (0.073) | 6.4 (0.23) |
| E-2005B | 0.50 | 2.50 (63.50) | 61.3 (2.41) | 24.5 (0.038) | 22.80 (0.035) | 1506 (0.092) | 7.1 (0.25) |
| E-2006A | 0.88 | 1.43 (36.32) | 46.1 (1.81) | 32.2 (0.050) | – | 1485 (0.091) | 7.4 (0.26) |

## MATERIALS

| P/N | F1 | | F2 | | F4 | | A6 | A4 | A2 |
|---|---|---|---|---|---|---|---|---|---|
| | Al (nH) ±25% | Loss W (100kHz-200mT) | Al (nH) ±25% | Loss W (300kHz-50mT) | Al (nH) ±25% | Loss W (1000kHz-50mT) | Al (nH) ±25% | Al (nH) ±25% | Al (nH) ±30% |
| E-0502A | 275 | <0.019 | 250 | <0.004 | 200 | <0.03 | | | 420 |
| *codif.* | F1E-0502A------ | | F2E-0502A------ | | F4E-0502A------ | | | | A2E-0502A------ |
| E-1304A | 860 | <0.22 | 710 | <0.044 | 535 | <0.26 | 960 | 1150 | |
| *codif.* | F1E-1304A------ | | F2E-1304A----- | | -F4E-1304A------ | | A6E-1304A------ | A4E-1304A----- | |
| E-1306A- | 1050 | <0.29 | 905 | <0.058 | 680 | <0.34 | 1840 | 2200 | |
| *codif.* | F1E-1306A------ | | F2E-1306A------ | | F4E-1306A------ | | A6E-1306A------ | A4E-1306A------ | |
| E-1605A | 1050 | <0.40 | 995 | <0.08 | | | 2400 | 2560 | |
| *codif.* | F1E-1605A------ | | F2E-1605A------ | | | | A6E-1605A------ | A4E-1605A------ | |
| E-1605B | 800 | <0.63 | 685 | <0.13 | | | 1400 | 1580 | |
| *codif.* | F1E-1605B------ | | F2E-1605B------ | | | | A6E-1605B------ | A4E-1605B------ | |
| E-1605C | 1100 | <0.44 | 960 | <0.087 | 710 | <0.52 | 1700 | 1650 | |
| *codif.* | F1E-1605C------ | | F2E-1605C------ | | F4E-1605C------ | | A6E-1605C------ | A4E-1605C------ | |
| E-1905A | 1150 | <0.51 | 1000 | <0.10 | | | 2100 | 2600 | |
| *codif.* | F1E-1905A------ | | F2E-1905A------ | | | | A6E-1905A------ | A4E-1905A------ | |
| E-1907A | 1450 | <0.7 | | | | | 2000 | 2450 | |
| *codif.* | F1E-1907A------ | | | | | | A6E-1907A------ | A4E-1907A------ | |
| E-2005B | 920 | <0.88 | | | | | 1600 | 1850 | |
| *codif.* | F1E-2005B------ | | | | | | A6E-2005B------ | A4E-2005B------ | |
| E-2006A | 1250 | <0.97 | 1200 | <0.18 | 910 | <1.10 | 2500 | 2850 | |
| *codif.* | F1E-2006A------ | | F2E-2006A------ | | F4E-2006A------ | | A6E-2006A------ | A4E-2006A------ | |

# Soft Ferrites

## E- Cores

### DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P/N | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) |
| E-2206A | 22.0 (0.866) | 0.45 (0.018) | 15.0 (0.591) | 0.20 (0.008) | 5.75 (0.226) | 0.25 (0.010) | 11.0 (0.433) | 0.25 (0.010) | 5.75 (0.226) | 0.25 (0.010) | 16.3 (0.642) | 0.35 (0.014) |
| E-2506A | 25.3 (0.996) | 0.50 (0.020) | 9.50 (0.374) | 0.25 (0.010) | 6.35 (0.250) | 0.25 (0.010) | 6.35 (0.250) | 0.25 (0.010) | 6.32 (0.249) | 0.13 (0.005) | 19.02 (0.749) | 0.38 (0.015) |
| E-2506B | 25.3 (0.996) | 0.50 (0.020) | 9.90 (0.390) | 0.25 (0.010) | 6.35 (0.250) | 0.25 (0.010) | 6.75 (0.266) | 0.25 (0.010) | 6.32 (0.249) | 0.13 (0.005) | 19.02 (0.749) | 0.38 (0.015) |
| E-2506C | 25.4 (1.000) | 0.50 (0.020) | 16.0 (0.630) | 0.25 (0.010) | 6.35 (0.250) | 0.25 (0.010) | 12.83 (0.505) | 0.25 (0.010) | 6.35 (0.250) | 0.15 (0.006) | 19.04 (0.750) | 0.40 (0.016) |
| E-2507A | 25.05 (0.986) | 0.75 (0.030) | 12.55 (0.494) | 0.25 (0.010) | 7.20 (0.283) | 0.30 (0.012) | 8.95 (0.352) | 0.25 (0.010) | 7.25 (0.285) | 0.25 (0.010) | 17.9 (0.705) | 0.40 (0.016) |
| E-2507B | 25.4 (1.000) | 0.50 (0.020) | 16.0 (0.630) | 0.26 (0.010) | 6.50 (0.256) | 0.25 (0.010) | 12.83 (0.505) | 0.25 (0.010) | 6.35 (0.250) | 0.15 (0.006) | 19.04 (0.750) | 0.40 (0.016) |
| E-2811A | 28.0 (1.102) | 0.55 (0.022) | 17.0 (0.669) | 0.20 (0.008) | 10.75 (0.423) | 0.20 (0.008) | 12.5 (0.492) | 0.30 (0.012) | 7.25 (0.285) | 0.25 (0.010) | 18.85 (0.742) | 0.25 (0.010) |
| E-3007B | 30.1 (1.185) | 0.70 (0.028) | 15.0 (0.591) | 0.20 (0.008) | 7.05 (0.278) | 0.25 (0.010) | 10.0 (0.394) | 0.30 (0.012) | 6.95 (0.274) | 0.25 (0.010) | 19.9 (0.783) | 0.40 (0.016) |
| E-3011A | 30.0 (1,181) | 0.60 (0.024) | 13.15 (0.518) | 0.20 (0.008) | 10.7 (0.421) | 0.30 (0.012) | 8.15 (0.321) | 0.15 (0.006) | 10.7 (0.421) | 0.25 (0.010) | 20.0 (0.787) | 0.30 (0.012) |
| E-3109A | 30.6 (1.205) | 0.60 (0.024) | 13.1 (0.516) | 0.15 (0.006) | 9.40 (0.370) | 0.30 (0.012) | 8.75 (0.344) | 0.15 (0.006) | 9.40 (0.370) | 0.30 (0.012) | 22.0 (0.866) | 0.60 (0.024) |

### EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor C (nH) | Core Constant $C_1$ $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume Ve $mm^3$ ($in.^3$) | Weight Per Set W g (oz.) |
|---|---|---|---|---|---|---|---|
| E-2206A | 0.68 | 1.84 (46.74) | 64.4 (2.54) | 35 (0.054) | 32.80 (0.051) | 2256 (0.138) | 10.8 (0.38) |
| E-2506A | 1.05 | 1.20 (30.48) | 48 (1.89) | 40 (0.062) | – | 1920 (0.117) | 10 (0.35) |
| E-2506B | 1.00 | 1.25 (31.75) | 49.6 (1.97) | 40 (0.062) | – | 2000 (0.122) | 9.4 (0.33) |
| E-2506C | 0.69 | 1.81 (45.97) | 74 (2.91) | 40.3 (0.062) | – | 2984 (0.182) | 15 (0.53) |
| E-2507A | 1.20 | 1.05 (26.67) | 57.5 (2.264) | 55 (0.085) | 55.00 (0.085) | 3165 (0.193) | 16.1 (0.57) |
| E-2507B | 0.70 | 1.83 (46.48) | 74 (2.91) | 41.3 (0.064) | – | 3054 (0.186) | 13.8 (0.49) |
| E-2811A | 1.49 | 0.84 (21.42) | 74.25 (2.92) | 88.29 (0.137) | – | 6556 (0.400) | 34 (1.20) |
| E-3007B | 1.15 | 1.09 (27.69) | 65.5 (2.58) | 59.9 (0.093) | 49.00 (0.076) | 3900 (0.238) | 21.7 (0.77) |
| E-3011A | 2.38 | 0.53 (13.41) | 57.8 (2.28) | 109.4 (0.170) | – | 6329 (0.386) | 30.3 (1.07) |
| E-3109A | 1.71 | 0.73 (18.67) | 61.4 (2.42) | 83.5 (0.129) | – | 5127 (0.313) | 24.2 (0.85) |

### MATERIALS

| P/N | F1 | | F2 | | F4 | | A6 | A4 |
|---|---|---|---|---|---|---|---|---|
| | Al (nH) ±25% | Loss W (100kHz-200mT) | Al (nH) ±25% | Loss W (300kHz-50mT) | Al (nH) ±25% | Loss W (1000kHz-50mT) | Al (nH) ±25% | Al (nH) ±25% |
| E-2206A | 1250 | <1.40 | | | | | 2180 | 2200 |
| *codif.* | F1E-2206A------ | | | | | | A6E-2206A------ | A4E-2206A------ |
| E-2506A | 1650 | <1.20 | 1600 | <0.23 | | | 3500 | 4000 |
| *codif.* | F1E-2506A------ | | F2E-2506A------ | | | | A6E-2506A------ | A4E-2506A------ |
| E-2506B | 1600 | <1.20 | | | | | 3300 | 4000 |
| *codif.* | F1E-2506B------ | | | | | | A6E-2506B------ | A4E-2506B------ |
| E-2506C | 1250 | <1.80 | | | | | 2150 | 2750 |
| *codif.* | F1E-2506C------ | | | | | | A6E-2506C------ | A4E-2506C------ |
| E-2507A | 2050 | <1.84 | 1750 | <0.37 | 1300 | <2.20 | 4000 | 4800 |
| *codif.* | F1E-2507A------ | | F2E-2507A------ | | F4E-2507A------ | | A6E-2507A------ | A4E-2507A------ |
| E-2507B | 1350 | <1.80 | | | | | 2350 | 2450 |
| *codif.* | F1E-2507B------ | | | | | | A6E-2507B------ | A4E-2507B------ |
| E-2811A | 2700 | <3.90 | | | | | 4950 | 5200 |
| *codif.* | F1E-2811A------ | | | | | | A6E-2811A------ | A4E-2811A------ |
| E-3007B | 2000 | 2.26 | 1750 | <0.45 | | | 3800 | 4600 |
| *codif.* | F1E-3007B------ | | F2E-3007B------ | | | | A6E-3007B------ | A4E-3007B------ |
| E-3011A | 4350 | <3.67 | | | | | 7850 | |
| *codif.* | F1E-3011A------ | | | | | | A6E-3011A------ | A4E-3011A------ |
| E-3109A | 2950 | <3.00 | | | | | 4300 | 5450 |
| *codif.* | F1E-3109A------ | | | | | | A6E-3109A------ | A4E-3109A------ |

# Soft Ferrites

## E- Cores

## DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **E-3109B** | 30.5 (1.201) | 0.60 (0.024) | 13.4 (0.528) | 0.15 (0.006) | 9.10 (0.358) | 0.30 (0.012) | 9.05 (0.356) | 0.15 (0.006) | 9.10 (0.358) | 0.30 (0.012) | 22.2 (0.874) | 0.40 (0.016) |
| **E-3213A** | 31.9 (1.256) | 1.00 (0.039) | 14.0 (0.551) | 0.40 (0.016) | 12.7 (0.500) | 0.30 (0.012) | 9.65 (0.380) | 0.25 (0.010) | 8.90 (0.350) | 0.25 (0.010) | 22.77 (0.896) | 0.77 (0.030) |
| **E-3509A** | 34.9 (1.374) | 0.70 (0.028) | 14.4 (0.567) | 0.25 (0.010) | 9.15 (0.360) | 0.25 (0.010) | 9.90 (0.390) | 0.25 (0.010) | 9.20 (0.362) | 0.25 (0.010) | 26.0 (1.024) | 0.50 (0.020) |
| **E-3509B** | 34.9 (1.374) | 0.70 (0.028) | 14.4 (0.567) | 0.25 (0.010) | 9.15 (0.360) | 0.25 (0.010) | 9.80 (0.386) | 0.25 (0.010) | 9.20 (0.362) | 0.25 (0.010) | 25.75 (1.014) | 0.50 (0.020) |
| **E-3510A** | 34.9 (1.374) | 0.70 (0.028) | 14.4 (0.567) | 0.25 (0.010) | 9.70 (0.382) | 0.20 (0.008) | 9.90 (0.390) | 0.25 (0.010) | 9.20 (0.362) | 0.25 (0.010) | 26.0 (1.024) | 0.50 (0.020) |
| **E-3510B** | 34.9 (1.374) | 0.70 (0.028) | 23.8 (0.937) | 0.25 (0.010) | 9.52 (0.375) | 0.40 (0.016) | 19.05 (0.750) | 0.40 (0.016) | 9.52 (0.375) | 0.20 (0.008) | 25.43 (1.001) | 0.50 (0.020) |
| **E-3512A** | 34.9 (1.374) | 0.70 (0.028) | 14.4 (0.567) | 0.25 (0.010) | 12.0 (0.472) | 0.25 (0.010) | 9.80 (0.386) | 0.25 (0.010) | 9.20 (0.362) | 0.25 (0.010) | 25.75 (1.014) | 0.50 (0.020) |
| **E-3512B** | 34.9 (1.374) | 0.70 (0.028) | 23.8 (0.937) | 0.25 (0.010) | 12.0 (0.472) | 0.40 (0.016) | 19.05 (0.750) | 0.40 (0.016) | 9.52 (0.375) | 0.20 (0.008) | 25.43 (1.001) | 0.50 (0.020) |
| **E-3512C** | 35.15 (1.384) | 0.65 (0.026) | 23.45 (0.923) | 0.35 (0.014) | 11.7 (0.461) | 0.30 (0.012) | 18.3 (0.720) | 0.30 (0.012) | 10.0 (0.394) | 0.30 (0.012) | 24.6 (0.969) | min. |
| **E-3611A** | 35.9 (1.413) | 1.00 (0.039) | 17.8 (0.701) | 0.20 (0.008) | 11.25 (0.443) | 0.25 (0.010) | 12.3 (0.484) | 0.30 (0.012) | 9.45 (0.372) | 0.25 (0.010) | 25.2 (0.992) | 0.70 (0.028) |

## EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant $C_1$ $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **E-3109B** | 1.58 | 0.80 (20.20) | 63 (2.48) | 79 (0.122) | – | 4970 (0.303) | 26 (0.92) |
| **E-3213A** | 2.15 | 0.58 (14.73) | 66 (2.60) | 113 (0.175) | – | 7500 (0.458) | 37 (1.31) |
| **E-3509A** | 1.47 | 0.85 (21.59) | 70.6 (2.78) | 82.6 (0.128) | 81.40 (0.126) | 5830 (0.356) | 30 (1.06) |
| **E-3509B** | 1.50 | 0.84 (21.28) | 70.2 (2.76) | 84 (0.130) | – | 5889 (0.359) | 27.5 (0.97) |
| **E-3510A** | 1.56 | 0.79 (20.07) | 70.6 (2.78) | 87.6 (0.136) | – | 6181 (0.377) | 29 (1.02) |
| **E-3510B** | 1.06 | 1.19 (30.11) | 107 (4.21) | 90.5 (0.140) | – | 9676 (0.590) | 46.9 (1.65) |
| **E-3512A** | 1.97 | 0.64 (16.20) | 70.2 (2.76) | 110.2 (0.171) | – | 7734 (0.472) | 36.2 (1.28) |
| **E-3512B** | 1.34 | 0.94 (23.82) | 107 (4.21) | 114 (0.177) | – | 12196 (0.744) | 54.1 (1.91) |
| **E-3512C** | 1.45 | 0.86 (21.84) | 104 (4.09) | 120 (0.186) | 117.00 (0.181) | 12500 (0.763) | 62.6 (2.21) |
| **E-3611A** | 1.80 | 0.70 (17.78) | 81 (3.19) | 116 (0.180) | 106.00 (0.164) | 9400 (0.574) | 54 (1.90) |

## MATERIALS

| | F1 | | A6 | A4 |
|---|---|---|---|---|
| | **Al** (nH) | Loss **W** (100kHz-200mT) | **Al** (nH) ±25% | **Al** (nH) ±25% |
| **E-3109B** | 2600 | <2.88 | 4000 | 5100 |
| *codif.* | F1E-3109B------ | | A6E-3109B------ | A4E-3109B------ |
| **E-3213A** | 3750 | <4.40 | 5550 | 7100 |
| *codif.* | F1E-3213A------ | | A6E-3213A------ | A4E-3213A------ |
| **E-3509A** | 2600 | <3.40 | 4700 | 5300 |
| *codif.* | F1E-3509A------ | | A6E-3509A------ | A4E-3509A------ |
| **E-3509B** | 2800 | <3.50 | 4700 | 5300 |
| *codif.* | F1E-3509B------ | | A6E-3509B------ | A4E-3509B------ |
| **E-3510A** | 2750 | <3.60 | 4900 | 6300 |
| *codif.* | F1E-3510A------ | | A6E-3510A----- | A4E-3510A----- |
| **E-3510B** | 2100 | <5.70 | 3150 | 4250 |
| *codif.* | F1E-3510B------ | | A6E-3510B------ | A4E-3510B------ |
| **E-3512A** | 3500 | <4.50 | 5200 | |
| *codif.* | F1E-3512A------ | | A6E-3512A------ | |
| **E-3512B** | 2600 | <7.10 | 4000 | |
| *codif.* | F1E-3512B------ | | A6E-3512B------ | |
| **E-3512C** | 2800 | <7.30 | 4300 | |
| *codif.* | F1E-3512C------ | | A6E-3512C------ | |
| **E-3611A** | 3300 | <5.50 | | |
| *codif.* | F1E-3611A------ | | | |

# Soft Ferrites

## E- Cores

### DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P/N | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) |
| E-4012B | 40.5 (1.594) | 0.40 (0.016) | 27.25 (1.073) | 0.25 (0.010) | 11.65 (0.459) | 0.35 (0.014) | 20.25 (0.797) | 0.40 (0.016) | 11.65 (0.459) | 0.25 (0.010) | 28.0 (1.102) | 0.55 (0.022) |
| E-4012C | 39.9 (1.571) | 0.80 (0.031) | 17.3 (0.681) | 0.15 (0.006) | 11.87 (0.467) | 0.20 (0.008) | 10.2 (0.402) | 0.20 (0.008) | 11.65 (0.459) | 0.25 (0.010) | 28.05 (1.104) | 0.55 (0.022) |
| E-4012D | 40.0 (1.575) | 0.50 (0.020) | 27.25 (1.073) | 0.25 (0.010) | 11.65 (0.459) | 0.35 (0.014) | 20.25 (0.797) | 0.25 (0.010) | 11.65 (0.459) | 0.35 (0.014) | 29.0 (1.142) | 0.50 (0.020) |
| E-4112A | 40.7 (1.602) | 0.80 (0.031) | 16.48 (0.649) | 0.25 (0.010) | 12.45 (0.490) | 0.25 (0.010) | 10.5 (0.413) | 0.25 (0.010) | 12.45 (0.490) | 0.25 (0.010) | 29.1 (1.146) | 0.50 (0.020) |
| E-4113A | 41.0 (1.614) | 0.80 (0.031) | 16.65 (0.656) | 0.15 (0.006) | 12.6 (0.496) | 0.30 (0.012) | 10.45 (0.411) | 0.25 (0.010) | 12.7 (0.500) | 0.25 (0.010) | 28.54 (1.124) | 0.50 (0.020) |
| E-4215A | 42.15 (1.659) | 0.85 (0.033) | 21.0 (0.827) | 0.20 (0.008) | 14.95 (0.589) | 0.25 (0.010) | 15.15 (0.596) | 0.35 (0.014) | 11.95 (0.470) | 0.25 (0.010) | 30.1 (1.185) | 0.60 (0.024) |
| E-4215B | 42.8 (1.685) | 0.85 (0.033) | 21.1 (0.831) | 0.20 (0.008) | 15.47 (0.609) | 0.25 (0.010) | 15.11 (0.595) | 0.35 (0.014) | 11.9 (0.469) | 0.25 (0.010) | 30.97 (1.219) | 0.60 (0.024) |
| E-4215H | 42.3 (1.665) | 0.85 (0.033) | 21.4 (0.843) | 0.20 (0.008) | 15.0 (0.591) | 0.25 (0.010) | 15.4 (0.606) | 0.35 (0.014) | 12.0 (0.472) | 0.25 (0.010) | 30.3 (1.193) | 0.60 (0.024) |
| E-4220A | 42.15 (1.659) | 0.85 (0.033) | 21.0 (0.827) | 0.20 (0.008) | 19.5 (0.768) | 0.50 (0.020) | 15.15 (0.596) | 0.35 (0.014) | 11.95 (0.470) | 0.25 (0.010) | 30.1 (1.185) | 0.60 (0.024) |
| E-4220B | 42.8 (1.685) | 0.85 (0.033) | 21.1 (0.831) | 0.20 (0.008) | 19.6 (0.772) | 0.40 (0.016) | 15.11 (0.595) | 0.35 (0.014) | 11.9 (0.469) | 0.25 (0.010) | 30.97 (1.219) | 0.60 (0.024) |

### EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor C (nH) | Core Constant $C_1$ $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume Ve $mm^3$ ($in.^3$) | Weight Per Set W g (oz.) |
|---|---|---|---|---|---|---|---|
| E-4012B | 1.55 | 0.81 (20.59) | 117.4 (4.62) | 144.6 (0.224) | – | 16980 (1.04) | 79.9 (2.82) |
| E-4012C | 2.41 | 0.52 (13.24) | 77.1 (3.04) | 147.7 (0.229) | – | 11398 (0.696) | 54.5 (1.92) |
| E-4012D | 1.47 | 0.85 (21.71) | 117.5 (4.63) | 137.3 (0.213) | – | 16134 (0.985) | 79.3 (2.80) |
| E-4112A | 2.42 | 0.52 (13.21) | 77 (3.03) | 149 (0.231) | 144.00 (0.223) | 11562 (0.706) | 60.7 (2.14) |
| E-4113A | 2.57 | 0.49 (12.45) | 77.3 (3.04) | 158 (0.245) | 156.00 (0.242) | 12200 (0.744) | 62.6 (2.21) |
| E-4215A | 2.35 | 0.54 (13.72) | 97 (3.82) | 180 (0.279) | 180.00 (0.279) | 17500 (1.07) | 90 (3.17) |
| E-4215B | 2.36 | 0.53 (13.52) | 98 (3.86) | 184 (0.285) | – | 18000 (1.10) | 89.6 (3.16) |
| E-4215H | 2.29 | 0.55 (13.97) | 99 (3.90) | 180 (0.279) | – | 17770 (1.08) | 88.8 (3.13) |
| E-4220A | 3.00 | 0.42 (10.67) | 97 (3.82) | 233 (0.361) | – | 22600 (1.38) | 120 (4.23) |
| E-4220B | 3.00 | 0.42 (10.64) | 98 (3.86) | 233 (0.361) | – | 22900 (1.40) | 120 (4.23) |

### MATERIALS

| P/N | B2 | | F1 | | F2 | | A6 |
|---|---|---|---|---|---|---|---|
| | Al (nH) ±25% | Loss W (100kHz-100mT) | Al (nH) ±25% | Loss W (100kHz-200mT) | Al (nH) ±25% | Loss W (300kHz-50mT) | Al (nH) ±25% |
| E-4012B *codif.* | | | 3050 F1E-4012B------ | <9.90 | | | 4750 A6E-4012B------ |
| E-4012C *codif.* | | | 4350 F1E-4012C------ | <6.70 | | | 6550 A6E-4012C------ |
| E-4012D *codif.* | | | 2850 F1E-4012D------ | <9.40 | | | 4500 A6E-4012D------ |
| E-4112A *codif.* | 4000 B1E-4112A------ | <1.75 | 4400 F1E-4112A------ | <6.71 | 3750 F2E-4112A------ | <1.40 | |
| E-4113A *codif.* | 3800 B1E-4113A------ | <1.85 | 4200 F1E-4113A------ | <7.31 | 4000 F2E-4113A------ | <1.50 | |
| E-4215A *codif.* | 3750 B2E-4215A------ | <2.65 | 4450 F1E-4215A------ | <11.00 | 3800 F2E-4215A------ | <2.1 | |
| E-4215B *codif.* | | | 4500 F1E-4215B------ | <11 | | | |
| E-4215H *codif.* | 3650 B2E-4215H------ | <2.60 | 4350 F1E-4215H------ | <11 | | | |
| E-4220A *codif.* | 4875 B2E-4220A------ | <3.40 | 5700 F1E-4220A------ | <14 | 4850 F2E-4220A------ | <2.60 | |
| E-4220B *codif.* | | | 5700 F1E-4220B------ | <14 | | | |

# Soft Ferrites

## E- Cores

### DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **E-4220H** | 42.3 (1.665) | 0.85 (0.033) | 21.4 (0.843) | 0.20 (0.008) | 19.6 (0.772) | 0.40 (0.016) | 15.4 (0.606) | 0.35 (0.014) | 12.0 (0.472) | 0.25 (0.010) | 30.3 (1.193) | 0.60 (0.024) |
| **E-4916A** | 48.85 (1.923) | 0.75 (0.030) | 20.6 (0.811) | 0.20 (0.008) | 15.6 (0.614) | 0.25 (0.010) | 12.11 (0.477) | 0.20 (0.008) | 15.6 (0.614) | 0.25 (0.010) | 32.4 (1.276) | 0.65 (0.026) |
| **E-5521A** | 55.15 (2.171) | 1.05 (0.041) | 27.5 (1.083) | 0.30 (0.012) | 20.7 (0.815) | 0.30 (0.012) | 18.8 (0.740) | 0.30 (0.012) | 16.95 (0.667) | 0.25 (0.010) | 38.1 (1.500) | 0.60 (0.024) |
| **E-5525A** | 55.15 (2.171) | 1.05 (0.041) | 27.5 (1.083) | 0.30 (0.012) | 24.7 (0.972) | 0.30 (0.012) | 18.8 (0.740) | 0.30 (0.012) | 16.95 (0.667) | 0.25 (0.010) | 38.1 (1.500) | 0.60 (0.024) |
| **E-6527A** | 65.15 (2.565) | 1.35 (0.053) | 32.5 (1.280) | 0.30 (0.012) | 27.1 (1.067) | 0.30 (0.012) | 22.6 (0.890) | 0.40 (0.016) | 19.65 (0.774) | 0.35 (0.014) | 44.95 (1.770) | 0.75 (0.030) |
| **E-7032A** | 70.5 (2.776) | 1.00 (0.039) | 32.95 (1.297) | 0.25 (0.010) | 31.6 (1.244) | 0.40 (0.016) | 22.25 (0.876) | 0.35 (0.014) | 21.65 (0.852) | 0.35 (0.014) | 48.75 (1.919) | 0.75 (0.030) |
| **E-7040A** | 70.5 (2.776) | 1.00 (0.039) | 32.95 (1.297) | 0.25 (0.010) | 40.0 (1.574) | 0.80 (0.031) | 22.85 (0.899) | 0.35 (0.014) | 21.65 (0.852) | 0.35 (0.014) | 48.75 (1.919) | 0.75 (0.030) |
| **E-8020A** | 80.0 (3.150) | 1.80 (0.071) | 38.1 (1.500) | 0.40 (0.016) | 19.8 (0.780) | 0.40 (0.016) | 28.3 (1.114) | 0.40 (0.016) | 19.8 (0.780) | 0.40 (0.016) | 60.2 (2.370) | 1.30 (0.051) |

### EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant $C_1$ $mm^{-1}$ ($in.^{-1}$) | Effective Length **le** mm (in.) | Effective Area **Ae** $mm^2$ ($in.^2$) | Min. Area **A min.** $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **E-4220H** | 2.99 | 0.42 (10.67) | 99 (3.90) | 235 (0.364) | – | 23220 (1.42) | 120 (4.23) |
| **E-4916A** | 3.50 | 0.36 (9.14) | 91 (3.58) | 254 (0.394) | 243.00 (0.38) | 23200 (1.42) | 120 (4.23) |
| **E-5521A** | 3.60 | 0.35 (8.89) | 123 (4.84) | 357 (0.553) | – | 43700 (2.67) | 230 (8.11) |
| **E-5525A** | 4.30 | 0.29 (7.37) | 123 (4.84) | 420 (0.651) | – | 52000 (3.17) | 270 (9.52) |
| **E-6527A** | 4.80 | 0.265 (6.73) | 146 (5.75) | 550 (0.853) | – | 80400 (4.91) | 470 (16.58) |
| **E-7032A** | 5.75 | 0.22 (5.59) | 149 (5.87) | 683 (1.059) | – | 102000 (6.22) | 510 (17.99) |
| **E-7040A** | 7.24 | 0.17 (4.31) | 150 (5.91) | 864 (1.339) | 856.00 (1.32) | 130000 (7.93) | 660 (23.29) |
| **E-8020A** | 2.65 | 0.47 (11.94) | 185 (7.28) | 391 (0.606) | 388.00 (0.60) | 72120 (4.40) | 354 (12.49) |

### MATERIALS

| P/N | B2 | | B2 | | F1 | | F1 | | F2 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (100kHz-100mT) | **Al** (nH) ±25% | Loss **W** (25kHz-200mT) | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) | **Al** (nH) ±25% | Loss **W** (25kHz-200mT) | **Al** (nH) ±25% | Loss **W** (25kHz-200mT) |
| **E-4220H** *codif.* | | | | | 5700 F1E-4220H------ | <14 | | | | |
| **E-4916A** *codif.* | 5600 B2E-4916A------ | <3.60 | | | 6550 F1E-4916A------ | <14 | | | | |
| **E-5521A** *codif.* | | | 5600 B2E-5521A------ | <6.6 | | | 5600 F1E-5521A------ | <4.4 | 5600 F2E-5521A------ | <3.8 |
| **E-5525A** *codif.* | | | 6600 B2E-5525A------ | <7.9 | | | 6600 F1E-5525A------ | <5.3 | 6600 F2E-5525A------ | <4.5 |
| **E-6527A** *codif.* | | | 7300 B2E-6527A------ | <12 | | | 7300 F1E-6527A------ | <8 | 7300 F2E-6527A------ | <6.8 |
| **E-7032A** *codif.* | | | 9100 B2E-7032A------ | <16 | | | 9100 F1E-7032A------ | <11 | 9100 F2E-7032A------ | <9 |
| **E-7040A** *codif.* | | | 11500 B2E-7040A------ | <20 | | | 11500 F1E-7040A------ | <13 | 11500 F2E-7040A------ | <11 |
| **E-8020A** *codif.* | | | 4400 B2E-8020A------ | <11 | | | 4400 F1E-8020A------ | <7.3 | 4400 F2E-8020A------ | <6.2 |

# Soft Ferrites

## EI Cores

## DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | | J | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) |
| **EI2206A** | 22.0 (0.866) | 0.45 (0.018) | 15.0 (0.591) | 0.20 (0.008) | 5.75 (0.226) | 0.25 (0.010) | 11.0 (0.433) | 0.25 (0.010) | 5.75 (0.226) | 0.25 (0.010) | 16.30 (0.642) | 0.35 (0.014) | 4.00 (0.157) | 0.20 (0.008) |
| **EI2506C** | 25.4 (1.000) | 0.50 (0.020) | 16.0 (0.630) | 0.26 (0.010) | 6.35 (0.250) | 0.25 (0.010) | 12.83 (0.505) | 0.25 (0.010) | 6.35 (0.250) | 0.15 (0.006) | 19.04 (0.750) | 0.40 (0.016) | 3.18 (0.125) | 0.20 (0.008) |
| **EI2506D** | 25.0 (0.984) | 0.50 (0.020) | 17.0 (0.669) | 0.30 (0.012) | 6.20 (0.244) | 0.20 (0.008) | 13.5 (0.531) | 0.30 (0.012) | 6.35 (0.250) | 0.25 (0.010) | 18.60 (0.732) | 0.30 (0.012) | 3.45 (0.136) | 0.20 (0.008) |
| **EI2811A** | 28.0 (1.102) | 0.55 (0.022) | 17.0 (0.669) | 0.20 (0.008) | 10.75 (0.423) | 0.20 (0.008) | 12.5 (0.492) | 0.30 (0.012) | 7.25 (0.285) | 0.25 (0.010) | 18.85 (0.742) | 0.25 (0.010) | 3.50 (0.138) | 0.20 (0.008) |
| **EI3011B** | 30.25 (1.191) | 0.60 (0.024) | 21.3 (0.839) | 0.20 (0.008) | 10.65 (0.419) | 0.25 (0.010) | 16.3 (0.642) | 0.30 (0.012) | 10.65 (0.419) | 0.25 (0.010) | 20.35 (0.801) | 0.35 (0.014) | 5.50 (0.217) | 0.20 (0.008) |
| **EI3313A** | 33.0 (1.299) | 0.65 (0.026) | 23.3 (0.917) | 0.30 (0.012) | 12.7 (0.500) | 0.30 (0.012) | 19.05 (0.750) | 0.40 (0.016) | 9.55 (0.376) | 0.20 (0.008) | 23.50 (0.925) | 0.58 (0.023) | 5.00 (0.197) | 0.20 (0.008) |
| **EI3510B** | 34.9 (1.374) | 0.70 (0.028) | 23.8 (0.937) | 0.25 (0.010) | 9.52 (0.375) | 0.40 (0.016) | 19.05 (0.750) | 0.40 (0.016) | 9.52 (0.375) | 0.20 (0.008) | 25.43 (1.001) | 0.50 (0.020) | 4.75 (0.187) | 0.20 (0.008) |
| **EI3512C** | 35.15 (1.384) | 0.65 (0.026) | 23.45 (0.923) | 0.35 (0.014) | 11.7 (0.461) | 0.30 (0.012) | 18.3 (0.720) | 0.30 (0.012) | 10.0 (0.394) | 0.30 (0.012) | 24.60 (0.969) | min | 5.50 (0.217) | 0.20 (0.008) |
| **EI4012D** | 40.0 (1.575) | 0.50 (0.020) | 27.25 (1.073) | 0.25 (0.010) | 11.65 (0.459) | 0.35 (0.014) | 20.25 (0.797) | 0.25 (0.010) | 11.65 (0.459) | 0.35 (0.014) | 29.00 (1.142) | 0.50 (0.020) | 7.50 (0.295) | 0.30 (0.012) |
| **EI4215B** | 42.8 (1.685) | 0.85 (0.033) | 21.1 (0.831) | 0.20 (0.008) | 15.47 (0.609) | 0.25 (0.010) | 15.11 (0.595) | 0.35 (0.014) | 11.9 (0.469) | 0.25 (0.010) | 30.97 (1.219) | 0.60 (0.024) | 5.97 (0.235) | 0.20 (0.008) |

## EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **EI2206A** | 1.07 | 1.17 (29.72) | 42.6 (1.68) | 36.6 (0.057) | 32.80 (0.05) | 15.47 (0.09) | 8.6 (0.30) |
| **EI2506C** | 1.05 | 1.20 (30.48) | 48.3 (1.90) | 40.3 (0.062) | | 1950 (0.12) | 10 (0.35) |
| **EI2506D** | 1.03 | 1.22 (30.99) | 49.7 (1.96) | 40.7 (0.063) | 39.30 (0.06) | 2020 (0.12) | 10.8 (0.38) |
| **EI2811A** | 2.51 | 0.50 (12.70) | 48.9 (1.93) | 86.1 (0.133) | | 4215 (0.26) | 22.5 (0.79) |
| **EI3011B** | 2.36 | 0.53 (13.46) | 56.8 (2.24) | 110 (0.171) | | 6440 (0.39) | 34.3 (1.21) |
| **EI3313A** | 2.25 | 0.56 (14.22) | 66.8 (2.63) | 119.8 (0.186) | | 8002 (0.49) | 41.7 (1.47) |
| **EI3510B** | 1.65 | 0.76 (19.30) | 68.9 (2.71) | 90.4 (0.140) | | 6232 (0.38) | 32.3 (1.14) |
| **EI3512C** | 2.26 | 0.56 (14.12) | 68 (2.68) | 122 (0.189) | | 8215 (0.50) | 44 (1.55) |
| **EI4012D** | 2.31 | 0.54 (13.72) | 77.3 (3.04) | 142 (0.220) | | 10982 (0.67) | 60.1 (2.12) |
| **EI4215B** | 3.40 | 0.37 (9.39) | 68 (2.68) | 184.2 (0.286) | | 12523 (0.76) | 65.5 (2.31) |

## MATERIALS

| P/N | F1 | | A6 | A4 |
|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) | **Al** (nH) ±25% | **Al** (nH) ±25% |
| **EI2206A** | 1650 F1EI2206A------ | <0.90 | 2300 A6EI2206A------ | 3000 A4EI2206A------ |
| **EI2506C** | 1700 F1EI2506C------ | <1.20 | 3400 A6EI2506C------ | 3800 A4EI2506C------ |
| **EI2506D** | 1650 F1EI2506D------ | <1.20 | 3400 A6EI2506D------ | 2950 A4EI2506D------ |
| **EI2811A** | 4050 F1EI2811A------ | <2.50 | 7350 A6EI2811A------ | 8400 A4EI2811A------ |
| **EI3011B** | 4000 F1EI3011B------ | <3.80 | 7850 A6EI3011B------ | |
| **EI3313A** | 3950 F1EI3313A------ | <4.70 | 5850 A6EI3313A------ | |
| **EI3510B** | 2900 F1EI3510B------ | <3.70 | 4350 A6EI3510B------ | |
| **EI3512C** | 4000 F1EI3512C------ | <4.80 | 5900 A6EI3512C------- | |
| **EI4012D** | 4200 F1EI4012D------ | <6.40 | 6300 A6EI4012D------ | |
| **EI4215B** | 6000 F1EI4215B------ | <7.25 | | |

# Soft Ferrites

## ED Cores

### DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **ED2912B** | 29.3 (1.154) | 0.80 (0.031) | 14.6 (0.575) | 0.25 (0.010) | 11.6 (0.457) | 0.25 (0.010) | 11.0 (0.433) | 0.20 (0.008) | 8.30 (0.327) | 0.20 (0.008) | 22.0 (0.866) | 0.40 (0.016) |
| **ED2912C** | 29.3 (1.154) | 0.80 (0.031) | 10.2 (0.402) | 0.25 (0.010) | 11.6 (0.457) | 0.25 (0.010) | 6.60 (0.260) | 0.20 (0.008) | 8.30 (0.327) | 0.20 (0.008) | 22.0 (0.866) | 0.40 (0.016) |
| **ED2912D** | 29.3 (1.154) | 0.80 (0.031) | 12.2 (0.480) | 0.25 (0.010) | 11.6 (0.457) | 0.25 (0.010) | 8.60 (0.339) | 0.20 (0.008) | 8.30 (0.327) | 0.20 (0.008) | 22.0 (0.866) | 0.40 (0.016) |

### EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **ED2912B** | 1.56 | 0.81 (20.57) | 69.7 (2.74) | 86.50 (0.034) | 82.20 (0.127) | 6030 (0.368) | 28 (0.988) |
| **ED2912C** | 2.07 | 0.61 (15.49) | 52.2 (2.06) | 86.00 (0.133) | 82.20 (0.127) | 4490 (0.274) | 23 (0.811) |
| **ED2912D** | 1.80 | 0.70 (17.78) | 60.12 (2.37) | 86.24 (0.134) | 85.25 (0.132) | 5184 (0.316) | 25 (0.882) |

### MATERIALS

| P/N | F1 | |
|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) |
| **ED2912B** | 2750 | <3.50 F1ED2912B ------ |
| **ED2912C** | 3100 | <2.70 F1ED2912C------ |
| **ED2912D** | 3100 | <3.10 F1ED2912D------ |

# Soft Ferrites

## ET Cores

### DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **ET2910A** | 29.8 (1.173) | 0.80 (0.031) | 15.8 (0.622) | 0.20 (0.008) | 9.50 (0.374) | 0.30 (0.012) | 11.0 (0.433) | 0.30 (0.012) | 9.50 (0.374) | 0.30 (0.012) | 22.7 (0.894) | 0.70 (0.028) |
| **ET3411A** | 34.2 (1.346) | 0.80 (0.031) | 17.3 (0.681) | 0.20 (0.008) | 10.8 (0.425) | 0.30 (0.012) | 12.1 (0.476) | 0.30 (0.012) | 10.8 (0.425) | 0.30 (0.012) | 26.3 (1.035) | 0.70 (0.028) |
| **ET3913A** | 39.1 (1.539) | 0.90 (0.035) | 19.8 (0.780) | 0.20 (0.008) | 12.5 (0.492) | 0.30 (0.012) | 14.6 (0.575) | 0.40 (0.16) | 12.5 (0.492) | 0.30 (0.012) | 30.1 (1.185) | 0.80 (0.031) |
| **ET4415A** | 44.0 (1.732) | 1.00 (0.039) | 22.3 (0.878) | 0.20 (0.008) | 14.8 (0.583) | 0.40 (0.016) | 16.5 (0.650) | 0.40 (0.016) | 14.8 (0.583) | 0.40 (0.016) | 33.3 (1.311) | 0.80 (0.031) |
| **ET4916A** | 48.7 (1.917) | 1.10 (0.043) | 24.7 (0.972) | 0.20 (0.008) | 16.3 (0.642) | 0.40 (0.016) | 18.1 (0.713) | 0.40 (0.016) | 16.3 (0.642) | 0.40 (0.016) | 37.0 (1.457) | 0.90 (0.035) |
| **ET5419A** | 54.5 (2.146) | 1.30 (0.051) | 27.6 (1.087) | 0.20 (0.008) | 18.9 (0.744) | 0.40 (0.016) | 20.2 (0.795) | 0.40 (0.016) | 18.9 (0.744) | 0.40 (0.016) | 41.2 (1.622) | 1.10 (0.043) |

### EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **ET2910A** | 1.36 | 0.93 (23.62) | 70.4 (2.77) | 76 (0.118) | 71.00 (0.110) | 5376 (0.328) | 28.8 (1.02) |
| **ET3411A** | 1.55 | 0.81 (20.57) | 79 (3.11) | 97 (0.150) | 92.00 (0.143) | 7600 (0.464) | 40 (1.41) |
| **ET3913A** | 1.70 | 0.74 (18.80) | 92 (3.62) | 125 (0.194) | – | 11500 (0.702) | 64 (2.26) |
| **ET4415A** | 2.10 | 0.60 (15.24) | 103 (4.06) | 173 (0.268) | – | 17800 (1.09) | 94 (3.32) |
| **ET4916A** | 2.35 | 0.54 (13.72) | 114 (4.49) | 211 (0.327) | – | 24000 (1.46) | 124 (4.37) |
| **ET5419A** | 2.80 | 0.45 (11.43) | 127 (5.00) | 280 (0.434) | 280.00 (0.434) | 35450 (2.16) | 180 (6.35) |

### MATERIALS

| P/N | B2 | | B3 | | B5 | | F1 | | F2 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (100kHz-100mT) | **Al** (nH) ±25% | Loss **W** (16kHz-200mT) | **Al** (nH) ±25% | Loss **W** (32kHz-200mT) | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) | **Al** (nH) ±25% | Loss **W** (300kHz-50mT) |
| **ET2910A** | | | | | | | 2400 | <3.12 F1ET2910A------ | 2100 | <0.62 F2ET2910A------ |
| **ET3411A** | | | | | | | 2850 | <4.56 F1ET3411A------ | 2400 | <0.88 F2ET3411A------ |
| **ET3913A** | | | | | | | 3200 | <6.70 F1ET3913A------ | 2700 | <1.40 F2ET3913A------- |
| **ET4415A** | 3100 | <2.75 B2ET4415A------ | 3400 | <1.80 B3ET4415A------ | 3250 | <2.50 B5ET4415A------ | 4000 | <3.12 F1ET4415A------ | 3400 | <2.10 F2ET4415A------ |
| **ET4916A** | 43525 | <3.60 B2ET4916A------ | 3900 | <2.40 B3ET4916A------ | 3700 | <3.40 B5ET4916A------ | 4550 | <14 F1ET4916A------ | | |
| **ET5419A** | 4400 | <5.40 B2ET5419A------ | 4700 | <3.60 B3ET5419A------ | 4450 | <5.00 B5ET5419A------ | 5550 | <21 F1ET5419A------ | | |

# Soft Ferrites

## ER Cores

### DIMENSIONS

| | A | | B | | C | | D | | G | | H | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P/N | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) |
| ER2811A | 28.55 (1.124) | 0.55 (0.022) | 16.9 (0.665) | 0.25 (0.010) | 11.4 (0.449) | 0.25 (0.010) | 12.53 (0.493) | 0.28 (0.011) | 9.90 (0.390) | 0.25 (0.010) | 21.6 (0.850) | 0.40 (0.016) |
| ER3411A | 34.2 (1.346) | 0.80 (0.031) | 13.0 (0.512) | 0.20 (0.008) | 10.8 (0.425) | 0.30 (0.012) | 7.80 (0.307) | 0.30 (0.012) | 10.8 (0.425) | 0.30 (0.012) | 26.3 (1.035) | 0.70 (0.028) |
| ER3511A | 35.0 (1.378) | 0.90 (0.035) | 20.3 (0.799) | 0.20 (0.008) | 11.3 (0.445) | 0.40 (0.016) | 14.8 (0.583) | 0.40 (0.016) | 11.3 (0.445) | 0.35 (0.014) | 26.4 (1.039) | 0.90 (0.035) |
| ER3511B | 35.0 (1.378) | 0.90 (0.035) | 21.2 (0.835) | 0.20 (0.008) | 11.3 (0.445) | 0.40 (0.016) | 15.5 (0.610) | 0.40 (0.016) | 11.3 (0.445) | 0.35 (0.014) | 26.4 (1.039) | 0.90 (0.035) |
| ER3913A | 39.1 (1.539) | 0.90 (0.035) | 17.8 (0.701) | 0.20 (0.008) | 12.5 (0.492) | 0.30 (0.012) | 12.6 (0.496) | 0.40 (0.016) | 12.5 (0.492) | 0.30 (0.012) | 30.1 (1.185) | 0.80 (0.031) |
| ER3913C | 39.1 (1.539) | 0.90 (0.035) | 21.1 (0.831) | 0.20 (0.008) | 12.5 (0.492) | 0.30 (0.012) | 15.9 (0.626) | 0.40 (0.016) | 12.5 (0.492) | 0.30 (0.012) | 30.1 (1.185) | 0.80 (0.031) |
| ER3913D | 39.1 (1.539) | 0.90 (0.035) | 22.2 (0.874) | 0.20 (0.008) | 12.5 (0.492) | 0.30 (0.012) | 17.0 (0.669) | 0.35 (0.014) | 12.5 (0.492) | 0.30 (0.012) | 30.1 (1.185) | 0.80 (0.031) |
| ER4013A | 40.0 (1.575) | 0.90 (0.035) | 22.4 (0.882) | 0.20 (0.008) | 13.3 (0.524) | 0.25 (0.010) | 15.45 (0.608) | 0.30 (0.012) | 13.3 (0.524) | 0.25 (0.010) | 29.7 (1.169) | 0.70 (0.028) |
| ER4215A | 42.0 (1.654) | 0.60 (0.024) | 21.6 (0.850) | 0.20 (0.008) | 14.7 (0.579) | 0.30 (0.012) | 15.9 (0.626) | 0.30 (0.012) | 14.7 (0.579) | 0.30 (0.012) | 31.0 (1.220) | 0.50 (0.020) |
| ER4215B | 42.0 (1.654) | 0.60 (0.024) | 21.1 (0.831) | 0.20 (0.008) | 14.7 (0.579) | 0.30 (0.012) | 15.4 (0.606) | 0.30 (0.012) | 14.7 (0.579) | 0.30 (0.012) | 31.0 (1.220) | 0.50 (0.020) |
| ER4518A | 45.1 (1.776) | 0.90 (0.035) | 17.3 (0.681) | 0.20 (0.008) | 17.75 (0.699) | 0.25 (0.010) | 11.0 (0.433) | 0.25 (0.010) | 17.75 (0.699) | 0.25 (0.010) | 33.65 (1.325) | 0.65 (0.026) |
| ER4518B | 45.1 (1.776) | 0.90 (0.035) | 22.3 (0.878) | 0.20 (0.008) | 17.65 (0.695) | 0.25 (0.010) | 16.6 (0.654) | 0.35 (0.014) | 16.7 (0.657) | 0.30 (0.012) | 33.65 (1.325) | 0.65 (0.026) |
| ER4821A | 48.0 (1.890) | 1.00 (0.039) | 21.0 (0.827) | 0.20 (0.008) | 20.9 (0.823) | 0.40 (0.016) | 15.0 (0.591) | 0.30 (0.012) | 18.0 (0.709) | 0.30 (0.012) | 38.0 (1.496) | 0.80 (0.031) |
| ER4916A | 48.7 (1.917) | 1.10 (0.043) | 25.1 (0.988) | 0.20 (0.008) | 16.3 (0.642) | 0.40 (0.016) | 18.5 (0.728) | 0.40 (0.016) | 16.3 (0.642) | 0.40 (0.016) | 37.0 (1.457) | 0.90 (0.035) |
| ER4916B | 48.7 (1.917) | 1.10 (0.043) | 22.7 (0.894) | 0.20 (0.008) | 16.3 (0.642) | 0.40 (0.016) | 16.1 (0.634) | 0.40 (0.016) | 16.3 (0.642) | 0.40 (0.016) | 37.0 (1.457) | 0.90 (0.035) |
| ER5318A | 53.5 (2.106) | 1.00 (0.039) | 18.3 (0.720) | 0.20 (0.008) | 17.95 (0.707) | 0.35 (0.014) | 11.4 (0.449) | 0.30 (0.012) | 17.9 (0.705) | 0.40 (0.016) | 40.65 (1.600) | 0.85 (0.033) |
| ER5525A | 55.2 (2.173) | 0.60 (0.024) | 28.4 (1.118) | 0.40 (0.016) | 24.7 (0.972) | 0.40 (0.016) | 19.15 (0.754) | 0.45 (0.018) | 20.6 (0.811) | 0.40 (0.016) | 42.2 (1.661) | 0.70 (0.028) |

## EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor C (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume Ve $mm^3$ ($in.^3$) | Weight Per Set W g (oz.) |
|---|---|---|---|---|---|---|---|
| **ER2811A** | 1.47 | 0.86 (21.84) | 73.7 (2.90) | 86 (0.133) | 77.00 (0.119) | 6350 (0.388) | 33.9 (1.20) |
| **ER3411A** | 1.95 | 0.64 (16.26) | 63 (2.48) | 98 (0.152) | 92.00 (0.143) | 6100 (0.372) | 31.4 (1.11) |
| **ER3511A** | 1.50 | 0.84 (21.28) | 86 (3.39) | 107 (0.166) | – | 9300 (0.568) | 50 (1.76) |
| **ER3511B** | 1.46 | 0.86 (21.86) | 92.8 (3.65) | 108.1 (0.168) | – | 10030 (0.612) | 51.6 (1.82) |
| **ER3913A** | 1.90 | 0.67 (17.02) | 84 (3.31) | 125 (0.194) | 123.00 (0.191) | 10530 (0.643) | 56 (1.98) |
| **ER3913C** | 1.64 | 0.77 (19.46) | 96 (3.78) | 125 (0.194) | – | 12000 (0.732) | 57.1 (2.01) |
| **ER3913D** | 1.54 | 0.80 (20.32) | 101 (3.98) | 125 (0.194) | – | 12700 (0.775) | 66.9 (2.36) |
| **ER4013A** | 2.00 | 0.63 (15.96) | 97 (3.82) | 152 (0.236) | – | 14770 (0.901) | 79 (2.79) |
| **ER4215A** | 2.20 | 0.57 (14.51) | 98 (3.86) | 173 (0.268) | – | 16940 (1.03) | 86.5 (3.05) |
| **ER4518A** | 3.76 | 0.33 (8.38) | 80 (3.15) | 238 (0.369) | 233.00 (0.361) | 18910 (1.15) | 96 (3.39) |
| **ER4518B** | 2.79 | 0.45 (11.43) | 100 (3.94) | 221 (0.343) | 210.00 (0.326) | 22030 (1.34) | 120 (4.23) |
| **ER4821A** | 3.22 | 0.39 (9.91) | 98.6 (3.88) | 253 (0.392) | 250.00 (0.388) | 24935 (1.52) | 140 (4.94) |
| **ER4916A** | 2.31 | 0.54 (13.72) | 115 (4.53) | 212 (0.329) | 209.00 (0.324) | 24400 (1.489) | 125 (4.41) |
| **ER4916B** | 2.51 | 0.50 (12.70) | 106 (4.17) | 211 (0.327) | 209.00 (0.324) | 22400 (1.367) | 115 (4.06) |
| **ER5318A** | 3.57 | 0.35 (8.89) | 90 (3.54) | 255 (0.395) | 252.00 (0.391) | 22900 (1.40) | 120 (4.23) |
| **ER5525A** | 3.30 | 0.39 (9.91) | 12.3 (0.48) | 330 (0.512) | – | 40600 (2.478) | 200 (7.05) |

## MATERIALS

| P/N | B3 | | B5 | | F1 | |
|---|---|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (16kHz-200mT) | **Al** (nH) ±25% | Loss **W** (32kHz-200mT) | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) |
| **ER2811A** | | | | | 2050 F1ER2811A------ | <3.70 |
| **ER3411A** | | | | | 3400 F1ER3411A------ | <3.60 |
| **ER3511A** | | | | | 2900 F1ER3511A------ | <5.40 |
| **ER3511B** | | | | | 2750 F1ER3511B------ | <5.90 |
| **ER3913A** | | | | | 3450 F1ER3913A------ | <6.10 |
| **ER3913C** | | | | | 3100 F1ER3913C------ | <7.00 |
| **ER3913D** | | | | | 2800 F1ER3913D------ | <7.37 |
| **ER4013A** | | | | | 3500 F1ER4013A------ | <8.60 |
| **ER4215A** | | | | | 4200 F1ER4215A------ | <9.90 |
| **ER4518A** | 5900 B3ER4518A------ | <1.90 | 5650 B5ER4518A------ | <2.70 | | |
| **ER4518B** | 4550 B3ER4518B------ | <2.30 | 4300 B5ER4518B------ | <3.10 | | |
| **ER4821A** | 5200 B3ER4821A------ | <2.90 | 5000 B5ER4821A------ | <3.50 | | |
| **ER4916A** | 3800 B3ER4916A------ | <2.50 | 3650 B5ER4916A------ | <3.5 | | |
| **ER4916B** | 4100 B3ER4916B------ | <2.30 | 3900 B5ER4916B------ | <3.20 | | |
| **ER5318A** | 5450 B5ER5318A------ | <3.30 | | | | |
| **ER5525A** | 5600 B5ER5525A------ | <6.00 | | | | |

# Soft Ferrites

## EF Cores

### DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | | I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **EF1204A** | 12.5 (0.492) | 0.30 (0.012) | 6.20 (0.244) | 0.10 (0.004) | 3.50 (0.138) | 0.10 (0.004) | 4.55 (0.179) | 0.15 (0.006) | 5.40 (0.213) | 0.15 (0.006) | 9.00 (0.354) | 0.25 (0.010) | 2.00 (0.079) | 0.10 (0.004) |
| **EF1505A** | 15.0 (0.591) | 0.40 (0.016) | 7.50 (0.295) | 0.15 (0.006) | 4.65 (0.183) | 0.15 (0.006) | 5.50 (0.217) | 0.25 (0.010) | 5.30 (0.209) | (0.15 (0.006) | 11.0 (0.433) | 0.35 (0.014) | 2.40 (0.094) | 0.10 (0.004) |
| **EF2007A** | 20.0 (0.787) | 0.55 (0.022) | 10.0 (0.394) | 0.15 (0.006) | 6.65 (0.262) | 0.15 (0.006) | 7.70 (0.303) | 0.25 (0.010) | 8.90 (0.350) | 0.20 (0.008) | 15.4 (0.606) | 0.50 (0.020) | 3.60 (0.142) | 0.15 (0.006) |
| **EF2509A** | 25.0 (0.984) | 0.65 (0.026) | 12.5 (0.492) | 0.15 (0.006) | 9.10 (0.358) | 0.20 (0.008) | 9.30 (0.366) | 0.25 (0.010) | 11.4 (0.449) | 0.20 (0.008) | 18.7 (0.736) | 0.60 (0.024) | 5.20 (0.205) | 0.15 (0.006) |
| **EF3009A** | 30.0 (1.181) | 0.80 (0.031) | 15.0 (0.591) | 0.15 (0.006) | 9.10 (0.358) | 0.20 (0.008) | 11.2 (0.441) | 0.30 (0.012) | 14.6 (0.575) | 0.25 (0.010) | 22.4 (0.882) | 0.75 (0.030) | 4.90 (0.193) | 0.15 (0.006) |

### EFFECTIVE CORE PARAMETERS

millimeters (inches)

| **P/N** | **Permeance Factor C** (nH) | **Core Constant C1** $mm^{-1}$ ($in.^{-1}$) | **Effective Length le** mm (in.) | **Effective Area Ae** $mm^2$ ($in.^2$) | **Min. Area A min.** $mm^2$ ($in.^2$) | **Effective Volume Ve** $mm^3$ ($in.^3$) | **Weight Per Set W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **EF1204A** | 0.50 | 2.50 (63.50) | 28.5 (1.12) | 11.4 (0.018) | 10.70 (0.017) | 325 (0.020) | 0.9 (0.032) |
| **EF1505A** | 0.55 | 2.26 (57.40) | 34 | 15 (0.023) | 12.20 (0.019) | 510 (0.031) | 2.8 (0.099) |
| **EF2007A** | 0.80 | 1.52 (38.61) | 47 | 31 (0.048) | – | 1460 (0.089) | 7 (0.247) |
| **EF2509A** | 1.25 | 0.98 (24.89) | 57 | 58 (0.090) | – | 3300 (0.201) | 16.5 (0.582) |
| **EF3009A** | 1.30 | 0.98 (24.89) | 68 (2.68) | 69 (0.107) | – | 4700 (0.287) | 22 (0.776) |

### MATERIALS

| **P/N** | **B2** | | **F1** | | **F2** | | **F4** | |
|---|---|---|---|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (100kHz-100mT) | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) | **Al** (nH) ±25% | Loss **W** (300kHz-50mT) | **Al** (nH) ±25% | Loss **W** (1000kHz-50mT) |
| **EF1204A** | | | 780 | <0.19 F1EF1204A------ | 680 | <0.037 F2EF1204A------ | 520 | <0.23 F4EF1204A------ |
| **EF1505A** | | | 880 | 0.30 F1EF1505A------ | 770 | <0.059 F2EF1505A------ | 435 | <0.35 F4EF1505A------ |
| **EF2007A** | | | 1150 | <0.85 F1EF2007A------ | 1200 | <0.17 F2EF2007A------ | 670 | <1.00 F4EF2007A------ |
| **EF2509A** | 1800 | <0.65 B2EF2509A------ | 2100 | <2.00 F1EF2509A------ | 1850 | <0.38 F2EF2509A------ | 1100 | <2.30 F4EF2509A------ |
| **EF3009A** | 1900 | <0.90 2EF3009A------ | 2300 | <2.80 F1EF3009A------ | 1950 | <0.55 F2EF3009A------ | 1150 | <3.20 F4EF3009A------ |

# Soft Ferrites

## EC Cores

### DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | F | | G | | H | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **EC3510A** | 34.5 (1.358) | 0.80 (0.031) | 17.3 (0.681) | 0.15 (0.006) | 9.50 (0.374) | 0.30 (0.012) | 12.25 (0.482) | 0.35 (0.014) | 28.5 (1.122) | 0.80 (0.031) | 9.50 (0.374) | 0.30 (0.012) | 22.75 (0.896) | 0.55 (0.022) |
| **EC4112A** | 40.6 (1.598) | 1.00 (0.039) | 19.5 (0.768) | 0.15 (0.006) | 11.6 (0.457) | 0.30 (0.012) | 13.9 (0.547) | 0.40 (0.016) | 33.6 (1.323) | 1.00 (0.039) | 11.6 (0.457) | 0.30 (0.012) | 27.05 (1.065) | 0.75 (0.030) |
| **EC5214A** | 52.2 (2.055) | 1.30 (0.051) | 24.2 (0.953) | 0.15 (0.006) | 13.4 (0.528) | 0.35 (0.014) | 15.9 (0.626) | 0.40 (0.016) | 44.0 (1.732) | 1.30 (0.051) | 13.4 (0.528) | 0.35 (0.014) | 33.0 (1.299) | 0.90 (0.035) |
| **EC7017A** | 70.0 (2.756) | 1.70 (0.067) | 34.5 (1.358) | 0.15 (0.006) | 16.4 (0.646) | 0.40 (0.016) | 22.75 (0.896) | 0.45 (0.018) | 59.6 (2.346) | 1.70 (0.067) | 16.4 (0.646) | 0.40 (0.016) | 44.5 (1.752) | 1.20 (0.047) |
| **EC7017B** | 70.0 (2.756) | 1.70 (0.067) | 29.8 (1.173) | 0.15 (0.006) | 16.4 (0.646) | 0.40 (0.016) | 23.0 (0.906) | 0.40 (0.016) | 59.6 (2.346) | 1.70 (0.067) | 16.4 (0.646) | 0.40 (0.016) | 44.5 (1.752) | 1.20 (0.047) |

### EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **EC3510A** | 1.37 | 0.92 (23.37) | 77 (3.03) | 84 (0.130) | 71.00 (0.110) | 6500 (0.40) | 36 (1.27) |
| **EC4112A** | 1.70 | 0.74 (18.80) | 89 (3.50) | 121 (0.188) | 106.00 (0.164) | 10900 (0.67) | 56 (1.98) |
| **EC5214A** | 2.16 | 0.58 (14.73) | 105 (4.13) | 180 (0.279) | 141.00 (0.219) | 18800 (1.15) | 110 (3.88) |
| **EC7017A** | 2.45 | 0.51 (12.95) | 144 (5.67) | 279 (0.432) | 211.00 (0.327) | 40000 (2.44) | 252 (8.89) |
| **EC7017B** | 2.25 | 0.57 (14.48) | 137 (5.39) | 242 (0.375) | 211.00 (0.327) | 33600 (2.05) | 216 (7.62) |

### MATERIALS

| P/N | B2 | | F1 | |
|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (100kHz-100mT) | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) |
| **EC3510A** | 2170 | <1.30 | 2500 | <3.80 |
| | B2EC3510A------ | | F1EC3510A------ | |
| **EC4112A** | 2790 | <2.20 | 3150 | <6.40 |
| | B2EC4112A------ | | F1EC4112A------ | |
| **EC5214A** | 3600 | <3.70 | 4150 | <11.00 |
| | B2EC5214A------ | | F1EC5214A------ | |

### MATERIALS (LARGE CORES > 210 g/set)

| P/N | B2 | | F1 | |
|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (25kHz-200mT) | **Al** (nH) ±25% | Loss **W** (25kHz-200mT) |
| **EC7017A** | 3900 | <6.00 | 3900 | <4.00 |
| | B2EC7017A------ | | F1EC7017A------ | |
| **EC7017B** | 3550 | <5.10 | 3550 | <3.40 |
| | B2EC7017B------ | | F1EC7017B------ | |

# Soft Ferrites

## EP Cores

### DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | F | | G | | H | | I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **EP0700A** | 9.20 (0.362) | 0.20 (0.008) | 6.35 (0.250) | 0.15 (0.006) | 1.70 (0.066) | 0.10 (0.004) | 7.40 (0.291) | 0.20 (0.008) | | | 3.30 (0.130) | 0.10 (0.004) | 7.40 (0.291) | 0.10 (0.004) | 5.20 (0.204) | 0.20 (0.008) |
| **EP1000A** | 11.5 (0.452) | 0.30 (0.012) | 7.60 (0.300) | 0.20 (0.008) | 1.80 (0.070) | 0.13 (0.005) | 9.40 (0.370) | 0.20 (0.008) | | | 3.30 (0.130) | 0.15 (0.006) | 10.2 (0.402) | 0.20 (0.008) | 7.40 (0.291) | 0.20 (0.008) |
| **EP1300A** | 12.5 (0.492) | 0.30 (0.012) | 8.80 (0.346) | 0.20 (0.008) | 2.38 (0.093) | 0.45 (0.018) | 10.0 (0.393) | 0.30 (0.012) | | | 4.35 (0.171) | 0.15 (0.006) | 12.65 (0.508) | 0.15 (0.006) | 9.20 (0.362) | 0.20 (0.008) |

### EFFECTIVE CORE PARAMETERS

millimeters (inches)

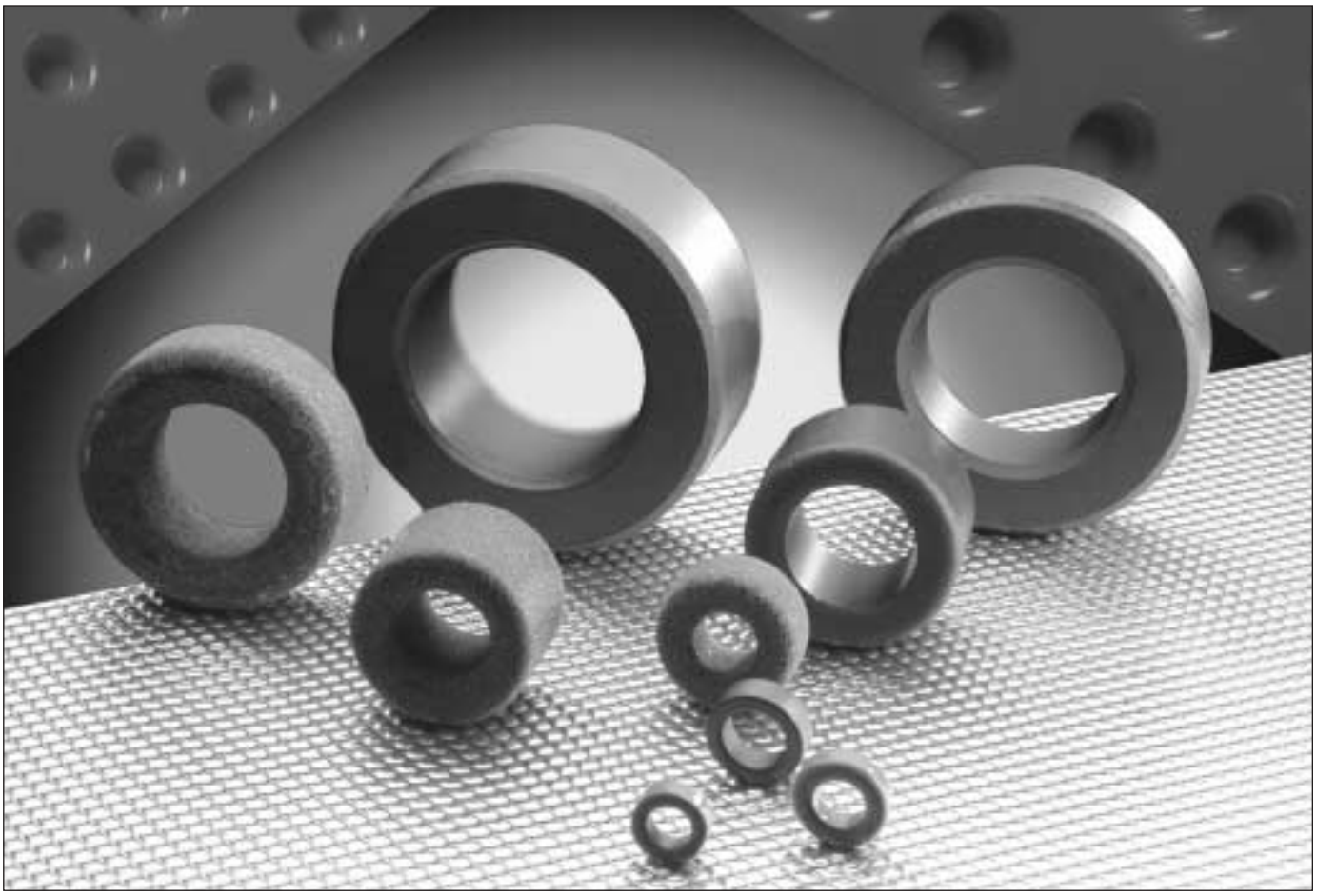
| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^{-2}$ ($in.^{-2}$) | Min. Area A min. $mm^{-2}$ ($in.^{-2}$) | Effective Volume **Ve** $mm^{-3}$ ($in.^{-3}$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **EP0700A** | 0.87 | 1.45 (36.83) | 15.5 (0.61) | 10.7 (0.042) | 8.55 (0.033) | 165 (0.065) | 2.00 (0.071) |
| **EP1000A** | 0.74 | 1.7 (43.18) | 19.1 (0.752) | 11.3 (0.044) | 8.55 (0.033) | 216 (0.085) | 2.6 (0.091) |
| **EP1300A** | 1.02 | 1.23 (31.24) | 24.1 (0.949) | 19.5 (0.076) | 14.9 (0.058) | 469 (0.184) | 4.3 (0.15) |

### MATERIALS

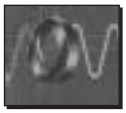
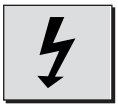
| P/N | A2 | A3 | A4 | F1 | | F2 | |
|---|---|---|---|---|---|---|---|
| | **Al** (nH) ±30% | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) | **Al** (nH) ±25% | Loss **W** (300kHz-50mT) |
| **EP0700A** | 1700 | 1550 | 1500 | 1000 | <0.096 | 920 | <0.020 |
| *codif.* | A2EP0700A------ | A3EP0700A------ | A4EP0700A------ | F1EP0700A------ | | F2EP0700A------ | |
| **EP1000A** | 1700 | 1550 | 1450 | 950 | <0.126 | 850 | <0.020 |
| *codif.* | A2EP1000A------ | A3EP1000A------ | A4EP1000A------ | F1EP1000A------ | | F2EP1000A------ | |
| **EP1300A** | 2750 | 2550 | 2350 | 1450 | <0.273 | 1300 | <0.060 |
| *codif.* | A2EP1300A------ | A3EP1300A------ | A4EP1300A------ | F1EP1300A------ | | F2EP1300A------ | |

# Soft Ferrites

## Toroids



## KEY APPLICATIONS

- **EMI Suppression** 
- **High Power** 
- **Lighting** 

## HOW TO ORDER

| A 4 | TR | 1 9 0 0 | A – – – – – – |
|---|---|---|---|
| Material | Model | Shape Code | |

Coating:
- Uncoated core: **–**
- Coated core: **R** Polyamide
  **E** Epoxy
  **P** Parylene

## GENERAL DESCRIPTION

Ferrinox toroids provide high inductance values in the minimum volume. The magnetic circuit with no airgap offers minimum leakage inductance and optimal coupling. The uniform cross section area along the magnetic path allows operation at maximum flux density therefore preventing any local saturation and supplementary losses.

## APPLICATION

The toroids may be used in a wide range of applications including noise suppression chokes, wide band transformers, converter transformer, pulse transformers, delay lines, ground fault interrupter.

Material selection for noise suppression is facilitated by the addition of cut-off frequency data and permeability versus frequency curves.

## TOROIDS COATINGS

In order to improve insulation between windings and ferrite toroids, several coatings are available:

| Process | Code | Thickness | Toroids Sizes | Breakdown Voltage VDC | Color |
|---|---|---|---|---|---|
| Standard Polyamide | R | 200 to 400 µm 8 to 16 mils | From 6.3 to 40 included | > 2000 | Neutral |
| Parylene C | P | 5 to 26 µm 2 to 1 mil | Only upon request >10 mm | > 500 | Neutral |
| Epoxy | E | 200 to 400 µm | From 10 to 31.5 | > 2000 | Grey |

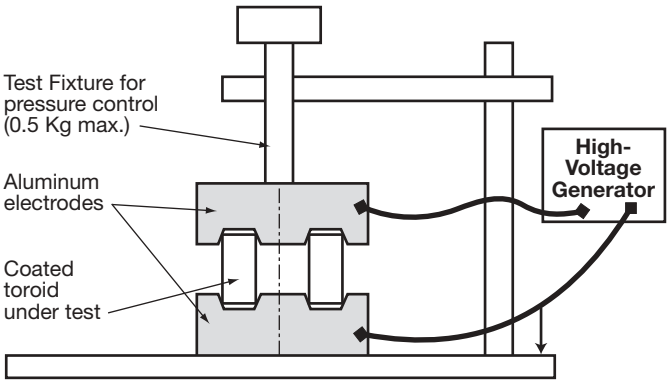
## STANDARD POLYAMIDE PROCESS

Coating of these toroids is carried out by a patented process (without grip marks), which deposits a polyamide coating guaranteeing:

- Very good dielectric rigidity
- Excellent resistance to the main solvents and lisuis or gaseous chemical agents
- A melting point > 175°C
- A self-extinguishing product (conforming to UL 94V2)
- Coating thickness 200 µm typical value
- Single color: clear natural

## VOLTAGE BREAKDOWN MEASUREMENT

Coated toroids are tested with the following device (According to the cecc method: SS25500/Annex A/Method A).




## TOROIDS DRAWING

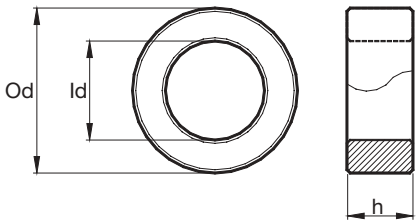



*Figure 13 – Toroids*

# Soft Ferrites

## Toroids

### DIMENSIONS

millimeters (inches)

| | Uncoated | | | | | | Coated | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Od | | Id | | h | | Od | | Id | | h | |
| P/N | dimens. | (±) | dimens. | (±) | dimens. | (±) | dimens. | max. | dimens. | min. | dimens. | max. |
| T-0630A | 6.30 (0.248) | 0.20 (0.008) | 3.80 (0.150) | 0.15 (0.006) | 2.50 (0.098) | 0.15 (0.006) | 7.20 (0.283) | max. | 2.80 (0.110) | min. | 3.25 (0.128) | max. |
| T-0950A | 9.52 (0.375) | 0.25 (0.010) | 4.75 (0.187) | 0.13 (0.005) | 3.17 (0.125) | 0.25 (0.010) | 10.62 (0.418) | max. | 3.80 (0.150) | min. | 4.17 (0.164) | max. |
| T-1000A | 10.0 (0.394) | 0.30 (0.012) | 6.00 (0.236) | 0.20 (0.008) | 4.00 (0.157) | 0.15 (0.006) | 11.1 (0.437) | max. | 5.00 (0.197) | min. | 4.90 (0.193) | max. |
| T-1000C | 10.0 (0.394) | 0.30 (0.012) | 6.00 (0.236) | 0.20 (0.008) | 3.00 (0.118) | 0.15 (0.006) | 11.1 (0.437) | max. | 5.00 (0.197) | min. | 3.95 (0.156) | max. |
| T-1270A | 12.7 (0.500) | 0.40 (0.016) | 7.14 (0.281) | 0.25 (0.010) | 4.70 (0.185) | 0.20 (0.008) | 13.9 (0.547) | max. | 6.09 (0.240) | min. | 5.70 (0.224) | max. |
| T-1270B | 12.7 (0.500) | 0.40 (0.016) | 7.14 (0.281) | 0.25 (0.010) | 6.35 (0.250) | 0.25 (0.010) | 13.9 (0.547) | max. | 6.09 (0.240) | min. | 7.40 (0.291) | max. |
| T-1270C | 12.7 (0.500) | 0.40 (0.016) | 7.92 (0.312) | 0.25 (0.010) | 6.35 (0.250) | 0.25 (0.010) | 13.9 (0.547) | max. | 6.87 (0.270) | min. | 7.40 (0.291) | max. |
| T-1300A | 13.35 (0.526) | 0.40 (0.016) | 7.30 (0.287) | 0.20 (0.008) | 3.20 (0.126) | 0.30 (0.012) | 14.55 (0.573) | max. | 6.30 (0.248) | min. | 4.30 (0.169) | max. |
| T-1300C | 13.35 (0.526) | 0.45 (0.018) | 7.30 (0.287) | 0.25 (0.010) | 5.00 (0.197) | 0.20 (0.008) | 14.60 (0.575) | max. | 6.25 (0.246) | min. | 6.00 (0.236) | max. |
| T-1400A | 14.0 (0.551) | 0.40 (0.016) | 9.00 (0.354) | 0.40 (0.016) | 5.00 (0.197) | 0.30 (0.012) | 15.20 (0.598) | max. | 7.80 (0.307) | min. | 6.10 (0.240) | max. |

### EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Piece **W** g (oz.) |
|---|---|---|---|---|---|---|
| T-0630A | 0.25 | 5.00 (127.00) | 16.0 (0.63) | 3.20 (0.005) | 51 (0.003) | 0.25 (0.01) |
| T-0950A | 0.44 | 2.85 (72.39) | 20.7 (0.81) | 7.26 (0.01) | 150 (0.01) | 0.81 (0.03) |
| T-1000A | 0.40 | 3.10 (78.74) | 25.0 (0.98) | 8.00 (0.01) | 200 (0.01) | 0.9 (0.03) |
| T-1000C | 0.31 | 4.10 (104.14) | 24.1 (0.95) | 5.87 (0.01) | 141 (0.01) | 0.72 (0.03) |
| T-1270A | 0.54 | 2.32 (58.93) | 29.5 (1.16) | 12.7 (0.02) | 380 (0.02) | 2.0 (0.07) |
| T-1270B | 0.73 | 1.72 (43.69) | 30.0 (1.18) | 17.0 (0.03) | 507 (0.03) | 2.4 (0.08) |
| T-1270C | 0.60 | 2.10 (53.34) | 31.2 (1.23) | 14.9 (0.02) | 465 (0.03) | 2.2 (0.08) |
| T-1300A | 0.38 | 3.35 (85.09) | 32.0 (1.26) | 10.0 (0.02) | 314 (0.02) | 1.5 (0.05) |
| T-1300C | 0.60 | 2.08 (52.83) | 31.0 (1.22) | 15.0 (0.02) | 448 (0.03) | 2.2 (0.08) |
| T-1400A | 0.43 | 2.89 (73.41) | 35.0 (1.38) | 12.0 (0.02) | 451 (0.03) | 2.2 (0.08) |

### MATERIALS

| P/N | A2 **Al** (nH) ±30% | A3 **Al** (nH) ±25% | A4 **Al** (nH) ±25% | A5 **Al** (nH) ±25% | A6 **Al** (nH) ±25% | A9 **Al** (nH) ±25% | F1 **Al** (nH) ±25% | F1 Loss **W** (100kHz-200mT) |
|---|---|---|---|---|---|---|---|---|
| T-0630A | 2500 A2T-0630A------ | | 1500 A4T-0630A------ | 1250 A5T-0630A------ | 1000 A6T-0630A------ | 560 A9T-0630A------ | | |
| T-0950A | 4400 A2T-0950A------ | 3300 A3T-0950A------ | 2650 A4T-0950A------ | 2135 A5T-0950A------ | 1750 A6T-0950A------ | 1100 A9T-0950A------ | 1000 | <0.09 F1T-0950A------ |
| T-1000A | 4000 A2T-1000A------ | 3000 A3T-1000A------ | 2400 A4T-1000A------ | 2000 A5T-1000A------ | 1600 A6T-1000A------ | 900 A9T-1000A------ | 870 | <0.116 F1T-1000A------ |
| T-1000C | 3100 A2T-1000C------ | 2350 A3T-1000C------ | 1800 A4T-1000C------ | 1800 A5T-1000C------ | 1450 A6T-1000C------ | 900 A9T-1000C------ | 680 | <0.09 F1T-1000C------ |
| T-1270A | 5400 A2T-1270A------ | 4050 A3T-1270A------ | 3100 A4T-1270A------ | 2700 A5T-1270A------ | 2150 A6T-1270A------ | 1350 A9T-1270A------ | 1180 | <0.24 F1T-1270A------ |
| T-1270B | 7300 A2T-1270B------ | 5500 A3T-1270B------ | 4400 A4T-1270B------ | 3650 A5T-1270B------ | 2900 A6T-1270B------ | 1850 A9T-1270B------ | 1590 | <0.29 F1T-1270B------ |
| T-1270C | 6000 A2T-1270C------ | 4500 A3T-1270C------ | 3500 A4T-1270C------ | 3000 A5T-1270C------ | 2400 A6T-1270C------ | 1620 A9T-1270C------ | 1400 | <0.29 F1T-1270C------ |
| T-1300A | 3800 A2T-1300A------ | | 2200 A4T-1300A------ | 1900 A5T-1300A------ | 1500 A6T-1300A------ | 950 A9T-1300A------ | 875 | <0.19 F1T-1300A------ |
| T1300C | 6000 A2T-1300C------ | | 3600 A4T-1300C------ | 3000 A5T-1300C------ | 2400 A6T-1300C------ | 1500 A9T-1300C------ | 1400 | <0.26 F1T-1300C------ |
| T-1400A | 4400 A2T-1400A------ | 3300 A3T-1400A------ | 2400 A4T-1400A------ | 2200 A5T-1400A------ | 1770 A6T-1400A------ | 1100 A9T-1400A------ | 1000 | <0.25 F1T-1400A------ |

# Soft Ferrites

## Toroids

## DIMENSIONS

millimeters (inches)

| | Uncoated | | | | | | Coated | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Od | | Id | | h | | Od | | Id | | h | |
| P/N | dimens. | (±) | dimens. | (±) | dimens. | (±) | dimens. | max. | dimens. | min. | dimens. | max. |
| T-1400B | 14.0 (0.551) | 0.45 (0.018) | 9.00 (0.354) | 0.30 (0.012) | 9.00 (0.354) | 0.35 (0.014) | 15.25 (0.600) | max. | 7.90 (0.311) | min. | 10.15 (0.400) | max. |
| T-1600A | 16.0 (0.630) | 0.50 (0.020) | 9.60 (0.378) | 0.30 (0.012) | 6.30 (0.248) | 0.20 (0.008) | 17.3 (0.681) | max. | 8.50 (0.335) | min. | 7.30 (0.287) | max. |
| T-1900A | 19.0 (0.748) | 0.60 (0.024) | 11.4 (0.449) | 0.35 (0.014) | 15.0 (0.591) | 0.55 (0.022) | 20.4 (0.803) | max. | 10.05 (0.396) | min. | 16.35 (0.644) | max. |
| T-1900C | 18.8 (0.740) | 0.40 (0.016) | 11.0 (0.430) | 0.30 (0.012) | 8.00 (0.315) | 0.25 (0.010) | 20.0 (0.787) | max. | 9.90 (0.390) | min. | 9.05 (0.356) | max. |
| T-2000A | 20.0 (0.787) | 0.60 (0.024) | 10.0 (0.394) | 0.30 (0.012) | 10.0 (0.394) | 0.35 (0.014) | 21.4 (0.843) | max. | 8.90 (0.350) | min. | 11.15 (0.439) | max. |
| T-2000B | 20.0 (0.787) | 0.60 (0.024) | 10.0 (0.394) | 0.30 (0.012) | 7.00 (0.276) | 0.25 (0.010) | 21.4 (0.843) | max. | 8.90 (0.350) | min. | 8.05 (0.317) | max. |
| T-2000C | 20.0 (0.787) | 0.60 (0.024) | 10.0 (0.394) | 0.30 (0.012) | 8.00 (0.315) | 0.30 (0.012) | 21.3 (0.839) | max. | 8.65 (0.341) | min. | 9.20 (0.362) | max. |
| T-2000D | 20.0 (0.787) | 0.60 (0.024) | 10.5 (0.413) | 0.35 (0.014) | 15.0 (0.591) | 0.55 (0.022) | 21.4 (0.843) | max. | 9.00 (0.354) | min. | 16.35 (0.644) | max. |
| T-2210A | 22.1 (0.870) | 0.65 (0.026) | 13.72 (0.540) | 0.40 (0.016) | 12.7 (0.500) | 0.45 (0.018) | 23.5 (0.925) | max. | 12.52 (0.493) | min. | 13.9 (0.547) | max. |
| T-2210B | 22.1 (0.870) | 0.65 (0.026) | 13.72 (0.540) | 0.40 (0.016) | 6.35 (0.250) | 0.20 (0.008) | 23.33 (0.919) | max. | 12.64 (0.498) | min. | 7.40 (0.291) | max. |

## EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Piece **W** g (oz.) |
|---|---|---|---|---|---|---|
| T-1400B | 0.80 | 1.58 (40.13) | 35.0 (1.38) | 22.0 (0.03) | 774 (0.05) | 3.7 (0.13) |
| T-1600A | 0.63 | 1.99 (50.55) | 38.5 (1.52) | 20.0 (0.03) | 810 (0.05) | 3.9 (0.14) |
| T-1900A | 1.53 | 0.82 (20.83) | 46.0 (1.81) | 56.0 (0.09) | 2551 (0.16) | 12.2 (0.43) |
| T-1900C | 0.85 | 1.50 (38.10) | 46.8 (1.84) | 31.2 (0.05) | 1460 (0.09) | 7.1 (0.25) |
| T-2000A | 1.39 | 0.91 (23.11) | 43.6 (1.72) | 48.0 (0.07) | 2092 (0.13) | 10 (0.35) |
| T-2000B | 0.97 | 1.29 (32.77) | 43.6 (1.72) | 33.6 (0.05) | 1460 (0.09) | 7.92 (0.28) |
| T-2000C | 1.11 | 1.13 (28.70) | 43.6 (1.72) | 38.4 (0.06) | 1670 (0.10) | 9.05 (0.32) |
| T-2000D | 1.93 | 0.65 (16.51) | 44.7 (1.76) | 68.8 (0.11) | 3080 (0.19) | 16.4 (0.58) |
| T-2210A | 1.20 | 1.06 (26.92) | 53.2 (2.09) | 52.2 (0.08) | 3000 (0.18) | 14.2 (0.50) |
| T-2210B | 0.60 | 2.10 (53.34) | 54.2 (2.13) | 27.0 (0.04) | 1500 (0.09) | 7.0 (0.25) |

## MATERIALS

| P/N | A2 | A4 | A5 | A6 | A9 | B2 | | F1 | |
|---|---|---|---|---|---|---|---|---|---|
| | **Al** (nH) ±30% | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | Loss **W** (100kHz-100mT) | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) |
| T-1400B | 8000 A2T-1400B------ | 4470 A4T-1400B------ | 4000 A5T-1400B------ | 3150 A6T-1400B------ | 2000 A9T-1400B------ | | | 1750 F1T-1400B------ | <0.45 |
| T-1600A | 6400 A2T-1600A------ | 3800 A4T-1600A------ | 3200 A5T-1600A------ | 2500 A6T-1600A------ | 1600 A9T-1600A------ | | | 1450 F1T-1600A------ | <0.45 |
| T-1900A | 15500 A2T-1900A------ | 9200 A4T-1900A------ | 7700 A5T-1900A------ | 6100 A6T-1900A------ | 3850 A9T-1900A------ | | | 3500 F1T-1900A------ | <1.50 |
| T-1900C | 8500 A2T-1900C------ | 5100 A4T-1900C------ | 4250 A5T-1900C------ | 3400 A6T-1900C------ | 2150 A9T-1900C------ | | | 1950 F1T-1900C------ | <0.85 |
| T-2000A | 14000 A2T-2000A------ | 8300 A4T-2000A------ | 6900 A5T-2000A------ | 5550 A6T-2000A------ | 3450 A9T-2000A------ | 2650 B2T-2000A------ | <0.32 | 3200 F1T-2000A------ | <1.30 |
| T-2000B | 9700 A2T-2000B------ | 5800 A4T-2000B------ | 4850 A5T-2000B------ | 3900 A6T-2000B------ | 2450 A9T-2000B------ | 1850 B2T-2000B------ | <0.22 | 2250 F1T-2000B------ | <0.85 |
| T-2000C | 11000 A2T-2000C------ | 6700 A4T-2000C------ | 5550 A5T-2000C------ | 4450 A6T-2000C------ | 2800 A9T-2000C------ | 2100 B2T-2000C------ | <0.26 | 2550 F1T-2000C------ | <0.97 |
| T-2000D | | 11500 A4T-2000D------ | 9700 A5T-2000D------ | 7700 A6T-2000D------ | 4850 A9T-2000D------ | 3650 B2T-2000D------ | <0.46 | | |
| T-2210A | | 7300 A4T-2210A------ | 6100 A5T-2210A------ | 4850 A6T-2210A------ | 3050 A9T-2210A------ | 2300 B2T-2210A------ | <0.43 | 2800 F1T-2210A------ | <1.70 |
| T-2210B | | 3650 A4T-2210B------ | 3050 A5T-2210B------ | 2450 A6T-2210B------ | 1650 A9T-2210B------ | 1150 B2T-2210B------ | <0.22 | 1400 F1T-2210B------ | <0.82 |

# Soft Ferrites

## Toroids

## DIMENSIONS

millimeters (inches)

| | Uncoated | | | | | | Coated | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Od | | Id | | h | | Od | | Id | | h | |
| P/N | dimens. | (±) | dimens. | (±) | dimens. | (±) | dimens. | max. | dimens. | min. | dimens. | max. |
| T-2500A | 25.0 (0.984) | 0.75 (0.030) | 15.0 (0.591) | 0.45 (0.018) | 10.0 (0.394) | 0.35 (0.014) | 26.55 (1.045) | max. | 13.75 (0.541) | min. | 11.15 (0.439) | max. |
| T-2500B | 25.0 (0.984) | 0.75 (0.030) | 15.0 (0.591) | 0.45 (0.018) | 15.0 (0.591) | 0.55 (0.022) | 26.55 (1.045) | max. | 13.75 (0.541) | min. | 16.35 (0.644) | max. |
| T-2540A | 25.4 (1.000) | 0.75 (0.030) | 15.5 (0.610) | 0.45 (0.018) | 7.93 (0.312) | 0.30 (0.012) | 27.0 (1.061) | max. | 14.3 (0.561) | min. | 9.03 (0.356) | max. |
| T-2600A | 26.0 (1.024) | 0.55 (0.022) | 14.15 (0.557) | 0.70 (0.028) | 10.0 (0.394) | 0.60 (0.024) | 27.35 (1,077) | max. | 13.35 (0.526) | min. | 11.1 (0.437) | max. |
| T-2600B | 26.0 (1.024) | 0.80 (0.031) | 14.5 (0.571) | 0.45 (0.018) | 14.95 (0.589) | 0.55 (0.022) | 27.6 (1.087) | max. | 13.25 (0.522) | min. | 16.3 (0.642) | max. |
| T-2600C | 26.0 (1.024) | 0.80 (0.031) | 14.5 (0.571) | 0.45 (0.018) | 20.0 (0.787) | 0.70 (0.028) | 27.6 (1.087) | max. | 13.25 (0.522) | min. | 21.5 (0.846) | max. |
| T-2800A | 27.6 (1.087) | 0.85 (0.033) | 17.6 (0.693) | 0.55 (0.022) | 19.0 (0.748) | 0.70 (0.028) | 29.25 (1.152) | max. | 16.25 (0.640) | min. | 20.5 (0.807) | max. |
| T-2800B | 27.6 (1.087) | 0.60 (0.024) | 17.6 (0.693) | 0.40 (0.016) | 15.4 (0.606) | 0.30 (0.012) | 29.0 (1.142) | max. | 16.4 (0.646) | min. | 16.5 (0.650) | max. |
| T-2800C | 27.6 (1.087) | 0.60 (0.024) | 17.6 (0.693) | 0.40 (0.016) | 7.00 (0.276) | 0.20 (0.008) | 29.0 (1.142) | max. | 16.4 (0.646) | min. | 8.00 (0.315) | max. |
| T-2800D | 27.6 (1.087) | 0.85 (0.033) | 17.6 (0.693) | 0.55 (0.022) | 9.00 (0.354) | 0.30 (0.012) | 29.25 (1.152) | max. | 16.25 (0.640) | min. | 10.1 (0.398) | max. |

## EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Piece **W** g (oz.) |
|---|---|---|---|---|---|---|
| T-2500A | 1.02 | 1.23 (31.24) | 60.2 (2.37) | 48.9 (0.08) | 2940 (0.18) | 15.1 (0.53) |
| T-2500B | 1.53 | 0.82 (20.83) | 60.2 (2.37) | 73.0 (0.11) | 4417 (0.27) | 21.2 (0.75) |
| T-2540A | 0.78 | 1.60 (40.64) | 61.7 (2.429) | 38.5 (0.06) | 2370 (0.14) | 12.1 (0.43) |
| T-2600A | 1.15 | 1.10 (27.94) | 63.6 (2.50) | 57.5 (0.09) | 3660 (0.22) | 17 (0.60) |
| T-2600B | 1.75 | 0.72 (18.24) | 60.1 (2.37) | 83.6 (0.13) | 5030 (0.31) | 26.2 (0.92) |
| T-2600C | 2.34 | 0.54 (13.72) | 60.1 (2.37) | 112 (0.17) | 6720 (0.41) | 35.1 (1.24) |
| T-2800A | 1.71 | 0.74 (18.80) | 68.7 (2.70) | 93.4 (0.14) | 6410 (0.39) | 32.4 (1.14) |
| T-2800B | 1.35 | 0.93 (23.62) | 71.0 (2.80) | 76.0 (0.12) | 5400 (0.33) | 26 (0.92) |
| T-2800C | 0.63 | 2.03 (51.56) | 71.0 (2.80) | 35.0 (0.05) | 2485 (0.15) | 11.7 (0.41) |
| T-2800D | 0.81 | 1.55 (39.37) | 68.7 (2.70) | 44.2 (0.07) | 3040 (0.19) | 15.3 (0.54) |

## MATERIALS

| P/N | A2 | A4 | A5 | A6 | A9 | B2 | | F1 | |
|---|---|---|---|---|---|---|---|---|---|
| | **Al** (nH) ±30% | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | Loss **W** (100kHz-100mT) | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) |
| T-2500A | 10000 A2T-2500A------ | 6000 A4T-2500A------ | 5100 A5T-2500A------ | 4000 A6T-2500A------ | 2500 A9T-2500A------ | 1950 B2T-2500A------ | <0.45 | 2350 F1T-2500A------ | <1.80 |
| T-2500B | | 9200 A4T-2500B------ | 7700 A5T-2500B------ | 6100 A6T-2500B------ | 3850 A9T-2500B----- | 2900 B2T-2500B------ | <0.66 | 3500 F1T-2500B------ | <2.60 |
| T-2540A | | 4700 A4T-2540A------ | 3900 A5T-2540A------ | 3100 A6T-2540A------ | 1950 A9T-2540A------ | 1500 B2T-2540A------ | <0.36 | | |
| T-2600A | | 6900 A4T-2600A------ | | 4600 A6T-2600A------- | 2900 A9T-2600A------- | 2200 B2T-2600A------ | <0.55 | | |
| T-2600B | | 9900 A4T-2600B------ | | 7000 A6T-2600B------ | 4400 A9T-2600B------ | 3350 B2T-2600B------ | <0.76 | | |
| T-2600C | | 13200 A4T-2600C------ | | 9400 A6T-2600C------ | 5850 A9T-2600C------ | 4450 B2T-2600C------ | <1.10 | | |
| T-2800A | | 10500 A4T-2800A------ | | 6800 A6T-2800A------ | 4300 A9T-2800A------ | 3250 B2T-2800A------ | <0.97 | | |
| T-2800B | | 8100 A4T-2800B------ | | 5400 A6T-2800B------ | 3400 A9T-2800B------ | 2550 B2T-2800B------ | <0.81 | | |
| T-2800C | | 3800 A4T-2800C------ | | 2500 A6T-2800C------ | 1600 A9T-2800C------ | 1200 B2T-2800C------ | <0.40 | | |
| T-2800D | | 4850 A4T-2800D------ | | 3250 A6T-2800D------ | 2050 A9T-2800D------ | 1550 B2T-2800D------ | <0.46 | | |

# Soft Ferrites

## Toroids

### DIMENSIONS

millimeters (inches)

| | Uncoated | | | | | | Coated | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Od | | Id | | h | | Od | | Id | | h | |
| P/N | dimens. | (±) | dimens. | (±) | dimens. | (±) | dimens. | max. | dimens. | min. | dimens. | max. |
| T-3150A | 31.5 (1.240) | 0.95 (0.037) | 19.0 (0.748) | 0.60 (0.024) | 12.5 (0.492) | 0.45 (0.018) | 33.25 (1.309) | max. | 17.65 (0.695) | min. | 13.75 (0.541) | max. |
| T-3150C | 31.5 (1.240) | 0.95 (0.037) | 19.0 (0.748) | 0.60 (0.024) | 20.0 (0.787) | 0.70 (0.028) | 33.25 (1.309) | max. | 17.65 (0.695) | min. | 21.5 (0.846) | max. |
| T-3600A | 36.0 (1.417) | 1.10 (0.043) | 23.0 (0.906) | 0.70 (0.028) | 15.0 (0.591) | 0.55 (0.022) | 37.9 (1.492) | max. | 21.5 (0.846) | min. | 16.35 (0.644) | max. |
| T-3600B | 36.0 (1.417) | 1.10 (0.043) | 23.0 (0.906) | 0.70 (0.028) | 20.0 (0.787) | 0.70 (0.028) | 37.9 (1.492) | max. | 21.5 (0.846) | min. | 21.5 (0.846) | max. |
| T-3800A | 38.1 (1.500) | 0.76 (0.030) | 19.05 (0.750) | 0.38 (0.015) | 12.7 (0.500) | 0.25 (0.010) | 39.66 (1.561) | max. | 17.87 (0.704) | min. | 13.75 (0.541) | max. |
| T-3800B | 38.1 (1.500) | 0.76 (0.030) | 19.05 (0.750) | 0.38 (0.015) | 6.40 (0.252) | 0.25 (0.010) | 39.66 (1.561) | max. | 17.87 (0.704) | min. | 7.40 (0.291) | max. |
| T-4000A | 40.0 (1.575) | 1.20 (0.047) | 24.0 (0.945) | 0.70 (0.028) | 16.0 (0.630) | 0.50 (0.020) | 42.0 (1.654) | max. | 22.45 (0.884) | min. | 17.4 (0.685) | max. |
| T-4000B | 40.0 (1.575) | 1.20 (0.047) | 24.0 (0.945) | 0.70 (0.028) | 20.0 (0.787) | 0.60 (0.024) | 42.0 (1.654) | max. | 22.5 (0.886) | min. | 21.4 (0.843) | max. |
| T-5000A | 50.0 (1.969) | 1.50 (0.059) | 15.0 (0.591) | 0.45 (0.018) | 10.0 (0.394) | 0.35 (0.014) | | | | | | |

### EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Piece **W** g (oz.) |
|---|---|---|---|---|---|---|
| T-3150A | 1.26 | 0.99 (25.15) | 76.0 (2.99) | 76.5 (0.12) | 5820 (0.36) | 29.7 (1.05) |
| T-3150C | 2.02 | 0.62 (15.75) | 76.0 (2.99) | 122 (0.19) | 9310 (0.57) | 47.6 (1.68) |
| T-3600A | 1.34 | 0.93 (23.62) | 89.6 (3.53) | 95.9 (0.15) | 8600 (0.52) | 43.4 (1.53) |
| T-3600B | 1.79 | 0.70 (17.78) | 90.0 (3.54) | 128 (0.20) | 11461 (0.70) | 55 (1.94) |
| T-3800A | 1.76 | 0.71 (18.03) | 83.0 (3.27) | 116 (0.18) | 9644 (0.59) | 46.3 (1.63) |
| T-3800B | 0.87 | 1.50 (38.10) | 89.8 (3.54) | 60.5 (0.09) | 5430 (0.33) | 25.5 (0.90) |
| T-4000A | 1.63 | 0.77 (19.56) | 96.3 (3.79) | 125 (0.19) | 12100 (0.74) | 61.8 (2.18) |
| T-4000B | 2.00 | 0.63 (16.00) | 100 (3.94) | 160 (0.25) | 16070 (0.98) | 77 (2.72) |
| T-5000A | 2.41 | 0.52 (13.21) | 81.1 (3.19) | 155.3 (0.24) | 12590 (0.77) | 85.8 (3.03) |

### MATERIALS

| P/N | A4 | A5 | A6 | A9 | B2 | | F1 | |
|---|---|---|---|---|---|---|---|---|
| | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | Loss **W** (100kHz-100mT) | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) |
| T-3150A | 7600 A4T-3150A------ | | 5000 A6T-3150A------ | 3200 A9T-3150A------ | 2400 B2T-3150A------ | <0.88 | 2900 F1T-3150A------ | <3.40 |
| T-3150C | 12000 A4T-3150C------ | | 8100 A6T-3150C------ | 5050 A9T-3150C------ | 3850 B2T-3150C------ | <1.50 | 4650 F1T-3150C------ | <5.40 |
| T-3600A | 7700 A4T-3600A------ | 6700 A5T-3600A------ | 5350 A6T-3600A------ | 3350 A9T-3600A------ | 2550 B2T-3600A------ | <1.29 | 3100 F1T-3600A------ | <5.00 |
| T-3600B | 10500 A4T-3600B------ | | 7200 A6T-3600B------ | 4500 A9T-3600B------ | 3400 B2T-3600B------ | <1.80 | | |
| T-3800A | 10500 A4T-3800A------ | 8800 A5T-3800A------ | 7000 A6T-3800A------ | 4400 A9T-3800A------ | 3350 B2T-3800A------ | <1.50 | | |
| T-3800B | 5200 A4T-3800B------ | 4350 A5T-3800B------ | 3500 A6T-3800B------ | 2200 A9T-3800B------ | 1650 B2T-3800B------ | <0.82 | | |
| T-4000A | 9600 A4T-4000A------ | | 6300 A6T-4000A------ | 4000 A9T-4000A------ | 3100 B2T-4000A------ | <1.90 | 3750 F1T-4000A------ | <7.10 |
| T-4000B | 12000 A4T-4000B------ | | 8000 A6T-4000B------ | 4600 A9T-4000B------ | | | | |
| T-5000A | 14500 A4T-5000A------ | | 9650 A6T-5000A------ | | 4600 B2T-5000A------ | <1.90 | 5500 F1T-5000A------ | <7.4 |

# Soft Ferrites

## Toroids

## DIMENSIONS

millimeters (inches)

| Uncoated | | | | | | |
|---|---|---|---|---|---|---|
| | Od | | Id | | h | |
| P/N | dimens. | (±) | dimens. | (±) | dimens. | (±) |
| T-5600A | 55.4 (2.181) | 1.95 (0.077) | 32.35 (1.274) | 1.15 (0.045) | 18.0 (0.709) | 0.75 (0.030) |
| T-6300A | 63.0 (2.480) | 2.00 (0.079) | 38.0 (1.496) | 1.20 (0.047) | 25.0 (0.984) | 0.80 (0.031) |
| T-6700A | 67.0 (2.638) | 2.00 (0.079) | 15.0 (0.591) | 0.50 (0.020) | 20.0 (0.787) | 0.60 (0.024) |
| T-7500A | 75.0 (2.953) | 2.00 (0.079) | 23.0 (0.906) | 0.50 (0.020) | 20.0 (0.787) | 0.70 (0.028) |
| T-8000A | 80.0 (3.150) | 2.80 (0.110) | 40.0 (1.575) | 1.40 (0.055) | 15.0 (0.591) | 0.60 (0.024) |
| T--100B | 100 (3.937) | 3.50 (0.138) | 55.0 (2.165) | 1.95 (0.077) | 20.0 (0.787) | 0.80 (0.031) |
| T--100C | 100 (3.937) | 3.50 (0.138) | 67.0 (2.638) | 2.00 (0.079) | 20.0 (0.787) | 0.80 (0.031) |
| T--152A | 152 (5.984) | 5.00 (0.197) | 68.5 (2.697) | 2.00 (0.079) | 19.0 (0.748) | 0.50 (0.020) |
| T--152B | 152 (5.984) | 5.00 (0.197) | 68.5 (2.697) | 2.00 (0.079) | 18.5 (0.728) | 0.50 (0.020) |
| T--152D | 152 (5.984) | 5.00 (0.197) | 104 (4.094) | 3.60 (0.142) | 19.0 (0.748) | 0.80 (0.031) |

## EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Piece **W** g (oz.) |
|---|---|---|---|---|---|---|
| T-5600A | 1.94 | 0.65 (16.51) | 131.4 (5.17) | 202.5 (0.31) | 26610 (1.62) | 137.3 (4.84) |
| T-6300A | 2.50 | 0.51 (12.95) | 160 (6.30) | 315 (0.49) | 50000 (3.05) | 240 (8.47) |
| T-6700A | 6.00 | 0.21 (5.33) | 129 (5.08) | 520 (0.81) | 57080 (4.09) | 320 (11.29) |
| T-7500A | 4.73 | 0.27 (6.60) | 123 (6.06) | 463 (0.81) | 57100 (4.89) | 384 (13.93) |
| T-8000A | 2.08 | 0.60 (15.24) | 174.2 (6.86) | 288.3 (0.45) | 50220 (3.06) | 271.4 (9.57) |
| T--100B | 2.39 | 0.53 (13.46) | 230 (9.06) | 437 (0.68) | 100276 (6.12) | 481 (16.97) |
| T--100C | 1.58 | 0.80 (20.32) | 255 (10.04) | 317 (0.49) | 81100 (4.92) | 405 (14.29) |
| T--152A | 3.03 | 0.41 (10.41) | 312 (12.28) | 753 (1.17) | 235000 (14.34) | 1320 (46.56) |
| T--152B | 2.95 | 0.43 (10.92) | 312 (12.28) | 733 (1.14) | 229000 (13.97) | 1280 (45.15) |
| T--152D | 1.42 | 0.89 (22.61) | 393 (15.47) | 443 (0.69) | 174000 (10.62) | 865 (30.51) |

## MATERIALS

| P/N | A4 | A6 | B2 | | F1 | |
|---|---|---|---|---|---|---|
| | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | Loss **W** (25kHz-200mT) | **Al** (nH) ±25% | Loss **W** (25kHz-200mT) |
| T-5600A | 9700 A4T-5600A------ | 7700 A6T-5600A------ | 3700 B2T-5600A------ | <4.00 | 3700 F1T-5600A------ | <2.7 |
| T-6300A | 12500 A4T-6300A------ | 10000 A6T-6300A------ | 4800 B2T-6300A------ | <7.00 | 4800 F1T-6300A------ | <4.70 |
| T-6700A | | 24000 A6T-6700A------ | 11500 B2T-6700A------ | <5.90 | 11500 F1T-6700A------ | <4 |
| T-7500A | | 19000 A6T-7500A------ | 9000 B2T-7500A------ | <8.60 | 9000 F1T-7500A------ | <4.90 |
| T-8000A | | 8000 A6T-8000A------ | 3950 B2T-8000A------ | <7.60 | 3950 F1T-8000A------ | <5.10 |
| T--100B | | 9600 A6T--100B------ | 4550 B2T--100B------ | <15.00 | 4550 F1T--100B------ | <10 |
| T--100C | | 6250 A6T--100C------ | 3000 B2T--100C------ | <13.00 | 3000 F1T--100C------ | <8.3 |
| T--152A | | 12000 A6T--152A------ | 5800 B2T--152A------ | <36.00 | | |
| T--152B | | 12000 A6T--152B----- | 5600 B2T--152B------ | <35.00 | | |
| T--152D | | A6T--152D------ | 2750 B2T--152D------ | <27.0 | | |

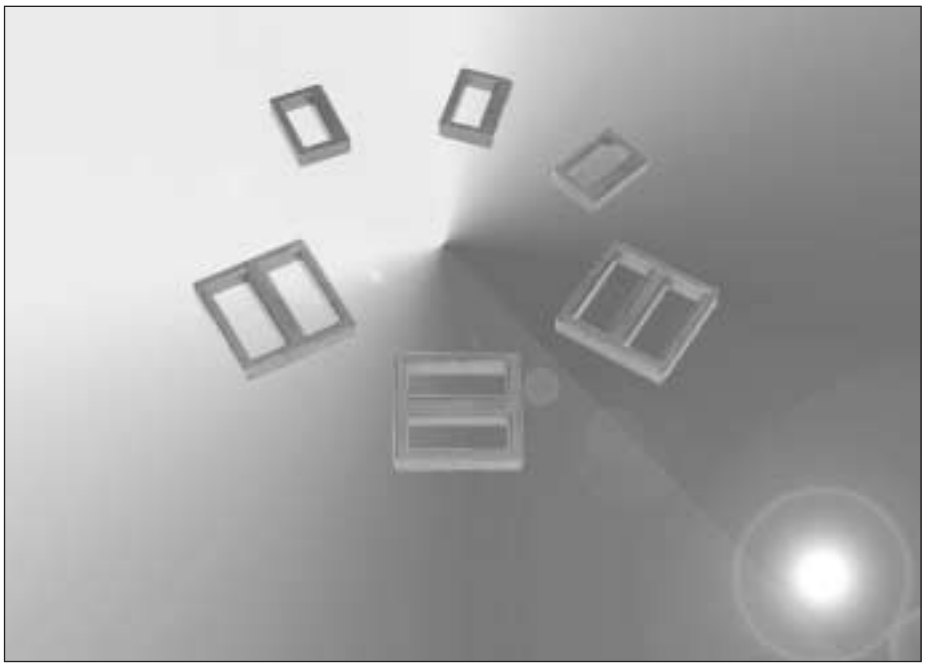
# Soft Ferrites

## Coated Toroids

### MATERIALS

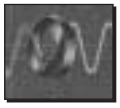
| P/N | A2 | A3 | A4 | A5 | A6 | A9 | B2 | | F1 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **Al** (nH) ±30% | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | **Al** (nH) ±25% | Loss **W** (100kHz-100mT) | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) |
| TR0630A | 2200 A2TR0630A------ | | 1300 A4TR0630A------ | 1100 A5TR0630A------ | 880 A6TR0630A------ | 520 A9TR0630A------ | | | | |
| TR0950A | 3850 A2TR0950A------ | 2900 A3TR0950A------ | 2300 A4TR0950A------ | 1800 A5TR0950A------ | 1550 A6TR0950A------ | 970 A9TR0950A------ | | | 890 F1TR0950A------ | <0.09 |
| TR1000A | 3500 A2TR1000A------ | 2650 A3TR1000A------ | 2100 A4TR1000A------ | 1750 A5TR1000A------ | 1400 A6TR1000A------ | 840 A9TR1000A------ | | | 810 F1TR1000A------ | <0.12 |
| TR1000C | 2750 A2TR1000C------ | 2050 A3TR1000C------ | 1650 A4TR1000C------ | 1350 A5TR1000C------ | 1100 A6TR1000C------ | 680 A9TR1000C------ | | | 625 F1TR1000C------ | <0.09 |
| TR1270A | 4750 A2TR1270A------ | 3550 A3TR1270A------ | 2800 A4TR1270A------ | 2550 A5TR1270A------ | 1900 A6TR1270A------ | 1350 A9TR1270A------ | | | 1100 F1TR1270A------ | <0.23 |
| TR1270B | 6400 A2TR1270B------ | 4800 A3TR1270B------ | 3850 A5TR1270B------ | 3200 A5TR1270B------ | 2600 A6TR1270B------ | 1600 A9TR1270B------ | | | 1500 F1TR1270B------ | <0.30 |
| TR1270C | 5300 A2TR1270C------ | 3950 A3TR1270C------ | 3100 A4TR1270C------ | 2800 A5TR1270C------ | 2100 A6TR1270C------ | 1300 A9TR1270C------ | | | 1200 F1TR1270C------ | <0.27 |
| TR1300A | 3350 A2TR1300A------ | | 2000 A4TR1300A ------ | 1650 A5TR1300A------ | 1350 A6TR1300A------ | 840 A9TR1300A------ | | | 770 F1TR1300A------ | <0.19 |
| TR1300C | 5300 A2TR1300C------ | | 3150 A4TR1300C------ | 2650 A5TR1300C------ | 2100 A6TR1300C------ | 1300 A9TR1300C------ | | | 1200 F1TR1300C------ | <0.26 |
| TR1400A | 3850 A2TR1400A------ | 2900 A3TR1400A------ | 2100 A4TR1400A------ | 1950 A5TR1400A------ | 1500 A6TR1400A------ | 1100 A9TR1400A------ | | | 890 F1TR1400A------ | <0.25 |
| TR1400B | 7000 A2TR1400B------ | 5300 A3TR1400B------ | 4100 A4TR1400B------ | 3500 A5TR1400B------ | 2700 A6TR1400B------ | 1750 A9TR1400B------ | | | 1600 F1TR1400B------ | <0.45 |
| TR1600A | 5650 A2TR1600A------ | 4200 A3TR1600A------ | 3300 A4TR1600A------ | 2800 A5TR1600A------ | 2200 A6TR1600A------ | 1400 A9TR1600A------ | | | 1300 F1TR1600A------ | <0.45 |
| TR1900A | 13500 A2TR1900A------ | | 8000 A4TR1900A------ | 6700 A5TR1900A------ | 5400 A6TR1900A------ | 3350 A9TR1900A------ | | | 3100 F1TR1900A------ | <1.50 |
| TR1900C | 7500 A2TR1900C------ | | 4500 A4TR1900C------ | 3750 A5TR1900C------ | 3000 A6TR1900C------ | 1850 A9TR1900C------ | | | 1700 F1TR1900C------ | <0.85 |
| TR2000A | 12000 A2TR2000A------ | 9200 A3TR2000A------ | 7200 A4TR2000A------ | 6100 A5TR2000A------ | 4850 A6TR2000A------ | 3050 A9TR2000A------ | 2300 B2TR2000A------ | <0.32 | 2800 F1TR2000A------ | <1.30 |
| TR2000B | 8500 A2TR2000B------ | 6400 A3TR2000B------ | 5000 A4TR2000B------ | 4100 A5TR2000B------ | 3400 A6TR2000B------ | 2100 A9TR2000B------ | 1600 B2TR2000B------ | <0.22 | 1950 F1TR2000B------ | <0.85 |
| TR2000C | 9800 A2TR2000C------ | 7300 A3TR2000C------ | 5500 A4TR2000C------ | 4900 A5TR2000C------ | 3900 A6TR2000C------ | 2450 A9TR2000C------ | 1850 B2TR2000C------ | <0.26 | 2250 F1TR2000C------ | <0.97 |
| TR2000D | | | 10000 A4TR2000D------ | 8500 A5TR2000D------ | 6800 A6TR2000D------ | 4250 A9TR2000D------ | 3100 B2TR2000D------ | <0.46 | | |
| TR2210A | | | 6400 A4TR2210A------ | 5500 A5TR2210A------ | 4250 A6TR2210A------ | 2500 A9TR2210A------ | 2000 B2TR2210A------ | <0.45 | F1TR2210A------ | |
| TR2210B | | | 3100 A4TR2210B------ | 2700 A5TR2210B------ | 2150 A6TR2210B------ | 1350 A9TR2210B------ | 1000 B2TR2210B------ | <0.22 | 1250 F1TR2210B------ | <0.82 |
| TR2500A | | | 5200 A4TR2500A------ | 4500 A5TR2500A------ | 3500 A6TR2500A------ | 2200 A9TR2500A------ | 1750 B2TR2500A------ | <0.45 | 2050 F1TR2500A------ | <1.80 |
| TR2500B | | | 8000 A4TR2500B------ | 6700 A5TR2500B------ | 5600 A6TR2500B------ | 3350 A9TR2500B------ | 2550 B2TR2500B------ | <0.66 | 3100 F1TR2500B------ | <2.60 |
| TR2540A | | | 4100 A4TR2540A------ | 3450 A5TR2540A------ | 2750 A6TR2540A------ | 1700 A9TR2540A------ | 1300 B2TR2540A------ | <0.36 | | |
| TR2600A | | | 6100 A4TR2600A------ | | 4000 A6TR2600A------ | 2500 A9TR2600A------ | 1900 B2TR2600A------ | <0.55 | | |
| TR2600B | | | 9200 A4TR2600B------ | | 6200 A6TR2600B------ | 3850 A9TR2600B------ | 2950 B2TR2600B------ | <0.76 | | |
| TR2600C | | | 12500 A4TR2600C------ | | 8200 A6TR2600C------ | 5150 A9TR2600C------ | 3900 B2TR2600C------ | <1.10 | | |
| TR2800A | | | 8700 A4TR2800A------ | | 6200 A6TR2800A------ | 3600 A9TR2800A------ | 2850 B2TR2800A------ | <0.97 | | |
| TR2800B | | | 7100 A4TR2800B------ | | 4750 A6TR2800B------ | 2950 A9TR2800B------ | 2250 B2TR2800B------ | <0.81 | | |
| TR2800C | | | 3350 A4TR2800C------ | | 2200 A6TR2800C------ | 1400 A9TR2800C------ | 1000 B2TR2800C------ | <0.40 | | |
| TR2800D | | | 4300 A4TR2800D------ | | 2850 A6TR2800D------ | 1800 A9TR2800D------ | 1350 B2TR2800D------ | <0.46 | | |
| TR3150A | | | 6600 A4TR3150A------ | | 4400 A6TR3150A------ | 2650 A9TR3150A------ | 2100 B2TR3150A------ | <0.88 | 2250 F1TR3150A------ | <3.4 |
| TR3150C | | | 10500 A4TR3150C------ | | 7100 A6TR3150C------ | 4450 A9TR3150C------ | 3400 B2TR3150C------ | <1.50 | 4100 F1TR3150C----- | <5.40 |
| TR3600A | | | 7200 A4TR3600A------ | | 4700 A6TR3600A------ | 3070 A9TR3600A------ | 2200 B2TR3600A------ | <1.29 | 2700 F1TR3600A----- | <5.00 |
| TR3600B | | | 9500 A4TR3600B------ | | 6300 A6TR3600B------ | 3800 A9TR3600B------ | 3000 B2TR3600B------ | <1.80 | | |
| TR3800A | | | 9300 A4TR3800A------ | 7700 A5TR3800A------ | 6200 A6TR3800A------ | 3850 A9TR3800A------ | 2950 B2TR3800A------ | <1.50 | | |
| TR3800B | | | 4600 A4TR3800B------ | 3850 A5TR3800B------ | 3100 A6TR3800B------ | 1980 A9TR3800B------ | 1450 B2TR3800B------ | <0.82 | | |
| TR4000A | | | 8400 A4TR4000A------ | | 5500 A6TR4000A------ | 3580 A9TR4000A------ | 2750 B2TR4000A------ | <1.90 | 3300 F1TR4000A----- | <7.10 |
| TR4000B | | | 9500 A4TR4000B------ | | 7000 A6TR4000B------ | 4400 A9TR4000B------ | | | | |

Dimensions and Effective core parameters: refer to pages 57 to 61



## KEY APPLICATIONS

- **EMI Suppression**



## HOW TO ORDER

| A 3 | S Q | 2 0 0 5 A | – – – – – – |
|---|---|---|---|
| Material | Model | Shape Code | |

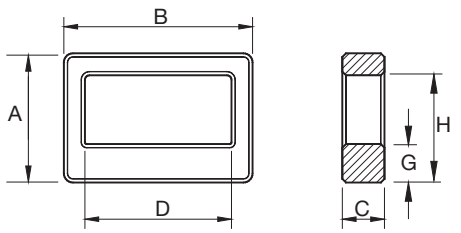



*Figure 14 – SQ Cores*

## DIMENSIONS

**millimeters (inches)**

| | A | | B | | C | | D | | G | | H | | I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **SQ1913A** | 13.8 (0.543) | 0.40 (0.016) | 19.6 (0.60) | 0.60 (0.024) | 5.00 (0.30) | 0.30 (0.012) | 13.2 (0.520) | 0.30 (0.012) | | | 7.00 (0.276) | 0.20 (0.008) | | |
| **SQ2005A** | 14.1 (0.555) | 0.25 (0.010) | 20.6 (0.811) | 0.30 (0.012) | 4.60 (0.180) | 0.20 (0.008) | 16.0 (0.630) | 0.30 (0.012) | 4.20 (0.165) | 0.20 (0.008) | 7.50 (0.295) | 0.15 (0.006) | 2.40 (0.094) | 0.20 (0.008) |

## EFFECTIVE CORE PARAMETERS

**millimeters (inches)**

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **SQ1913A** | 0.40 | 4.12 | 50.90 | 11.10 | – | 564.99 | 4.20 |
| **SQ2005A** | 0.29 | 4.38 (111.52) | 52.9 (2.082) | 12.1 (0.047) | 10.6 (0.041) | 638 (0.251) | 3.76 (0.1316) |

## MATERIALS

| P/N | A1 | A2 | A3 | A4 |
|---|---|---|---|---|
| | **Al** (nH) ±30% | **Al** (nH) ±30% | **Al** (nH) ±25% | **Al** (nH) ±25% |
| **SQ1913A** | 4800 | 4000 | 3000 | 2400 |
| *codif.* | A1SQ1913A------ | A2SQ1913A------ | A3SQ1913A------ | A4SQ1913A------ |
| **SQ2005A** | 3500 | 2900 | 2200 | 1750 |
| *codif.* | A1SQ2005A------ | A2SQ2005A------ | A3SQ2005A------ | A4SQ2005A------ |

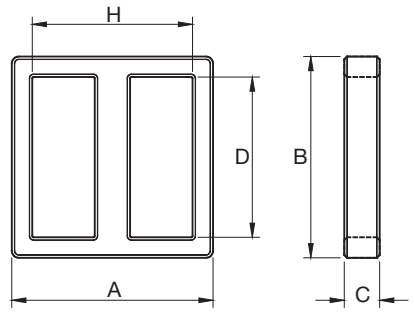



*Figure 15 – ST Cores*

## DIMENSIONS

**millimeters (inches)**

| | A | | B | | C | | D | | G | | H | | I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **ST2404A** | 24.4 (0.961) | 0.40 (0.016) | 24.4 (0.961) | 0.40 (0.016) | 4.30 (0.169) | 0.20 (0.008) | 19.4 (0.764) | 0.30 (0.012) | | | 19.3 (0.764) | 0.30 (0.012) | | |
| **ST2805A** | 28.45 (1.120) | 0.55 (0.022) | 28.45 (1.120) | 0.55 (0.022) | 5.00 (0.30) | 0.30 (0.012) | 22.65 (0.892) | 0.45 (0.018) | 5.00 (0.197) | 0.20 (0.008) | 22.65 (0.892) | 0.45 (0.018) | | |

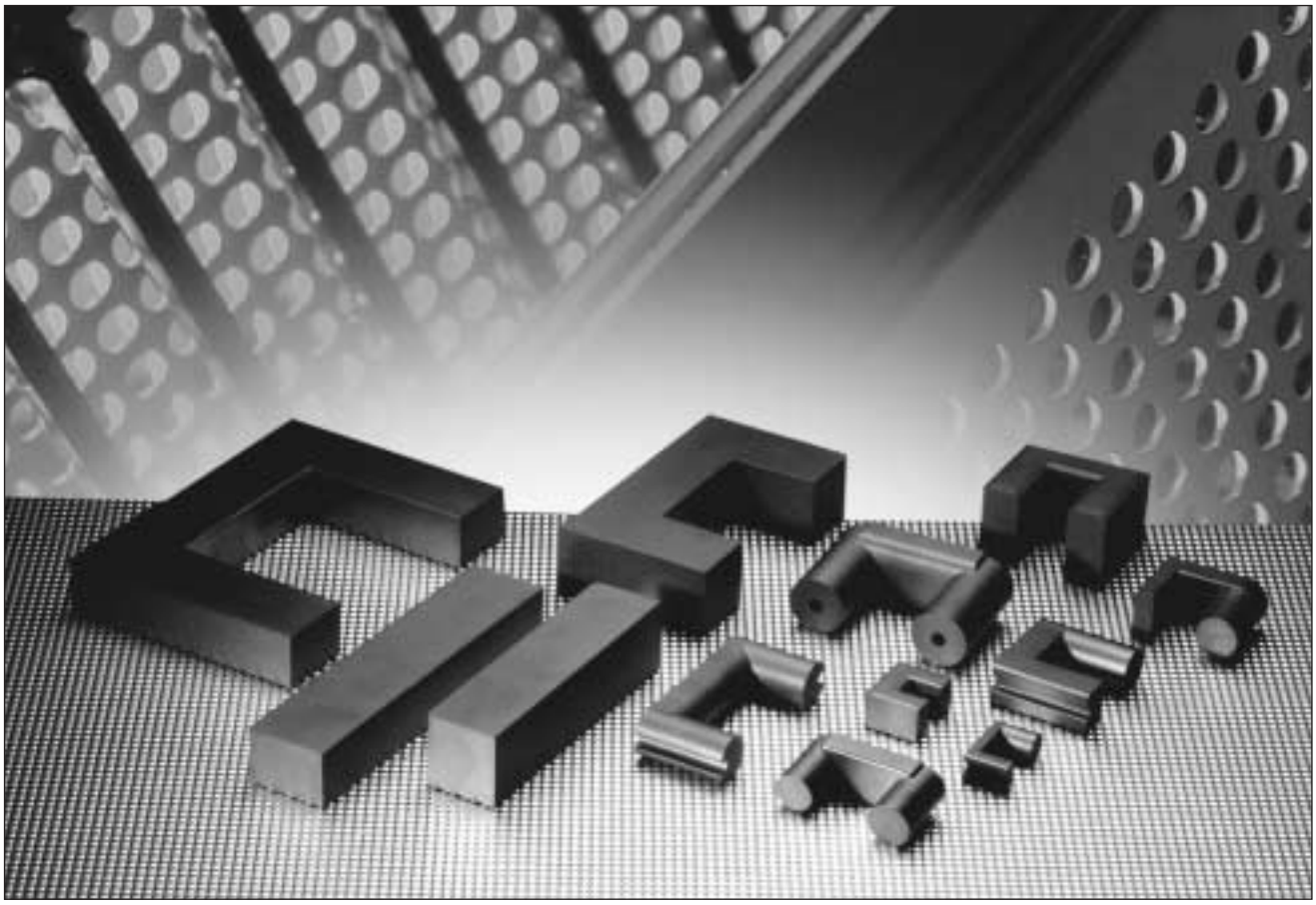
## EFFECTIVE CORE PARAMETERS

**millimeters (inches)**

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **ST2404A** | 0.36 | 3.43 | 61.00 | 17.80 | – | 1086.00 | 5.70 |
| **ST2805A** | 0.48 | 2.61 (66.29) | 71.4 (2.811) | 27.4 (0.042) | 25 (0.039) | 1950 (0.119) | 9.6 (0.339) |

## MATERIALS

| P/N | A1 | A2 | A3 | A4 |
|---|---|---|---|---|
| | **Al** (nH) ±30% | **Al** (nH) ±30% | **Al** (nH) ±25% | **Al** (nH) ±25% |
| **ST2404A** | 4300 | 3600 | 2700 | 2200 |
| *codif.* | A1ST2404A------ | A2ST2404A------ | A3ST2404A------ | A4ST2404A------ |
| **ST2805A** | 5800 | 4800 | 3600 | 2900 |
| *codif.* | A1ST2805A------ | A2ST2805A------ | A3ST2805A------ | A4ST2805A------ |



## KEY APPLICATIONS

- **EMI Suppression**
- **High Power**
- **Lighting**

## HOW TO ORDER

| F 1 | U - | 2 0 0 7 | A | E 1 0 0 – – |
|---|---|---|---|---|
| **Material** | **Model** | **Shape Code** | **Form Factor** | **Finishing** |

**Finishing**
Gapped cores can be ordered as:
- Mechanical Gap (gap value + tol. in mm)
- Electrical Gap ($A_L$ value + tol. in %)
- Contact your local representative

### U- and IU Cores (set)

Order the two parts separately (U cores and IU cores)

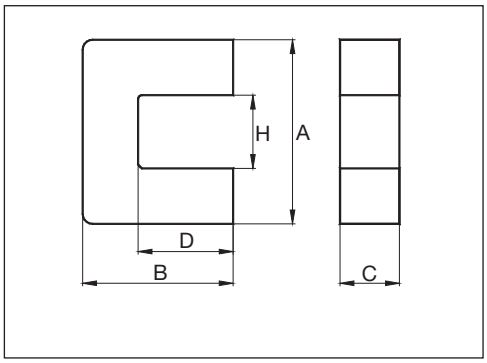



*Figure 16 – U- Core*

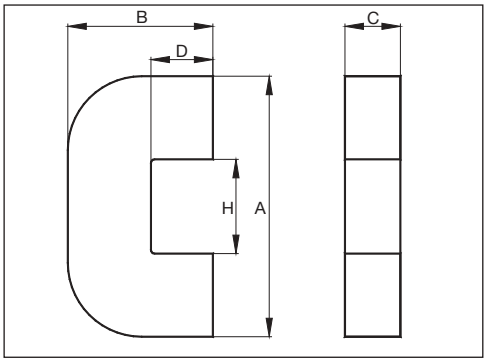



*Figure 17 – U--141- Core*

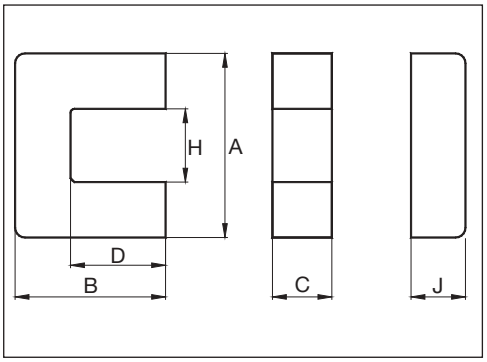



*Figure 18 – UI Core*

**Our UR drawings are different for each of them.**
**You will find their dedicated drawing on page 72.**

# Soft Ferrites

## U- Cores

### DIMENSIONS

| | A | | B | | C | | D | | H | | I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **U-1105A** | 10.5 (0.413) | 0.40 (0.016) | 7.80 (0.307) | 0.20 (0.008) | 5.00 (0.197) | 0.15 (0.006) | 5.25 (0.207) | 0.25 (0.010) | 5.00 (0.197) | min. min. | 2.50 (0.098) | 0.20 (0.008) |
| **U-1204A** | 12.0 (0.472) | 0.55 (0.022) | 9.20 (0.362) | 0.30 (0.012) | 3.95 (0.156) | 0.15 (0.006) | 5.05 (0.199) | 0.15 (0.006) | 3.45 (0.136) | min. min. | 3.85 (0.152) | 0.15 (0.006) |
| **U-1506A** | 15.2 (0.598) | 0.70 (0.028) | 11.2 (0.441) | 0.50 (0.020) | 6.45 (0.254) | 0.25 (0.010) | 6.05 (0.238) | 0.35 (0.014) | 5.20 (0.205) | 0.30 (0.012) | 5.00 (0.197) | 0.20 (0.008) |
| **U-1513A** | 15.2 (0.598) | 0.70 (0.028) | 11.2 (0.441) | 0.50 (0.020) | 13.0 (0.512) | 0.25 (0.010) | 6.05 (0.238) | 0.35 (0.014) | 5.20 (0.205) | 0.30 (0.012) | 5.00 (0.197) | 0.20 (0.008) |
| **U-1520A** | 15.2 (0.598) | 0.70 (0.028) | 11.2 (0.441) | 0.50 (0.020) | 19.5 (0.768) | 0.25 (0.010) | 6.05 (0.238) | 0.35 (0.014) | 5.20 (0.205) | 0.30 (0.012) | 5.00 (0.197) | 0.20 (0.008) |
| **U-1606A** | 15.7 (0.618) | 0.50 (0.020) | 9.90 (0.390) | 0.20 (0.008) | 6.00 (0.236) | 0.20 (0.008) | 6.20 (0.244) | 0.25 (0.010) | 6.50 (0.256) | min. min. | 4.50 (0.177) | 0.20 (0.008) |
| **U-1706B** | 17.0 (0.669) | 0.70 (0.028) | 16.6 (0.654) | 0.20 (0.008) | 5.95 (0.234) | 0.20 (0.008) | 12.15 (0.478) | 0.40 (0.016) | 7.00 (0.276) | min. min. | 4.50 (0.177) | 0.15 (0.006) |
| **U-2007A** | 21.0 (0.827) | 0.60 (0.024) | 15.3 (0.602) | 0.50 (0.020) | 7.50 (0.295) | 0.30 (0.012) | 8.25 (0.325) | 0.25 (0.010) | 6.30 (0.248) | 0.30 (0.012) | 7.30 (0.287) | 0.20 (0.008) |
| **U-2507A** | 24.5 (0.965) | 0.70 (0.028) | 18.4 (0.724) | 0.50 (0.020) | 7.30 (0.287) | 0.30 (0.012) | 10.85 (0.427) | 0.25 (0.010) | 9.90 (0.390) | 0.30 (0.012) | 7.30 (0.287) | 0.30 (0.012) |
| **U-2513A** | 24.8 (0.976) | 0.70 (0.028) | 19.6 (0.772) | 0.20 (0.008) | 12.7 (0.500) | 0.30 (0.012) | 11.4 (0.449) | 0.40 (0.016) | 8.40 (0.331) | 0.40 (0.016) | 8.20 (0.323) | 0.20 (0.008) |

### EFFECTIVE CORE PARAMETERS

**millimeters (inches)**

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **U-1105A** | 0.4 | 3.17 (80.5) | 39.9 (1.57) | 12.6 (0.020) | 12.5 (0.019) | 503 (0.031) | 2.59 (0.091) |
| **U-1204A** | 0.47 | 2.65 (67.3) | 41.3 (1.63) | 15.6 (0.024) | 15.2 (0.024) | 645 (0.039) | 3.36 (0.119) |
| **U-1506A** | 0.8 | 1.55 (39.4) | 50.5 (1.99) | 32.6 (0.051) | – | 1650 (0.101) | 8.4 (0.296) |
| **U-1513A** | 1.63 | 0.77 (19.6) | 50.5 (1.99) | 65.7 (0.102) | 65 (0.101) | 3320 (0.203) | 17.3 (0.610) |
| **U-1520A** | 2.45 | 0.51 (13.0) | 50.5 (1.99) | 98.5 (0.153) | 97.5 (0.151) | 4980 (0.304) | 25 (0.882) |
| **U-1606A** | 0.61 | 2.05 (52.1) | 50.7 (2.00) | 24.8 (0.038) | 22.2 (0.034) | 1260 (0.077) | 6.56 (0.231) |
| **U-1706B** | 0.43 | 2.95 (74.9) | 78.7 (3.10) | 26.7 (0.041) | 26.5 (0.041) | 2100 (0.128) | 10.6 (0.374) |
| **U-2007A** | 1 | 1.25 (31.8) | 68 (2.68) | 54.3 (0.084) | – | 3700 (0.226) | 18 (0.635) |
| **U-2507A** | 0.78 | 1.60 (40.6) | 86.5 (3.41) | 53.9 (0.084) | 53.9 (0.084) | 4685 (0.286) | 24 (0.847) |
| **U-2513A** | 1.5 | 0.83 (21.1) | 87 (3.43) | 105 (0.163) | – | 9100 (0.555) | 44 (1.55) |

### MATERIALS

| P/N | F1 | | A4 | A6 |
|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) | **Al** (nH) ±25% | **Al** (nH) ±25% |
| **U-1105A** | 700 | <0.31 | 1600 | 1300 |
| *codif.* | F1U-1105A------ | | A4U-1105A------ | A6U-1105A------ |
| **U-1204A** | 790 | <0.38 | 1850 | 1600 |
| *codif.* | F1U-1204A------ | | A4U-1204A------ | A6U-1204A------ |
| **U-1506A** | 1400 | <0.96 | 3000 | 2400 |
| *codif.* | F1U-1506A------ | | A4U-1506A------ | A6U-1506A------ |
| **U-1513A** | 2900 | <2.00 | 6100 | 4650 |
| *codif.* | F1U-1513A------ | | A4U-1513A------ | A6U-1513A------ |
| **U-1520A** | 4350 | <2.90 | 9200 | 7000 |
| *codif.* | F1U-1520A------ | | A4U-1520A------ | A6U-1520A------ |
| **U-1606A** | 1200 | <0.74 | 2400 | 2000 |
| *codif.* | F1U-1606A------ | | A4U-1606A------ | A6U-1606A------ |
| **U-1706B** | 830 | <1.30 | 1920 | 1600 |
| *codif.* | F1U-1706B------ | | A4U-1706B------ | A6U-1706B------ |
| **U-2007A** | 1900 | <2.20 | 4220 | 3100 |
| *codif.* | F1U-2007A------ | | A4U-2007A------ | A6U-2007A------ |
| **U-2507A** | 1550 | <2.80 | 3450 | 2550 |
| *codif.* | F1U-2507A------ | | A4U-2507A------ | A6U-2507A------ |
| **U-2513A** | 2900 | <5.30 | 6700 | 4900 |
| *codif.* | F1U-2513A------ | | A4U-2513A------ | A6U-2513A------ |

# Soft Ferrites

## U- Cores

### DIMENSIONS

| | A | | B | | C | | D | | H | | I | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **U-4628A** | 46.0 (1.811) | 1.00 (0.039) | 39.5 (1.555) | 0.25 (0.010) | 28.0 (1.102) | 0.80 (0.031) | 25.5 (1.004) | 0.75 (0.030) | 16.0 (0.630) | min. min. | 14.0 (0.551) | 0.50 (0.020) |
| **U-9316A** | 93.0 (3.661) | 1.80 (0.071) | 76.0 (2.992) | 0.50 (0.020) | 16.0 (0.630) | 0.50 (0.020) | 48.0 (1.890) | 0.90 (0.035) | 34.6 (1.362) | min. min. | 28.0 (1.102) | 0.50 (0.020) |
| **U-9320A** | 93.0 (3.661) | 1.80 (0.071) | 76.0 (2.992) | 0.50 (0.020) | 20.0 (0.787) | 0.50 (0.020) | 48.0 (1.890) | 0.90 (0.035) | 34.6 (1.362) | min. min. | 28.0 (1.102) | 0.50 (0.020) |
| **U-9330A** | 93.0 (3.661) | 1.80 (0.071) | 76.0 (2.992) | 0.50 (0.020) | 30.0 (1.181) | 0.60 (0.024) | 48.0 (1.890) | 0.90 (0.035) | 34.6 (1.362) | min. min. | 28.0 (1.102) | 0.50 (0.020) |
| **U--102A** | 101.6 (4.000) | 2.00 (0.079) | 57.1 (2.248) | 0.40 (0.016) | 25.4 (1.000) | 0.80 (0.031) | 31.7 (1.248) | 0.75 (0.030) | 50.8 (2.000) | 3.60 (0.142) | 25.4 (1.000) | 0.80 (0.031) |
| **U--126A** | 126.0 (4.961) | 4.00 (0.157) | 91.0 (3.583) | 1.00 (0.039) | 20.0 (0.787) | 0.60 (0.024) | 63.0 (2.480) | 2.00 (0.079) | 70.0 (2.756) | 2.00 (0.079) | | |
| **U--141A** | 141.0 (5.551) | 5.00 (0.197) | 78.5 (3.091) | 1.00 (0.039) | 15.0 (0.591) | 1.00 (0.039) | 33.5 (1.319) | 1.00 (0.039) | 50.0 (1.969) | min. min. | 45.0 (1.772) | nom |
| **U--141B** | 141.0 (5.551) | 5.00 (0.197) | 78.5 (3.091) | 1.00 (0.039) | 30.0 (1.181) | 1.00 (0.039) | 33.5 (1.319) | 1.00 (0.039) | 51.0 (2.008) | min. min. | 45.0 (1.772) | nom |

### EFFECTIVE CORE PARAMETERS

**millimeters (inches)**

| **P/N** | **Permeance Factor C** (nH) | **Core Constant C1** $mm^{-1}$ ($in.^{-1}$) | **Effective Length le** mm (in.) | **Effective Area Ae** $mm^2$ ($in.^2$) | **Min. Area A min.** $mm^2$ ($in.^2$) | **Effective Volume Ve** $mm^3$ ($in.^3$) | **Weight Per Set W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **U-4628A** | 2.71 | 0.46 (11.7) | 182 (7.17) | 392 (0.605) | – | 71300 (4.35) | 360 (12.7) |
| **U-9316A** | 1.59 | 0.79 (20.1) | 354 (13.9) | 448 (0.694) | 448 (0.694) | 159000 (9.70) | 770 (27.2) |
| **U-9320A** | 1.99 | 0.63 (16.0) | 354 (13.9) | 560 (0.868) | 560 (0.868) | 198000 (12.1) | 960 (33.9) |
| **U-9330A** | 2.98 | 0.42 (10.7) | 354 (13.9) | 840 (1.302) | – | 297000 (18.1) | 1520 (53.6) |
| **U--102A** | 2.63 | 0.48 (12.3) | 308 (12.1) | 645 (1.00) | – | 199000 (12.1) | 1000 (35.3) |
| **U--126A** | 1.47 | 0.86 (21.8) | 480 (18.9) | 560 (0.868) | 560 (0.868) | 269000 (16.4) | 2078 (73.3) |
| **U--141A** | 2.25 | 0.56 (14.2) | 377.4 (14.9) | 675 (1.05) | – | 255000 (15.6) | 1600 (56.4) |
| **U--141B** | 4.5 | 0.28 (7.09) | 377 (14.8) | 1350 (2.09) | – | 509000 (31.1) | 3200 (112.9) |

### MATERIALS

| **P/N** | **B2** | | **F1** | |
|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (25kHz-200mT) | **Al** (nH) ±25% | Loss **W** (25kHz-200mT) |
| **U-4628A** | 4450 | <11.00 | 4450 | <7.20 |
| *codif* | B2U-4628A------ | | F1U-4628A------ | |
| **U-9316A** | 2850 | <24.00 | 2850 | <16.00 |
| *codif* | B2U-9316A------ | | F1U-9316A------ | |
| **U-9320A** | 3600 | <30.00 | 3600 | <20.00 |
| *codif.* | B2U-9320A------ | | F1U-9320A------ | |
| **U-9330A** | 5400 | <45.00 | 5400 | <35 |
| *codif.* | B2U-9330A------ | | F1U-9330A------ | |
| **U--102A** | 4700 | <30.00 | 4700 | <20.00 |
| *codif.* | B2U--102A------ | | F1U--102A------ | |
| **U--126A** | 2700 | <41.00 | 2700 | <31.00 |
| *codif.* | B2U--126A------ | | F1U--126A------ | |
| **U--141A** | 4050 | <39.00 | | |
| *codif.* | B2U--141A------ | | | |
| **U--141B** | 8100 | <77.00 | | |
| *codif.* | B2U--141B------ | | | |

# Soft Ferrites

## UI Cores

### DIMENSIONS

| | A | | B | | C | | D | | H | | J | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **UI9316A** | 93.0 (3.661) | 1.80 (0.071) | 76.0 (2.992) | 0.50 (0.020) | 16.0 (0.630) | 0.50 (0.020) | 48.0 (1.890) | 0.90 (0.035) | 34.6 (1.362) | min. min. | 27.5 (1.083) | 0.50 (0.020) |
| **UI9320A** | 93.0 (3.661) | 1.80 (0.071) | 76.0 (2.992) | 0.50 (0.020) | 20.0 (0.787) | 0.50 (0.020) | 48.0 (1.890) | 0.90 (0.035) | 34.6 (1.362) | min. min. | 27.5 (1.083) | 0.50 (0.020) |
| **UI9330A** | 93.0 (3.661) | 1.80 (0.071) | 76.0 (2.992) | 0.50 (0.020) | 30.0 (1.181) | 0.60 (0.024) | 48.0 (1.890) | 0.90 (0.035) | 34.6 (1.362) | min. min. | 27.5 (1.083) | 0.50 (0.020) |
| **UI-102A** | 101.6 (4.000) | 2.00 (0.079) | 57.1 (2.248) | 0.40 (0.016) | 25.4 (1.000) | 0.80 (0.031) | 31.7 (1.248) | 0.75 (0.030) | 50.8 (2.000) | 3.60 (0.142) | 25.3 (0.996) | 0.50 (0.020) |
| **UI-126A** | 126.0 (4.961) | 4.00 (0.157) | 91.0 (3.583) | 1.00 (0.039) | 20.0 (0.787) | 0.60 (0.024) | 63.0 (2.480) | 2.00 (0.079) | 70.0 (2.756) | 2.00 (0.079) | 28.0 (1.102) | 1.00 (0.039) |

### EFFECTIVE CORE PARAMETERS

**millimeters (inches)**

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **UI9316A** | 2.18 | 0.58 (14.73) | 258 (10.16) | 446 (0.691) | 440 (0.682) | 115000 (7.02) | 580 (20.46) |
| **UI9320A** | 2.72 | 0.46 (11.68) | 258 (10.16) | 560 (0.868) | 550 (0.853) | 144000 (8.79) | 750 (26.46) |
| **UI9330A** | 4.08 | 0.30 (7.62) | 258 (10.16) | 837 (1.297) | 825 (1.279) | 215000 (13.12) | 1100 (38.80) |
| **UI-102A** | 3.31 | 0.38 (9.65) | 245 (9.65) | 644 (1.014) | 643 (0.997) | 158000 (9.64) | 810 (28.57) |
| **UI-126A** | 1.99 | 0.63 (16.00) | 354 (13.94) | 560 (0.868) | 560 (0.868) | 198000 (12.08) | 750 (26.46) |

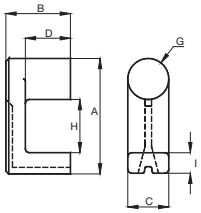
### MATERIALS

| P/N | B2 | | F1 | |
|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (25kHz-200mT) | **Al** (nH) ±25% | Loss **W** (25kHz-200mT) |
| **UI9316A** | 3750 | <18 | 3750 | <12 |
| *codif.* | B2UI9316A------ | | F1UI9316A------ | |
| **UI9320A** | 4650 | <22 | 4650 | <15 |
| *codif.* | B2UI9320A------ | | F1UI9320A------ | |
| **UI9330A** | 7000 | <33 | 7000 | <25 |
| *codif.* | B2UI9330A------ | | F1UI9330A------ | |
| **UI-102A** | 5600 | <24 | 5600 | <16 |
| *codif.* | B2UI-102A------ | | F1UI-102A------ | |
| **UI-126A** | 3600 | <30 | 3600 | <23 |
| *codif.* | B2UI-126A------ | | F1UI-126A------ | |

# Soft Ferrites

## UR Cores Overview

**UR2810A** *Figure 19*
**UR3110A**
**UR3110B**
**UR3110C**

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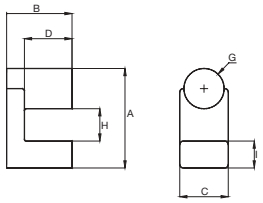
**UR2814A** *Figure 20*

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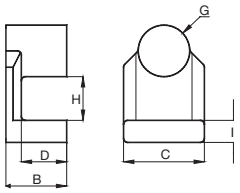
**UR2820A** *Figure 21*

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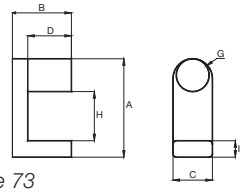
**UR3012A** *Figure 22*
**UR3012C**
**UR3012D**

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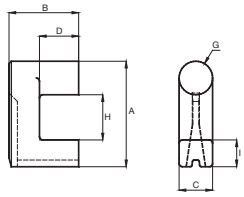
**UR3110D** *Figure 24*

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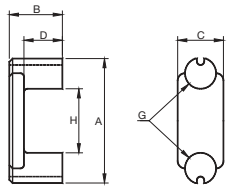
**UR3413A** *Figure 25*

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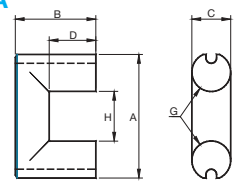
**UR3511A** *Figure 26*
**UR5917A**
**UR7016A**

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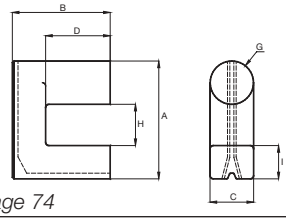
**UR3513A** *Figure 27*

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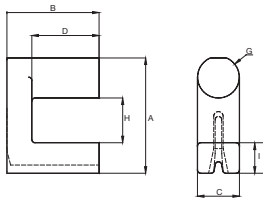
**UR3513B** *Figure 28*

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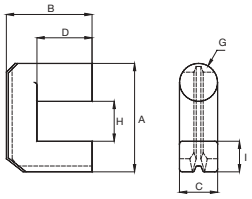
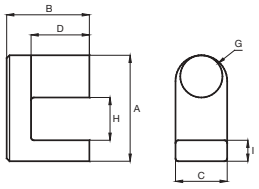
**UR3713A** *Figure 30*
**UR4115A**



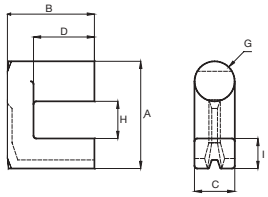

*page 74-75*

**UR3718B** *Figure 31*
**UR3718C**




*page 74-75*

**UR3814A** *Figure 32*

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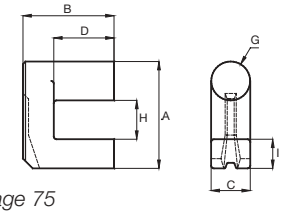
**UR3914A** *Figure 33*

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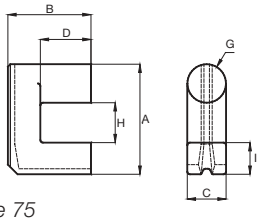
**UR4014A** *Figure 35*

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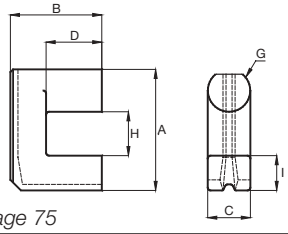
**UR3915A** *Figure 36*

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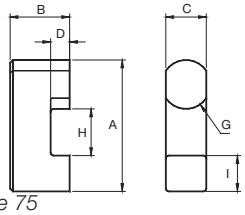
**UR4213A** *Figure 38*

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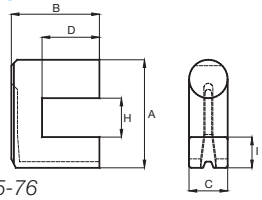
**UR4215A** *Figure 39*
**UR4215B**
**UR4215D**

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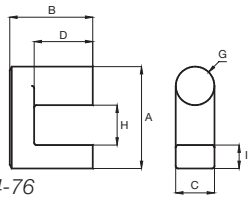
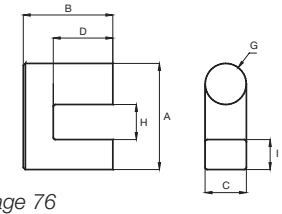
**UR3513H** *Figure 40*
**UR4216B**
**UR4216C**




*page 74-76*

**UR4618A** *Figure 41*
**UR4618B**

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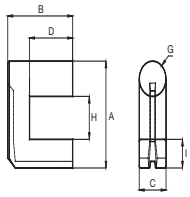
**UR4916A** *Figure 44*

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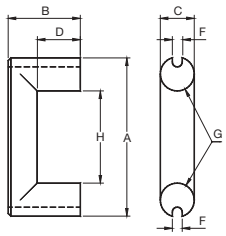
**UR4014A** *Figure 45*

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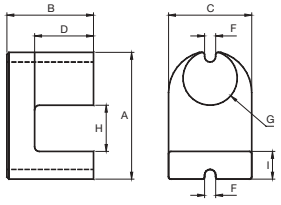
**UR5536A** *Figure 46*

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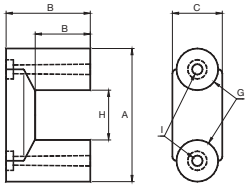
**UR6420A** *Figure 48*

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# Soft Ferrites

## UR Cores

## DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | | J | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| P/N | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) | dimens. | Tol.(±) |
| UR2810A | 28.0 (1.102) | 0.60 (0.024) | 15.75 (0.620) | 0.25 (0.010) | 10.0 (0.394) | 0.30 (0.012) | 11.0 (0.433) | 0.30 (0.012) | 10.0 (0.394) | 0.30 (0.012) | 13.0 (0.512) | 0.30 (0.012) | 5.00 (0.197) | 0.10 (0.004) |
| UR2814A | 28.8 (1.134) | max. | 20.25 (0.797) | 0.25 (0.010) | 13.5 (0.531) | 0.30 (0.012) | 13.25 (0.522) | 0.25 (0.010) | 11.2 (0.441) | 0.30 (0.012) | 9.00 (0.354) | 0.50 (0.020) | 7.50 (0.295) | 0.30 (0.012) |
| UR2820A | 28.45 (1.120) | 0.60 (0.024) | 16.2 (0.638) | 0.20 (0.008) | 19.6 (0.772) | 0.40 (0.016) | 11.0 (0.433) | 0.40 (0.016) | 12.5 (0.492) | 0.30 (0.012) | 10.6 (0.417) | 0.40 (0.016) | 5.35 (0.211) | 0.15 (0.006) |
| UR3012A | 30.0 (1.181) | 0.80 (0.031) | 19.0 (0.748) | 0.20 (0.008) | 12.0 (0.472) | 0.40 (0.016) | 12.9 (0.508) | min. | 10.0 (0.394) | 0.30 (0.012) | 15.0 (0.591) | 0.70 (0.028) | 5.00 (0.197) | 0.20 (0.008) |
| UR3012C | 30.0 (1.181) | 0.80 (0.031) | 21.7 (0.854) | 0.20 (0.008) | 12.0 (0.472) | 0.40 (0.016) | 15.6 (0.614) | min. | 10.0 (0.394) | 0.30 (0.012) | 15.0 (0.591) | 0.70 (0.028) | 5.00 (0.197) | 0.20 (0.008) |
| UR3012D | 30.0 (1.181) | 0.80 (0.031) | 25.9 (1.020) | 0.20 (0.008) | 12.0 (0.472) | 0.40 (0.016) | 20.2 (0.795) | 0.45 (0.018) | 10.0 (0.394) | 0.30 (0.012) | 15.0 (0.591) | 0.70 (0.028) | 5.00 (0.197) | 0.20 (0.008) |
| UR3110A | 31.5 (1.240) | 0.80 (0.031) | 20.8 (0.819) | 0.25 (0.010) | 10.0 (0.394) | 0.30 (0.012) | 11.7 (0.461) | 0.25 (0.010) | 10.0 (0.394) | 0.30 (0.012) | 13.5 (0.531) | 0.50 (0.020) | 8.00 (0.315) | nomi. |
| UR3110B | 31.5 (1.240) | 0.80 (0.031) | 22.5 (0.886) | 0.30 (0.012) | 10.0 (0.394) | 0.30 (0.012) | 14.0 (0.551) | 0.25 (0.010) | 10.0 (0.394) | 0.30 (0.012) | 13.5 (0.531) | 0.50 (0.020) | 8.00 (0.315) | nomi. |
| UR3110C | 31.5 (1.240) | 0.80 (0.031) | 25.5 (1.004) | 0.30 (0.012) | 10.0 (0.394) | 0.30 (0.012) | 17.0 (0.669) | 0.30 (0.012) | 10.0 (0.394) | 0.30 (0.012) | 13.5 (0.531) | 0.50 (0.020) | 8.00 (0.315) | nomi. |
| UR3110D | 31.5 (1.240) | 0.80 (0.031) | 20.2 (0.795) | 0.25 (0.010) | 10.0 (0.394) | 0.30 (0.012) | 11.7 (0.461) | 0.25 (0.010) | 10.0 (0.394) | 0.30 (0.012) | 13.5 (0.531) | 0.50 (0.020) | 8.00 (0.315) | nomi. |

## EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **UR2810A** | 0.74 | 1.70 (43.18) | 85 (3.35) | 50 (0.078) | 44.6 (0.069) | 4230 (0.258) | 24 (0.847) |
| **UR2814A** | 1.27 | 0.99 (25.15) | 97 (3.82) | 98 (0.152) | 94.5 (0.146) | 9500 (0.580) | 50 (1.76) |
| **UR2820A** | 1.6 | 0.82 (20.83) | 87 (3.43) | 109 (0.169) | 102 (0.158) | 9440 (0.576) | 50 (1.76) |
| **UR3012A** | 0.83 | 1.51 (38.46) | 103 (4.06) | 68 (0.105) | 60 (0.093) | 7000 (0.427) | 38 (1.34) |
| **UR3012C** | 0.75 | 1.68 (42.56) | 113 (4.45) | 68 (0.105) | 60 (0.093) | 7675 (0.468) | 40 (1.41) |
| **UR3012D** | 0.65 | 1.91 (48.51) | 130 (5.12) | 68 (0.105) | 60 (0.093) | 8800 (0.537) | 45 (1.59) |
| **UR3110A** | 1 | 1.27 (32.26) | 100 (3.94) | 79 (0.122) | 73 (0.113) | 7940 (0.485) | 40 (1.41) |
| **UR3110B** | 0.9 | 1.55 (39.37) | 109 (4.29) | 78 (0.121) | 78.5 (0.122) | 8500 (0.519) | 44 (1.55) |
| **UR3110C** | 0.8 | 1.55 (39.37) | 121 (4.76) | 78 (0.121) | 78.5 (0.122) | 9400 (0.574) | 52 (1.83) |
| **UR3110D** | 1 | 1.28 (32.51) | 100 (3.94) | 78 (0.121) | 75 (0.116) | 7820 (0.477) | 44 (1.55) |

## MATERIALS

| P/N | B3 Loss **W** (16kHz-200mT) |
|---|---|
| **UR2810A** | <0.43 |
| *codif.* | B3UR2810A------ |
| **UR2814A** | <0.95 |
| *codif.* | B3UR2814A------ |
| **UR2820A** | <0.95 |
| *codif.* | B3UR2820A------ |
| **UR3012A** | <0.70 |
| *codif.* | B3UR3012A------ |
| **UR3012C** | <0.77 |
| *codif.* | B3UR3012C------ |
| **UR3012D** | <0.88 |
| *codif.* | B3UR3012D------ |
| **UR3110A** | <0.80 |
| *codif.* | B3UR3110A------ |
| **UR3110B** | <0.85 |
| *codif.* | B3UR3110B------ |
| **UR3110C** | <0.94 |
| *codif.* | B3UR3110C------ |
| **UR3110D** | <0.79 |
| *codif.* | B3UR3110D------ |

# Soft Ferrites

## UR Cores

## DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | | J | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **UR3413A** | 34.0 (1.339) | nomi | 14.5 (0.571) | 0.20 (0.008) | 12.5 (0.492) | 0.30 (0.012) | 10.5 (0.413) | 0.30 (0.012) | 8.50 (0.335) | 0.20 (0.008) | 17.5 (0.689) | 0.05 (0.002) | | |
| **UR3511A** | 35.0 (1.378) | nomi | 22.8 (0.898) | 0.20 (0.008) | 11.0 (0.433) | 0.30 (0.012) | 13.2 (0.520) | 0.40 (0.016) | | | 14.1 (0.555) | 0.60 (0.024) | | |
| **UR3513A** | 35.4 (1.394) | 1.00 (0.039) | 27.5 (1.083) | 0.30 (0.012) | 13.1 (0.516) | 0.40 (0.016) | 17.5 (0.689) | 0.30 (0.012) | 13.0 (0.512) | 0.30 (0.012) | 12.0 (0.472) | min. | 10.0 (0.394) | 0.30 (0.012) |
| **UR3513B** | 35.15 (1.384) | 1.00 (0.039) | 30.8 (1.213) | 0.30 (0.012) | 12.8 (0.504) | 0.30 (0.012) | 20.5 (0.807) | 0.50 (0.020) | 12.7 (0.500) | 0.30 (0.012) | 13.05 (0.514) | min. | 9.30 (0.366) | 0.30 (0.012) |
| **UR3513H** | 35.4 (1.394) | 1.00 (0.039) | 29.4 (1.157) | 0.30 (0.012) | 13.1 (0.516) | 0.40 (0.016) | 19.4 (0.764) | 0.30 (0.012) | 13.0 (0.512) | 0.30 (0.012) | 12.0 (0.472) | min. min. | 10.0 (0.394) | 0.30 (0.012) |
| **UR3713A** | 37.5 (1.476) | 0.80 (0.031) | 29.4 (1.157) | 0.30 (0.012) | 13.1 (0.516) | 0.40 (0.016) | 18.9 (0.744) | 0.30 (0.012) | 13.0 (0.512) | 0.30 (0.012) | 13.2 (0.520) | min. | 10.5 (0.413) | 0.20 (0.008) |
| **UR3718B** | 36.9 (1.453) | 0.80 (0.031) | 25.5 (1.004) | 0.40 (0.016) | 18.0 (0.709) | 0.40 (0.016) | 16.8 (0.661) | min. | 14.7 (0.579) | 0.30 (0.012) | 14.9 (0.587) | 1.00 (0.039) | 7.30 (0.287) | 0.20 (0.008) |

## EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **UR3413A** | 0.86 | 1.46 (37.08) | 75.5 (2.97) | 51.9 (0.080) | 50 (0.078) | 3920 (0.239) | 25.6 (0.90) |
| **UR3511A** | 1 | 1.27 (32.26) | 114 (4.49) | 90 (0.140) | 88.0 (0.136) | 10300 (0.629) | 52 (1.83) |
| **UR3513A** | 1.3 | 0.98 (24.89) | 127 (5.00) | 129 (0.200) | 129 (0.200) | 16400 (1.001) | 85 (3.00) |
| **UR3513B** | 1.08 | 1.16 (29.46) | 141 (5.55) | 121 (0.188) | 112 (0.174) | 17000 (1.037) | 75 (2.65) |
| **UR3513H** | 1.21 | 1.04 (26.42) | 136 (5.35) | 131 (0.203) | 130 (0.202) | 17800 (1.086) | 90 (3.17) |
| **UR3713A** | 1.23 | 1.02 (25.95) | 136 (5.35) | 133 (0.206) | 132.7 (0.206) | 18000 (1.098) | 108 (3.81) |
| **UR3718B** | 1.47 | 0.85 (21.71) | 127 (5.00) | 149 (0.231) | 131 (0.203) | 18900 (1.153) | 100 (3.53) |

## MATERIALS

| P/N | B3 Loss **W** (16kHz-200mT) | B5 Loss **W** (32kHz-200mT) | F1 Loss **W** (100kHz-200mT) |
|---|---|---|---|
| **UR3413A** | <0.40 | | |
| *codif.* | B3UR3413A------ | | |
| **UR3511A** | <1.10 | | |
| *codif.* | B3UR3511A------ | | |
| **UR3513A** | <1.70 | <2.30 | <9.60 |
| *codif.* | B3UR3513A------ | B5UR3513A------ | F1UR3513A------ |
| **UR3513B** | <1.70 | <2.40 | <9.90 |
| *codif.* | B3UR3513B------ | B5UR3513B------ | F1UR3513B------ |
| **UR3513H** | <1.80 | <2.50 | <11.00 |
| *codif.* | B3UR3513H------ | B5UR3513H------ | F1UR3513H------ |
| **UR3713A** | <1.60 | | |
| *codif.* | B3UR3713A------ | | |
| **UR3718B** | <1.90 | | |
| *codif.* | B3UR3718B------ | | |

# Soft Ferrites

## UR Cores

### DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | | J | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **UR3718C** | 36.9 (1.453) | 0.80 (0.031) | 28.8 (1.134) | 0.20 (0.008) | 18.0 (0.709) | 0.40 (0.016) | 20.3 (0.799) | min. | 14.7 (0.579) | 0.30 (0.012) | 14.9 (0.587) | 1.00 (0.039) | 7.30 (0.287) | 0.20 (0.008) |
| **UR3814A** | 37.5 (1.476) | 0.80 (0.031) | 31.8 (1.252) | 0.30 (0.012) | 14.1 (0.555) | 0.30 (0.012) | 21.3 (0.839) | 0.40 (0.016) | 14.0 (0.551) | 0.30 (0.012) | 13.0 (0.512) | 0.50 (0.020) | 10.5 (0.413) | 0.30 (0.012) |
| **UR3914A** | 38.5 (1.516) | 1.00 (0.039) | 32.8 (1.291) | 0.30 (0.012) | 14.1 (0.555) | 0.30 (0.012) | 21.7 (0.854) | 0.40 (0.016) | 14.0 (0.551) | 0.30 (0.012) | 14.0 (0.551) | 0.50 (0.020) | 10.5 (0.413) | 0.30 (0.012) |
| **UR3915A** | 38.7 (1.524) | 1.00 (0.039) | 35.2 (1.386) | 0.50 (0.020) | 15.1 (0.594) | 0.40 (0.016) | 24.8 (0.976) | 0.50 (0.020) | 15.0 (0.591) | 0.40 (0.016) | 15.0 (0.591) | 1.00 (0.039) | 9.10 (0.358) | 0.30 (0.012) |
| **UR4014A** | 40.0 (1.575) | 0.80 (0.031) | 30.2 (1.189) | 0.30 (0.012) | 14.1 (0.555) | 0.30 (0.012) | 18.4 (0.724) | 0.40 (0.016) | 14.0 (0.551) | 0.30 (0.012) | 14.5 (0.571) | 0.40 (0.016) | 11.5 (0.453) | 0.30 (0.012) |
| **UR4115A** | 40.8 (1.606) | 0.80 (0.031) | 33.7 (1.327) | 0.30 (0.012) | 14.6 (0.575) | 0.40 (0.016) | 21.8 (0.858) | 0.40 (0.016) | 14.5 (0.571) | 0.30 (0.012) | 13.8 (0.543) | min. | 12.0 (0.472) | 0.25 (0.010) |
| **UR4213A** | 42.2 (1.661) | 1.00 (0.039) | 19.1 (0.752) | 0.30 (0.012) | 13.1 (0.516) | 0.30 (0.012) | 6.10 (0.240) | 0.30 (0.012) | 15.7 (0.618) | 0.30 (0.012) | 14.0 (0.551) | min. | 11.5 (0.453) | 0.30 (0.012) |
| **UR4215A** | 42.2 (1.661) | 0.85 (0.033) | 36.3 (1.429) | 0.30 (0.012) | 15.1 (0.594) | 0.30 (0.012) | 24.3 (0.957) | 0.40 (0.016) | 15.0 (0.591) | 0.30 (0.012) | 14.5 (0.571) | min. | 12.0 (0.472) | 0.25 (0.010) |

### EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **UR3718C** | 1.33 | 0.94 (24.00) | 140 (5.51) | 149 (0.231) | 131 (0.203) | 20820 (1.271) | 100 (3.53) |
| **UR3814A** | 1.26 | 1.00 (25.40) | 145 (5.71) | 145 (0.225) | 137 (0.212) | 20950 (1.278) | 104 (3.67) |
| **UR3914A** | 1.24 | 1.00 (25.40) | 150 (5.91) | 149 (0.231) | 143 (0.222) | 22360 (1.364) | 108 (3.81) |
| **UR3915A** | 1.13 | 1.11 (28.19) | 164 (6.46) | 148 (0.229) | 131 (0.203) | 24150 (1.474) | 120 (4.23) |
| **UR4014A** | 1.4 | 0.90 (22.86) | 140 (5.51) | 156 (0.242) | 153 (0.237) | 21880 (1.335) | 110 (3.88) |
| **UR4115A** | 1.35 | 0.93 (23.64) | 154 (6.06) | 165 (0.256) | 165.1 (0.256) | 25400 (1.550) | 126 (4.44) |
| **UR4213A*** | 1.54 | 0.82 (20.73) | 140 (5.51) | 172 (0.267) | 142 (0.220) | 24250 (1.480) | 135 (4.76) |
| **UR4215A** | 1.35 | 0.94 (23.88) | 168 (6.61) | 178 (0.276) | 173 (0.268) | 30000 (1.831) | 152 (5.36) |

* = Values for a set of UR4213A + UR4216C

### MATERIALS

| P/N | B3 Loss **W** (16kHz-200mT) | B5 Loss **W** (32kHz-200mT) |
|---|---|---|
| **UR3718C** | <2.10 | |
| *codif.* | B3UR3718C------ | |
| **UR3814A** | <2.10 | |
| *codif.* | B3UR3814A------ | |
| **UR3914A** | <2.30 | <3.20 |
| *codif.* | B3UR3914A------ | B5UR3914A------ |
| **UR3915A** | <2.40 | <3.40 |
| *codif.* | B3UR3915A------ | B5UR3915A------ |
| **UR4014A** | <2.20 | <3.1 |
| *codif.* | B3UR4014A------ | B5UR4014A------ |
| **UR4115A** | <2.60 | <3.60 |
| *codif.* | B3UR4115A------ | B5UR4115A------ |
| **UR4213A*** | <2.50 | <3.60 |
| *codif.* | B3UR4213A------ | B5UR4213A------ |
| **UR4215A** | <3.00 | <4.20 |
| *codif.* | B3UR4215A------ | B5UR4215A----- |

* = Values for a set of UR4213A + UR4216C

# Soft Ferrites

## UR Cores

## DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | G | | H | | J | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **UR4215B** | 42.2 (1.668) | 0.85 (0.034) | 36.8 (1.449) | 0.30 (0.012) | 15.1 (0.597) | 0.30 (0.012) | 25.0 (0.980) | 0.50 (0.020) | 15.0 (0.591) | 0.30 (0.012) | 15.2 (0.600) | 0.70 (0.028) | 12.0 (0.472) | 0.25 (0.010) |
| **UR4215D** | 42.2 (1.668) | 0.85 (0.034) | 34.4 (1.360) | 0.30 (0.012) | 15.1 (0.597) | 0.30 (0.012) | 22.4 (0.885) | 0.30 (0.012) | 15.0 (0.591) | 0.30 (0.012) | 14.5 (0.571) | min. | 12.0 (0.472) | 0.30 (0.012) |
| **UR4216B** | 43.2 (1.701) | maxi. | 34.0 (1.339) | 0.20 (0.008) | 15.9 (0.626) | 0.40 (0.016) | 24.0 (0.945) | 0.40 (0.016) | 15.8 (0.622) | 0.25 (0.010) | 16.35 (0.644) | 0.65 (0.026) | 9.60 (0.378) | 0.30 (0.012) |
| **UR4216C** | 41.6 (1.638) | 1.00 (0.039) | 42.6 (1.677) | 0.30 (0.012) | 15.8 (0.622) | 0.40 (0.016) | 29.1 (1.146) | 0.50 (0.020) | 15.7 (0.618) | 0.30 (0.012) | 14.0 (0.551) | min. | 10.9 (0.429) | 0.30 (0.012) |
| **UR4618A** | 46.0 (1.811) | 1.00 (0.039) | 38.8 (1.528) | 0.30 (0.012) | 17.9 (0.705) | 0.40 (0.016) | 25.8 (1.016) | 0.30 (0.012) | 17.8 (0.701) | 0.30 (0.012) | 14.65 (0.577) | min. | 13.0 (0.512) | 0.30 (0.012) |
| **UR4618B** | 46.0 (1.811) | 1.00 (0.039) | 20.8 (0.819) | 0.30 (0.012) | 17.9 (0.705) | 0.40 (0.016) | 7.80 (0.307) | 0.30 (0.012) | 17.8 (0.701) | 0.30 (0.012) | 14.65 (0.577) | min. | 13.0 (0.512) | 0.30 (0.012) |
| **UR4916A** | 48.5 (1.909) | 1.00 (0.039) | 39.0 (1.535) | 0.30 (0.012) | 16.1 (0.634) | 0.40 (0.016) | 25.9 (1.020) | 0.50 (0.020) | 16.0 (0.630) | 0.30 (0.012) | 18.9 (0.744) | min. | 13.0 (0.512) | 0.25 (0.010) |

## EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **UR4215B** | 1.32 | 0.95 (24.13) | 170 (6.69) | 179 (0.277) | 175 (0.271) | 30000 (1.831) | 155 (5.47) |
| **UR4215D** | 1.39 | 0.91 (23.11) | 158 (6.22) | 175 (0.271) | 173 (0.268) | 27700 (1.690) | 146 (5.15) |
| **UR4216B** | 1.3 | 0.98 (24.89) | 163 (6.42) | 166 (0.257) | 153 (0.237) | 27000 (1.648) | 144 (5.08) |
| **UR4216C** | 1.28 | 0.98 (24.89) | 185 (7.28) | 189 (0.292) | 172 (0.266) | 35000 (2.135) | 184 (6.49) |
| **UR4618A*** | 2.1 | 0.60 (15.24) | 142 (5.59) | 238 (0.369) | 233 (0.361) | 33750 (2.060) | 170 (6.00) |
| **UR4618B*** | 2.1 | 0.60 (15.24) | 142 (5.59) | 238 (0.369) | 233 (0.361) | 33750 (2.060) | 170 (6.00) |
| **UR4916A** | 1.35 | 0.92 (23.37) | 184 (7.24) | 199 (0.308) | 196 (0.304) | 36500 (2.227) | 190 (6.70) |

*= Values for a set of UR4618A + UR4618B

## MATERIALS

| P/N | B3 Loss **W** (16kHz-200mT) | B5 Loss **W** (32kHz-200mT) |
|---|---|---|
| **UR4215B** | <3.00 | <4.20 |
| *codif.* | B3UR4215B------ | B5UR4215B------ |
| **UR4215D** | <2.80 | <3.90 |
| *codif.* | B3UR4215D------ | B5UR4215D------ |
| **UR4216B** | <2.70 | <3.80 |
| *codif.* | B3UR4216B------ | B5UR4216B------ |
| **UR4216C** | <2.50 | <3.60 |
| *codif.* | B3UR4216C------ | B5UR4216C------ |
| **UR4618A*** | <3.35 | <4.73 |
| *codif.* | B3UR4618A------ | B5UR4618A------ |
| **UR4618B*** | <3.35 | <4.73 |
| *codif.* | B3UR4618B------ | B5UR4618B------ |
| **UR4916A** | <3.90 | <5.40 |
| *codif.* | B3UR4916A------ | B5UR4916A------ |

*= Values for a set of UR4618A + UR4618B

# Soft Ferrites

## UR Cores

### DIMENSIONS

millimeters (inches)

| | A | | B | | C | | D | | F | | G | | H | | J | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **UR5536A** | 54.9 (2.161) | 1.10 (0.043) | 37.5 (1.476) | 0.25 (0.010) | 36.0 (1.417) | 0.70 (0.028) | 25.5 (1.004) | 0.40 (0.016) | 4.80 (0.189) | 0.20 (0.008) | 23.5 (0.925) | 0.45 (0.018) | 20.0 (0.787) | 0.40 (0.016) | 12.0 (0.472) | 0.25 (0.010) |
| **UR5917A** | 59.0 (2.323) | 1.75 (0.069) | 35.8 (1.409) | 0.20 (0.008) | 17.0 (0.669) | 0.40 (0.016) | 21.9 (0.862) | 0.40 (0.016) | 4.50 (0.177) | nomi. | 17.0 (0.669) | 0.40 (0.016) | 26.5 (1.043) | 1.00 (0.039) | | |
| **UR6420A** | 64.05 (2.522) | 1.95 (0.077) | 40.5 (1.594) | 0.20 (0.008) | 24.0 (0.945) | 0.20 (0.008) | 26.5 (1.043) | 0.40 (0.016) | | | 20.05 (0.789) | 0.20 (0.008) | 23.0 (0.906) | min. | 5.00 (0.197) | 0.20 (0.008) |
| **UR7016A** | 69.0 (2.717) | 1.50 (0.059) | 31.8 (1.252) | 0.20 (0.008) | 15.9 (0.626) | 0.40 (0.016) | 19.1 (0.752) | 0.50 (0.020) | | | 15.9 (0.626) | 0.40 (0.016) | 38.2 (1.504) | 1.20 (0.047) | | |

### EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **UR5536A** | 2.8 | 0.45 (11.40) | 188 (7.40) | 418 (0.648) | 411 (0.637) | 78570 (4.79) | 400 (14.11) |
| **UR5917A** | 1.37 | 0.92 (23.30) | 191 (7.52) | 208 (0.322) | 208 (0.322) | 39800 (2.43) | 192 (6.77) |
| **UR6420A** | 1.7 | 0.72 (18.29) | 210 (8.27) | 290 (0.450) | | 61000 (3.72) | 304 (10.72) |
| **UR7016A** | 1.13 | 1.10 (27.94) | 196 (7.72) | 176 (0.273) | | 34500 (2.11) | 170 (6.00) |

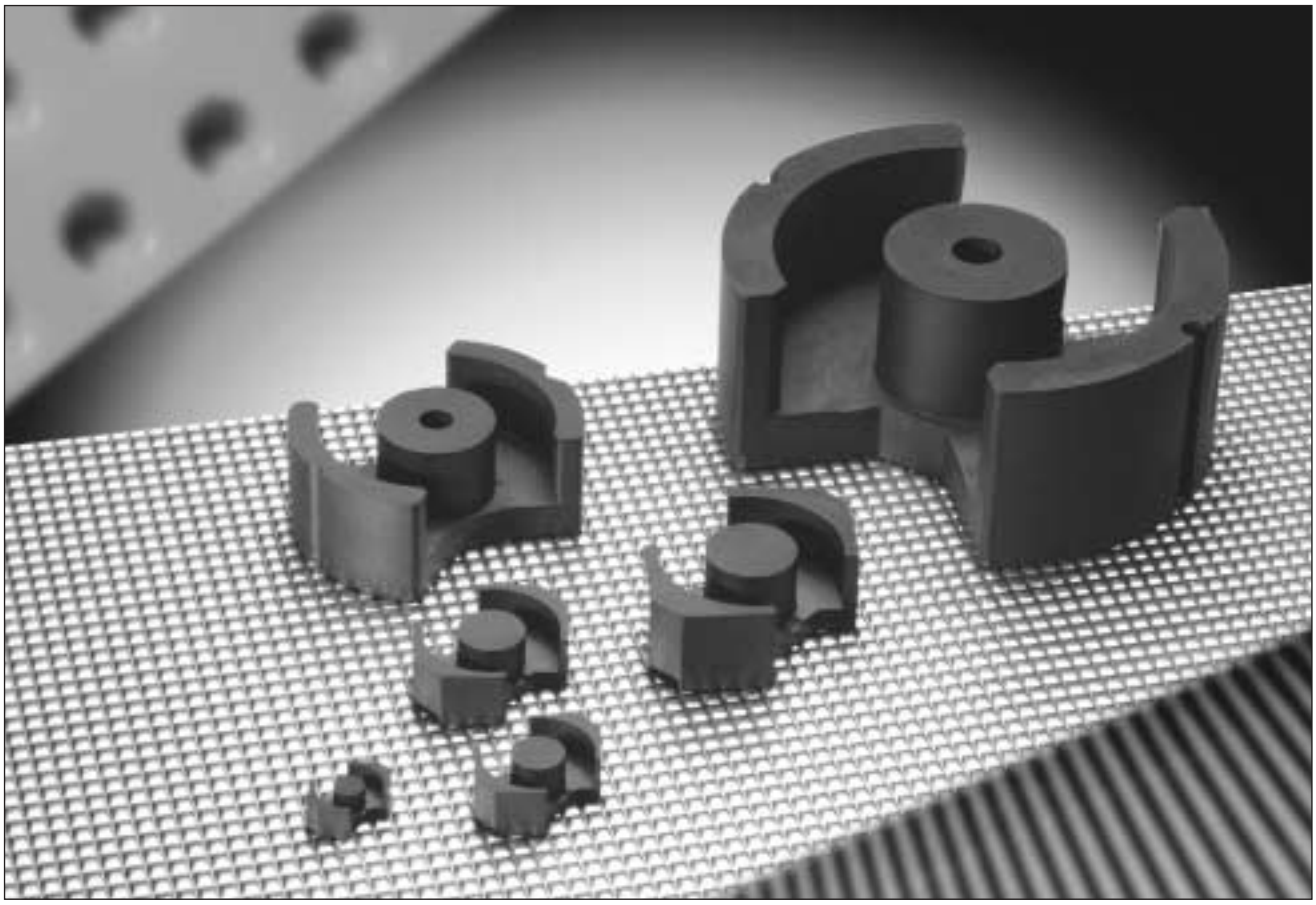
### MATERIALS

| P/N | B3 Loss **W** (16kHz-200mT) | B2 Loss **W** (100kHz-100mT) | F1 Loss **W** (100kHz-200mT) |
|---|---|---|---|
| **UR5536A** | <7.90 | | |
| *codif.* | B3UR5536A------ | | |
| **UR5917A** | | <6.00 | <24.00 |
| *codif.* | | B2UR5917A----- | F1UR5917A------ |
| **UR6420A** | | <9.20* | <6.10* |
| *codif.* | | B2UR6420A----- | F1UR6420A----- |
| **UR7016A** | | <5.20 | <21 |
| *codif.* | | B2UR7016A----- | F1UR7016A----- |

* at 25kHz-200mT

# Soft Ferrites

## RM, FM and FP Cores



## KEY APPLICATIONS

- **SMPS**
- **High Power**

## HOW TO ORDER

| F 1 | R M | 0 6 0 0 | B | A 1 5 0 | – – |
|---|---|---|---|---|---|
| Material | Model | Shape Code | Form Factor | Finishing | |

Ungapped core ⇒ – – – –

Core supplied with tolerated $A_L$ value:

- A + $A_L$ value in nH
  *ex:* $A_L$ = 250 nH ⇒ **A 2 5 0**
- Y + $A_L$ value in nH
  (only for very low $A_L$ values with symetrical air gap)
  *ex:* $A_L$ = 16 Nh ⇒ **Y 0 1 6**
- B + $A_L$ value * $10^{-1}$ in nH
  *ex:* $A_L$ = 1000 Nh ⇒ **B 1 0 0**

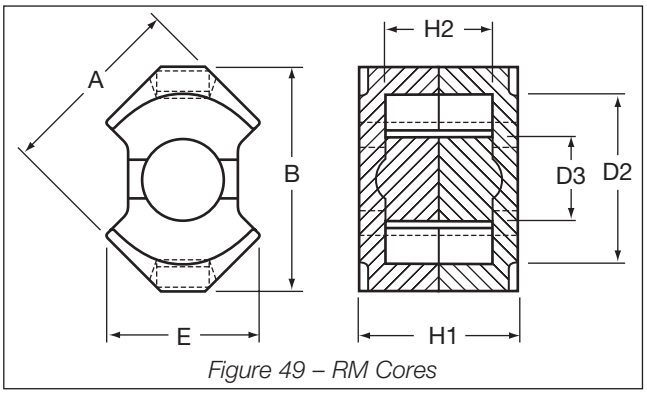



*Figure 49 – RM Cores*

## DIMENSIONS

millimeters (inches)

| | A | | B | | E | | H1 | | H2 | | D2 | | D3 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **RM0500B** | 12.05 (0.474) | 0.25 (0.010) | 14.3 (0.563) | 0.30 (0.012) | 10.0 (0.394) | max. | 10.4 (0.409) | 0.10 (0.004) | 6.50 (0.256) | 0.20 (0.008) | 10.4 (0.409) | 0.20 (0.008) | 4.80 (0.189) | 0.10 (0.004) |
| **RM0600B** | 14.4 (0.567) | 0.30 (0.012) | 17.3 (0.681) | 0.30 (0.012) | 10.75 (0.423) | max. | 12.4 (0.488) | 0.10 (0.004) | 8.20 (0.323) | 0.20 (0.008) | 12.65 (0.498) | 0.25 (0.010) | 6.30 (0.248) | 0.10 (0.004) |
| **RM0800B** | 19.25 (0.758) | 0.45 (0.018) | 22.75 (0.896) | 0.45 (0.018) | 15.7 (0.618) | max. | 16.3 (0.642) | 0.20 (0.008) | 11.2 (0.441) | 0.40 (0.016) | 17.3 (0.681) | 0.30 (0.012) | 8.40 (0.331) | 0.15 (0.006) |
| **RM1000B** | 24.15 (0.951) | 0.55 (0.022) | 27.85 (1.096) | 0.65 (0.026) | | | 18.6 (0.732) | 0.10 (0.004) | 12.7 (0.500) | 0.30 (0.012) | 21.65 (0.852) | 0.45 (0.018) | 10.7 (0.421) | 0.20 (0.008) |
| **RM1400B** | 34.1 (1.343) | 0.60 (0.024) | 41.5 (1.634) | 0.70 (0.028) | | | 28.9 (1.138) | 0.10 (0.004) | 21.1 (0.831) | 0.30 (0.012) | 29.6 (1.165) | 0.60 (0.024) | 14.7 (0.579) | 0.30 (0.012) |

## EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **RM0500B** | 1.35 | 0.94 (23.876) | 22.3 (0.878) | 23.8 (0.037) | 18.1 (0.028) | 530 (0.032) | 3.1 (0.109) |
| **RM0600B** | 1.6 | 0.79 (20.066) | 28.5 (1.122) | 35.7 (0.055) | 30.7 (0.048) | 1020 (0.062) | 5.2 (0.183) |
| **RM0800B** | 2.15 | 0.59 (14.986) | 38 (1.496) | 64 (0.099) | 55 (0.085) | 2400 (0.146) | 13 (0.459) |
| **RM1000B** | 2.75 | 0.45 (11.430) | 45 (1.772) | 99 (0.153) | 90 (0.140) | 4500 (0.275) | 22 (0.776) |
| **RM1400B** | 3.5 | 0.36 (9.144) | 69 (2.717) | 190 (0.295) | 147 (0.228) | 13100 (0.799) | 70 (2.469) |

## MATERIALS

| P/N | F1 | | F2 | |
|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) | **Al** (nH) ±25% | Loss **W** (300kHz-520mT) |
| **RM0500B** | 1850 | <0.31 | 1450 | <0.06 |
| *codif.* | F1RM0500B------ | | F2RM0500B------ | |
| **RM0600B** | 2400 | <0.61 | 2000 | <0.11 |
| *codif.* | F1RM0600B------ | | F2RM0600B------ | |
| **RM0800B** | 3500 | <1.50 | 2800 | <0.24 |
| *codif.* | F1RM0800B------ | | F2RM0800B------ | |
| **RM1000B** | 4700 | <2.70 | 3800 | <0.45 |
| *codif.* | F1RM1000B------ | | F2RM1000B------ | |
| **RM1400B** | 6300 | <7.60 | 5200 | <1.40 |
| *codif.* | F1RM1400B------ | | F2RM1400B------ | |

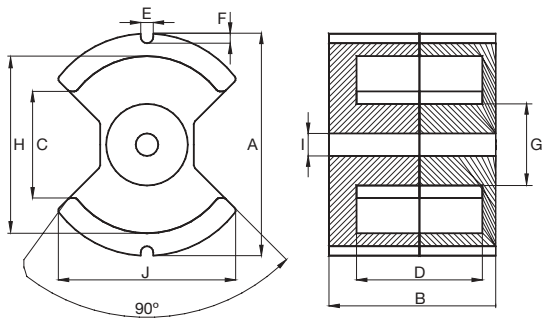



*Figure 50 – FM Cores*

## DIMENSIONS

**millimeters (inches)**

| | A | | B | | C | | D | | E | | F | | G | | H | | I | | J | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **FM5039A** | 49.15 (1.935) | 0.85 (0.033) | 38.8 (1.528) | 0.20 (0.008) | 23.4 (0.921) | mini. | 26.8 (1.055) | 0.40 (0.016) | 4.50 (0.177) | 0.20 (0.008) | 1.40 (0.055) | 0.20 (0.008) | 19.7 (0.776) | 0.30 (0.012) | 39.65 (1.561) | 0.65 (0.026) | 5.55 (0.219) | 0.15 (0.006) | 37.55 (1.478) | maxi. |
| **FM8770A** | 85.5 (3.366) | 1.50 (0.059) | 69.6 (2.740) | 0.40 (0.016) | 39.4 (1.551) | mini. | 48.4 (1.906) | 0.40 (0.016) | 4.80 (0.189) | 0.20 (0.008) | 3.70 (0.146) | 0.20 (0.008) | 31.4 (1.236) | 0.50 (0.020) | 68.15 (2.683) | 1.05 (0.041) | 8.65 (0.341) | 0.15 (0.006) | 72.1 (2.839) | maxi. |

## EFFECTIVE CORE PARAMETERS

**millimeters (inches)**

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **FM5039A** | 4.9 | 0.26 (6.604) | 87 (3.425) | 340 (0.527) | 280 (0.434) | 29600 (1.806) | 140 (4.938) |
| **FM8770A** | 7.5 | 0.17 (4.318) | 153 (6.024) | 920 (1.426) | 715 (1.108) | 140000 (8.543) | 860 (30.336) |

## MATERIALS

| P/N | B2 | |
|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (25kHz-200mT) |
| **FM5039A** | 6600 | <4.50 |
| | B2FM5039A------ | |
| **FM8770A** | 10500 | <21.00 |
| | B2FM8770A------ | |

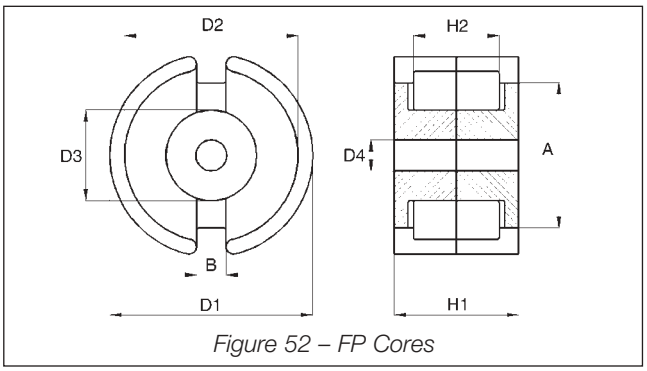



*Figure 52 – FP Cores*

## DIMENSIONS

**millimeters (inches)**

| | D1 | | D2 | | D3 | | D4 | | H1 | | H2 | | A | | B | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** |
| **FP0905A** | 9.15 (0.360) | 0.15 (0.006) | 7.625 (0.300) | 0.125 (0.005) | 3.80 (0.150) | 0.10 (0.004) | 2.05 (0.081) | 0.05 (0.002) | 5.25 (0.207) | 0.15 (0.006) | 3.75 (0.148) | 0.15 (0.006) | 7.35 (0.289) | 0.15 (0.006) | 2.10 (0.083) | 0.10 (0.004) |
| **FP1107A** | 11.1 (0.437) | 0.20 (0.008) | 9.20 (0.362) | 0.20 (0.008) | 4.60 (0.181) | 0.10 (0.004) | 2.05 (0.081) | 0.05 (0.002) | 6.45 (0.254) | 0.15 (0.006) | 4.55 (0.179) | 0.15 (0.006) | 7.45 (0.293) | 0.25 (0.010) | 2.20 (0.087) | 0.20 (0.008) |
| **FP1408A** | 14.0 (0.551) | 0.20 (0.008) | 11.8 (0.465) | 0.20 (0.008) | 5.90 (0.232) | 0.10 (0.004) | 3.05 (0.120) | 0.05 (0.002) | 8.35 (0.329) | 0.15 (0.006) | 5.80 (0.228) | 0.20 (0.008) | 9.50 (0.374) | 0.20 (0.008) | 2.70 (0.106) | 0.20 (0.008) |
| **FP1811A** | 17.9 (0.705) | 0.30 (0.012) | 15.15 (0.596) | 0.25 (0.010) | 7.45 (0.293) | 0.15 (0.006) | 3.05 (0.120) | 0.05 (0.002) | 10.55 (0.415) | 0.15 (0.006) | 7.40 (0.291) | 0.20 (0.008) | 12.1 (0.476) | 0.20 (0.008) | 3.40 (0.134) | 0.20 (0.008) |
| **FP2213A** | 21.6 (0.850) | 0.40 (0.016) | 18.2 (0.717) | 0.30 (0.012) | 9.25 (0.364) | 0.15 (0.006) | 4.45 (0.175) | 0.05 (0.002) | 13.4 (0.528) | 0.20 (0.008) | 9.40 (0.370) | 0.20 (0.008) | 14.6 (0.575) | 0.30 (0.012) | 3.80 (0.150) | 0.30 (0.012) |
| **FP2616A** | 25.5 (1.004) | 0.50 (0.020) | 21.6 (0.850) | 0.40 (0.016) | 11.3 (0.445) | 0.20 (0.008) | 5.45 (0.215) | 0.05 (0.002) | 16.1 (0.634) | 0.20 (0.008) | 11.2 (0.441) | 0.20 (0.008) | 18.7 (0.736) | 0.40 (0.016) | 3.80 (0.150) | 0.30 (0.012) |
| **FP3019A** | 30.0 (1.181) | 0.50 (0.020) | 25.4 (1.000) | 0.40 (0.016) | 13.3 (0.524) | 0.20 (0.008) | 5.45 (0.215) | 0.05 (0.002) | 18.8 (0.740) | 0.20 (0.008) | 13.2 (0.520) | 0.20 (0.008) | 21.5 (0.846) | 0.20 (0.008) | 4.40 (0.173) | 0.30 (0.012) |
| **FP3622A** | 35.6 (1.402) | 0.60 (0.024) | 30.4 (1.197) | 0.50 (0.020) | 15.9 (0.626) | 0.30 (0.012) | 5.45 (0.215) | 0.05 (0.002) | 21.8 (0.858) | 0.20 (0.008) | 15.0 (0.591) | 0.20 (0.008) | 25.5 (1.004) | 0.50 (0.020) | 5.20 (0.205) | 0.30 (0.012) |
| **FP7042A** | 71.1 (2.799) | 1.10 (0.043) | 58.4 (2.299) | 0.90 (0.035) | 29.0 (1.142) | 0.50 (0.020) | 8.65 (0.341) | 0.15 (0.006) | 41.6 (1.638) | 0.40 (0.016) | 28.4 (1.118) | 0.40 (0.016) | 48.2 (1.898) | 0.80 (0.031) | 10.5 (0.413) | 0.50 (0.020) |

## EFFECTIVE CORE PARAMETERS

**millimeters (inches)**

| P/N | Permeance Factor **C** (nH) | Core Constant C1 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **FP0905A** | 1 | 1.25 (31.750) | 12.5 (0.492) | 10 (0.016) | 8 (0.012) | 125 (0.008) | 0.8 (0.028) |
| **FP1107A** | 1.25 | 1 (25.400) | 15.9 (0.626) | 15.9 (0.025) | 13 (0.020) | 252 (0.015) | 1.7 (0.060) |
| **FP1408A** | 1.6 | 0.8 (20.320) | 20 (0.787) | 25 (0.039) | 20 (0.031) | 500 (0.031) | 3.2 (0.113) |
| **FP1811A** | 2.1 | 0.6 (15.240) | 25.9 (1.020) | 43 (0.067) | 36 (0.056) | 1120 (0.068) | 6.5 (0.229) |
| **FP2213A** | 2.5 | 0.5 (12.700) | 31.6 (1.244) | 63 (0.098) | 51 (0.079) | 2000 (0.122) | 12.5 (0.441) |
| **FP2616A** | 3.15 | 0.4 (10.160) | 37.2 (1.465) | 93 (0.144) | 76 (0.118) | 3460 (0.211) | 21 (0.741) |
| **FP3019A** | 3.8 | 0.33 (8.382) | 45 (1.772) | 136 (0.211) | 115 (0.178) | 6100 (0.372) | 35 (1.235) |
| **FP3622A** | 4.8 | 0.26 (6.604) | 52 (2.047) | 202 (0.313) | 175 (0.271) | 10600 (0.647) | 58 (2.046) |
| **FP7042A** | 8.4 | 0.15 (3.810) | 105 (4.134) | 700 (1.085) | 600 (0.930) | 74000 (4.516) | 415 (14.639) |

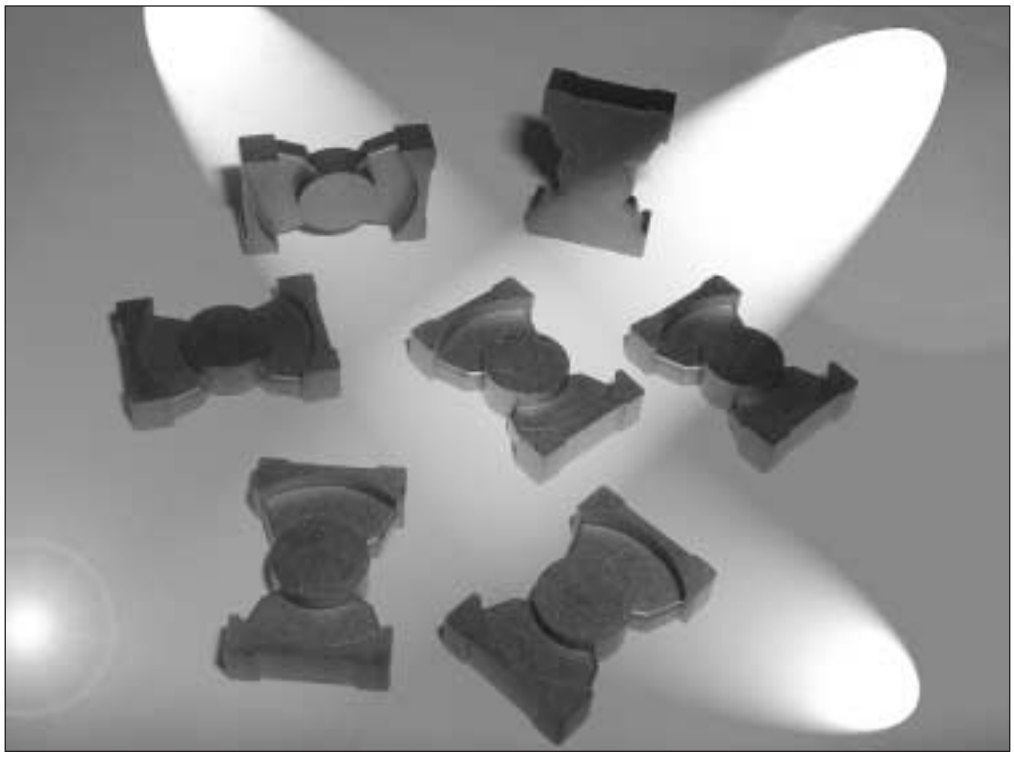
## MATERIALS

| P/N | T9 **Al** (nH) ±25% |
|---|---|
| **FP0905A** | 1200 T9FP0905A------ |
| **FP1107A** | 1800 T9FP1107A------ |
| **FP1408A** | 4400 T9FP1408A------ |
| **FP1811A** | 3400 T9FP1811A------ |
| **FP2213A** | 4500 T9FP2213A------ |

| P/N | T9 **Al** (nH) ±25% |
|---|---|
| **FP2616A** | 5900 T9FP2616A------ |
| **FP3019A** | 7200 T9FP3019A------ |
| **FP3622A** | 9000 T9FP3622A------ |
| **FP7042A** | 16000 T9FP7042A------ |

# Soft Ferrites

## PQ Cores



## KEY APPLICATIONS

- **SMPS**

## HOW TO ORDER

| F 1 | P Q | 2 0 1 6 | A | A 1 5 0 | – – |
|---|---|---|---|---|---|
| Material | Model | Shape Code | Form Factor | Finishing | |

Ungapped core ⇒ – – – –

Core supplied with tolerated $A_L$ value:

- A + $A_L$ value in nH
  *ex:* $A_L$ = 250 nH ⇒ **A 2 5 0**
- Y + $A_L$ value in nH
  (only for very low $A_L$ values with symetrical air gap)
  *ex:* $A_L$ = 16 Nh ⇒ **Y 0 1 6**
- B + $A_L$ value * $10^{-1}$ in nH
  *ex:* $A_L$ = 1000 Nh ⇒ **B 1 0 0**

# Soft Ferrites

## PQ Cores

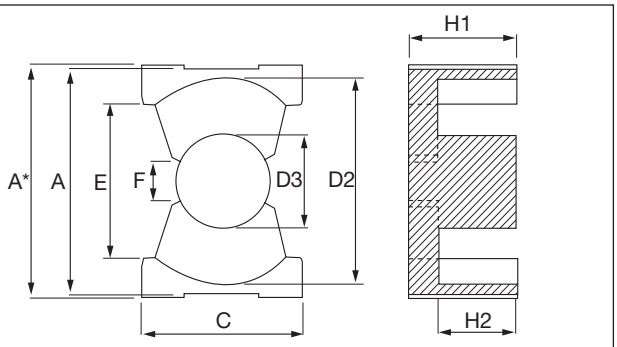



*Figure 51 – PQ Cores*

## DIMENSIONS

millimeters (inches)

| | A* | | A | | E | | C | | D2 | | D3 | | F | | H1 | | H2 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **P/N** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | **dimens.** | **Tol.(±)** | | |
| **PQ2016A** | 21.3 (0.839) | 0.40 (0.016) | 20.5 (0.807) | nomi. | 12.0 (0.472) | min. | 14.0 (0.551) | 0.40 (0.016) | 18.0 (0.709) | 0.40 (0.016) | 8.80 (0.346) | 0.20 (0.008) | 4.00 (0.157) | min. min. | 6.10 (0.319) | 0.10 (0.004) | 5.15 (0.203) | 0.15 (0.006) |
| **PQ2020A** | 21.3 (0.839) | 0.40 (0.016) | 20.50 (0.807) | nomi. | 12.0 (0.472) | min. | 14.0 (0.551) | 0.40 (0.016) | 18.0 (0.709) | 0.40 (0.016) | 8.80 (0.346) | 0.20 (0.008) | 4.00 (0.157) | min. min. | 10.1 (0.398) | 0.10 (0.004) | 7.15 (0.281) | 0.15 (0.006) |
| **PQ2620A** | 27.3 (1.075) | 0.45 (0.018) | 26.5 (1.043) | nomi. | 15.5 (0.610) | min. | 19.0 (0.748) | 0.45 (0.018) | 22.5 (0.886) | 0.45 (0.018) | 12.0 (0.472) | 0.20 (0.008) | 6.00 (0.236) | min. min. | 10.1 (0.398) | 0.13 (0.005) | 5.75 (0.226) | 0.15 (0.006) |
| **PQ2625A** | 27.3 (1.075) | 0.46 (0.018) | 26.5 (1.043) | nomi. | 15.5 (0.610) | min. | 19.0 (0.748) | 0.45 (0.018) | 22.5 (0.886) | 0.46 (0.018) | 12.0 (0.472) | 0.20 (0.008) | 6.00 (0.236) | min. min. | 12.35 (0.486) | 0.13 (0.005) | 8.05 (0.317) | 0.15 (0.006) |
| **PQ3230A** | 33.0 (1.299) | 0.50 (0.020) | 32.0 (1.260) | nomi. | 19.0 (0.748) | min. | 22.0 (0.866) | 0.50 (0.020) | 27.5 (1.083) | 0.50 (0.020) | 13.45 (0.530) | 0.25 (0.010) | 5.50 (0.217) | min. min. | 15.18 (0.597) | 0.13 (0.005) | 10.65 (0.419) | 0.15 (0.006) |

## EFFECTIVE CORE PARAMETERS

millimeters (inches)

| P/N | Permeance Factor **C** (nH) | Core Constant C2 $mm^{-1}$ ($in.^{-1}$) | Effective Length le mm (in.) | Effective Area Ae $mm^2$ ($in.^2$) | Min. Area A min. $mm^2$ ($in.^2$) | Effective Volume **Ve** $mm^3$ ($in.^3$) | Weight Per Set **W** g (oz.) |
|---|---|---|---|---|---|---|---|
| **PQ2016A** | 2.07 | 0.61 (15.49) | 37.6 (0.148) | 61.9 (0.096) | 59.1 (0.092) | 2330 (0.142) | 6 (0.212) |
| **PQ2020A** | 1.72 | 0.73 (18.54) | 45.7 (1.800) | 62.6 (0.097) | 59.1 (0.092) | 2850 (0.174) | 8 (0.282) |
| **PQ2620A** | 3.40 | 0.37 (9.400) | 45 (1.77) | 121 (0.188) | 109 (0.169) | 5470 (0.334) | 16 (0.564) |
| **PQ2625A** | 2.79 | 0.451 (11.46) | 54.3 (2.140) | 120 (0.186) | 108 (0.167) | 6530 (0.398) | 16 (0.564) |
| **PQ3230A** | 2.81 | 0.447 (11.35) | 74.7 (2.940) | 167 (0.259) | 142 (0.220) | 12500 (0.763) | 31 (1.093) |

## MATERIALS

| P/N | F1 | | F2 | |
|---|---|---|---|---|
| | **Al** (nH) ±25% | Loss **W** (100kHz-200mT) | **Al** (nH) ±25% | Loss **W** (300kHz-50mT) |
| **PQ2016A** | 3400 | <1.35 | 3080 | <0.28 |
| *codif.* | F1PQ2016A------ | | F2PQ2016A------ | |
| **PQ2020A** | 3000 | <1.65 | 2650 | <0.34 |
| *codif.* | F1PQ2020A------ | | F2PQ2020A------ | |
| **PQ2620A** | 5600 | <3.17 | 5200 | <0.66 |
| *codif.* | F1PQ2620A------ | | F2PQ2620A------ | |
| **PQ2625A** | 5000 | <3.79 | 4400 | <0.76 |
| *codif.* | F1PQ2625A------ | | F2PQ2625A------ | |
| **PQ3230A** | 5400 | <7.25 | 4600 | <1.44 |
| *codif.* | F1PQ3230A------ | | F2PQ3230A------ | |

# Soft Ferrites

## Index

| SHAPE | Power Materials | | | | | | | Filtering Materials | | | | | | Standard | | | Application | | | | | Market | | | | | Fig. | Page |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | T9 | B2 | B3 | B5 | F1 | F2 | F4 | A2 | A3 | A4 | A5 | A6 | A9 | IEC | EN | MMPA | EMI Suppression | High Power | Lighting | SMPS | TV/Monitors | Consumer | Electronic Data Process | Industry | Lighting | Telecom | No. | No. |
| ***E- Cores*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| E-0502A | | | | | X | X | X | X | | | | | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-1304A | | | | | X | X | X | | | X | | X | | 1246 | | UEI310 | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-1306A | | | | | X | X | X | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-1605A | | | | | X | X | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-1605B | | | | | X | X | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-1605C | | | | | X | X | X | | | X | | X | | 1246 | | UEI310 | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-1905A | | | | | X | X | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-1907A | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-2005B | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-2006A | | | | | X | X | X | | | X | | X | | 1246 | | UEI310 | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-2206A | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-2506A | | | | | X | X | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-2506B | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-2506C | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-2507A | | | | | X | X | X | | | X | | X | | 1246 | | UEI310 | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-2507B | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-2811A | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-3007B | | | X | | X | X | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-3011A | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-3109A | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-3109B | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-3213A | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-3509A | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-3509B | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-3510A | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-3510B | | | | | X | | | | | X | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-3512A | | | | | X | | | | | | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-3512B | | | | | X | | | | | | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-3512C | | | | | X | | | | | | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-3611A | | | | | X | | | | | | | | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-4012B | | | | | X | | | | | | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-4012C | | | | | X | | | | | | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-4012D | | | | | X | | | | | | | X | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-4212A | | X | | | X | X | | | | | | | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-4213A | | X | | | X | X | | | | | | | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-4215A | | X | | | X | X | | | | | | | | 1246 | | UEI310 | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-4215B | | | | | X | | | | | | | | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-4215H | | X | | | X | | | | | | | | | | | | X | | X | X | | X | X | | X | X | 6 | 42 |
| E-4220A | | X | | | X | X | | | | | | | | 1246 | | UEI310 | | | X | X | | X | X | | X | X | 6 | 42 |
| E-4220B | | | | | X | | | | | | | | | | | | | | X | X | | X | X | | X | X | 6 | 42 |
| E-4220H | | | | | X | | | | | | | | | | | | | | X | X | | X | X | | X | X | 6 | 42 |
| E-4916A | | X | | | X | | | | | | | | | | | | | X | | | | | | X | | | 6 | 42 |
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| U-2507A | | | | | X | | | | | X | | X | | | | | X | | X | X | | | | | X | X | 16 | 68 |
| U-2513A | | | | | X | | | | | X | | X | | | | | X | | X | X | | | | | X | X | 16 | 68 |
| U-2616A | | | | | X | | | | | | | | | | | | | | X | X | | | | | X | X | 16 | 68 |
| U-4628A | | X | | | X | | | | | | | | | | | | | | X | X | | | | | X | X | 16 | 68 |
| U-9316A | | X | | | X | | | | | | | | | | | | | | | X | | | | X | | | 16 | 68 |
| U-9320A | | X | | | X | | | | | | | | | | | | | | | X | | | | X | | | 16 | 68 |
| U-9330A | | X | | | X | | | | | | | | | | | | | | | X | | | | X | | | 16 | 68 |
| U--102A | | X | | | X | | | | | | | | | | | | | | X | X | | | | | X | X | 16 | 68 |
| U--126A | | X | | | X | | | | | | | | | | | | | | X | X | | | | | X | X | 16 | 68 |
| U--141A | | X | | | | | | | | | | | | | | | | | X | X | | | | | X | X | 17 | 68 |
| U--141B | | X | | | | | | | | | | | | | | | | | X | X | | | | | X | X | 17 | 68 |
| ***UI Cores*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UI9316A | | X | | | X | | | | | | | | | | | | | | | X | | | | X | | | 18 | 68 |
| UI9320A | | X | | | X | | | | | | | | | | | | | | | X | | | | X | | | 18 | 68 |
| UI9330A | | X | | | X | | | | | | | | | | | | | | | X | | | | X | | | 18 | 68 |
| UI-102A | | X | | | X | | | | | | | | | | | | | | | X | | | | X | | | 18 | 68 |
| UI-126A | | X | | | X | | | | | | | | | | | | | | | X | | | | X | | | 18 | 68 |
| ***UR Cores*** | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| UR2810A | | | X | | | | | | | | | | | | | | | | | | X | X | | | | | 19 | 72 |
| UR2814A | | | X | | | | | | | | | | | | | | | | | | X | X | | | | | 20 | 72 |
| UR2820A | | | X | | | | | | | | | | | | | | | | | | X | X | | | | | 21 | 72 |
| UR3012A | | | X | | | | | | | | | | | | | | | | | | X | X | | | | | 22 | 72 |
| UR3012C | | | X | | | | | | | | | | | | | | | | | | X | X | | | | | 22 | 72 |
| UR3012D | | | X | | | | | | | | | | | | | | | | | | X | X | | | | | 22 | 72 |
| UR3110A | | | X | | | | | | | | | | | | | | | | | | X | X | | | | | 19 | 72 |
| UR3110B | | | X | | | | | | | | | | | | | | | | | | | X | | | | | 19 | 72 |
| UR3110C | | | X | | | | | | | | | | | | | | | | | | | X | | | | | 19 | 72 |
| UR3110D | | | X | | | | | | | | | | | | | | | | | | | X | | | | | 24 | 72 |
| UR3413A | | | X | | | | | | | | | | | | | | | | | | | X | | | | | 25 | 72 |
| UR3511A | | | X | | | | | | | | | | | | | | | | | | | X | | | | | 26 | 72 |
| UR3513A | | | X | X | X | | | | | | | | | | | | | | | | | X | | | | | 27 | 72 |
| UR3513B | | | X | X | X | | | | | | | | | | | | | | | | | X | | | | | 28 | 72 |
| UR3513H | | | X | X | X | | | | | | | | | | | | | | | | | X | | | | | 40 | 72 |
| UR3713A | | | X | | | | | | | | | | | | | | | | | | X | X | | | | | 30 | 72 |
| UR3718B | | | X | | | | | | | | | | | | | | | | | | X | X | | | | | 31 | 72 |
| UR3718C | | | X | | | | | | | | | | | | | | | | | | X | X | | | | | 31 | 72 |
| UR3814A | | | X | | | | | | | | | | | | | | | | | | X | X | | | | | 32 | 72 |
| UR3914A | | | X | X | | | | | | | | | | | | | | | | | X | X | | | | | 33 | 72 |
| UR3915A | | | X | X | | | | | | | | | | | | | | | | | X | X | | | | | 36 | 72 |
| UR4014A | | | X | X | | | | | | | | | | | | | | | | | X | X | | | | | 45 | 72 |
| UR4115A | | | X | X | | | | | | | | | | | | | | | | | | X | | | | | 30 | 72 |
| UR4213A | | | X | X | | | | | | | | | | | | | | | | | | X | | | | | 38 | 72 |
| UR4215A | | | X | X | | | | | | | | | | | | | | | | | | X | | | | | 39 | 72 |
| UR4215B | | | X | X | | | | | | | | | | | | | | | | | | X | | | | | 39 | 72 |
| UR4215D | | | X | X | | | | | | | | | | | | | | | | | | X | | | | | 39 | 72 |
| UR4216B | | | X | X | | | | | | | | | | | | | | | | | X | X | | | | | 40 | 72 |
| UR4216C | | | X | X | | | | | | | | | | | | | | | | | X | X | | | | | 40 | 72 |
| UR4618A | | | X | X | | | | | | | | | | | | | | | | | X | X | | | | | 41 | 72 |
| UR4618B | | | X | X | | | | | | | | | | | | | | | | | X | X | | | | | 41 | 72 |
| UR4916A | | | X | X | | | | | | | | | | | | | | | X | | X | X | | X | X | | 42 | 72 |
| UR5536A | | | X | | | | | | | | | | | | | | | X | X | | | | | X | X | | 46 | 72 |
| UR5917A | | X | | | X | | | | | | | | | | | | | X | X | | | | | X | X | | 26 | 72 |
| UR6420A | | X | | | X | | | | | | | | | | | | | X | X | | | | | X | X | | 48 | 72 |
| UR7016A | | X | | | | | | | | | | | | | | | | X | X | | | | | X | X | | 26 | 72 |

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