INTERNATIONAL

Ferrite International . Pyroferric . TSC Bourgeois

TSC Ferrite International (Soft Ferrite Cores)

TSC Pyroferric (Iron Powder Cores)

TSC–bourgeois (Magnetic Laminations)

TSC International

TSC International is a manufacturer of magnetic materials for all frequencies. Our many end markets include: automotive, computer, lighting, telecommunications, instrumentation, industrial and consumer product industries across the United States and around the world.

Our objective is to provide the highest value magnetic products to our customers through a combination of exceptional *quality*, *delivery*, *service* and *price*. We offer speed to market with one stop shopping for materials for all frequencies along with engineering support.

TSC FERRITE International was established in 1985 as a division of Tempel Steel Company and was purchased by Tempel Smith in 1990. TSC Ferrite International purchased the assets of AVX/TPC Thomson, Beaune France in 2004. TSC Ferrite International produces MnZn and NiZn soft ferrites, which are electromagnetic material used as cores for high frequency (10KHz-10MHz) transformers and inductors.

TSC Pyroferric, founded in 1935, is the oldest manufacturer of iron powder cores in the United States. TSC acquired them in 1995, and they continue to manufacture iron powder cores for power conversion, line filter and RF applications.

In 1992 TSC Ferrite International purchased the assets of **TSC Arnold Technologies**, which was formerly known as The Lamination Division of the Arnold Engineering Company. TSC Arnold Technologies fabricates magnetic laminations by stamping. The laminations are used to make low frequency (dc-10KHz) inductors and transformers.

A Joint Venture between TSC International and r.bourgeois known as **TSC-bourgeois** was formed in 1998 to provide Laminations to the North American Motor and Automotive Industries.

In 1999 TSC International acquired Accucore from Magnetics International. **TSC Particle Core** is a new revolutionary magnetic material that offers an alternative to Laminations.

Combined, **TSC International** has >125,000 square feet of manufacturing space and >70 presses dedicated to meeting our market's demands.

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TSC International

POLICY STATEMENT

MISSION STATEMENT & QUALITY POLICY

It is the policy of TSC International to provide the highest value magnetic materials to its customers through a combination of exceptional quality, price, delivery and service.

OBJECTIVES

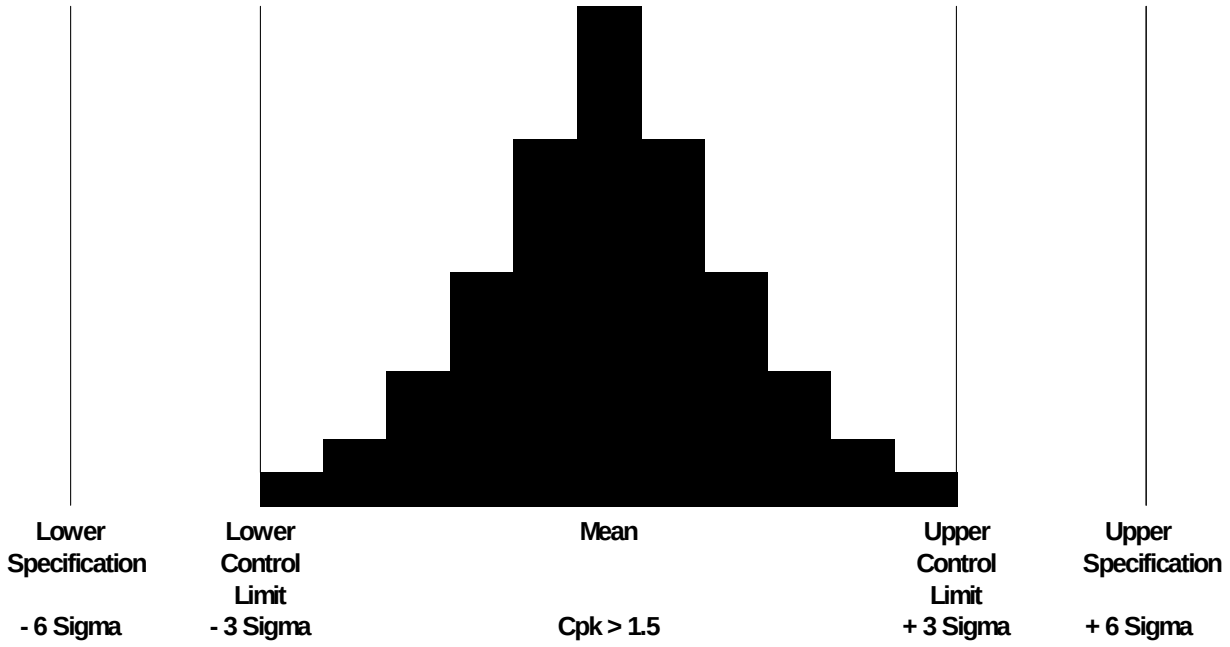
1. QUALITY: Achieve and maintain a quality system consistent with ISO-9000:2004 International Standards. Produce magnetic materials within that quality system which satisfy our customers for quality and consistency and which meet or exceed the industry standards such as those of the Magnetic Materials Producers Association.

2. PRICE: Maintain cost control by encouraging innovation, having a flat organizational structure with individual empowerment at all levels and by expanding market share.

3. DELIVERY: Achieve speed-to-market by maintaining efficient administrative and productive systems, good internal communications and fast factory throughput.

4. SERVICE: Maintain excellent service by creating working partnerships with open lines of communication at all levels.

5. Resources will be dedicated to continuous improvement while ensuring a sustainable manufacturing process.



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TSC International

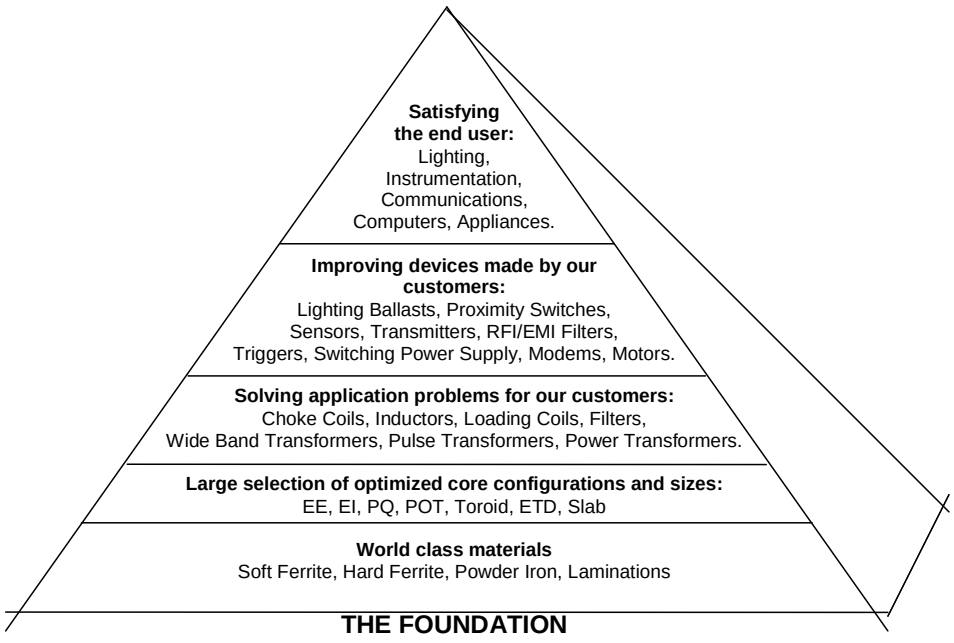
INDEX

	Product Line	Page(s)
About TSC International	ALL	Inside Cover
Policy Statement	ALL	1
Index	ALL	2 & 3
Soft ferrite Manufacturing Overview	Soft ferrite	4
Definition of a soft ferrite	Soft ferrite	5
Test instrumentation	Soft ferrite	6
Ordering & Tolerances	Soft ferrite	7
Summary of soft ferrite material properties	Soft ferrite	8 & 9
TSF-50ALL (Flat Line)	Soft ferrite	10
TSF-5099	Soft ferrite	11
TSF-7099	Soft ferrite	12
TSF-7070	Soft ferrite	13
TSF-8040	Soft ferrite	14
TSF-5000	Soft ferrite	15
TSF-Boost	Soft ferrite	16 & 17
TSF-010K	Soft ferrite	18
Soft ferrite Part Numbering System	Soft ferrite	19
E cores	Soft ferrite	20 – 25
ETD Cores	Soft ferrite	26 & 27
Planar E	Soft ferrite	28
EFD Cores	Soft ferrite	29
PQ Cores	Soft ferrite	30
EP Cores	Soft ferrite	31
Pot Cores	Soft ferrite	32 & 33
U Cores	Soft ferrite	34 & 35
Toroids	Soft ferrite	36 & 37
Custom cores	Soft ferrite	38 & 39
Composite E Cores	Soft ferrite/Iron powder	40 & 41
Composite Toroids	Soft ferrite/Iron powder	42 & 43
Iron Powder Manufacturing Overview	Iron powder	44
Iron Powder Part Numbering System	Iron powder	44
Iron Powder Finish & Tolerances	Iron powder	45
Iron Powder Material Properties	Iron powder	46 – 50
Iron Powder Material & Part Number Cross Reference	Iron powder	51
Iron Powder Toroids for Power Conversions & Line Filter Applications	Iron powder	52 – 55

TSC International

INDEX (cont.)

	Product Line	Page(s)
Iron Powder E Cores	Iron powder	56
Iron Powder Material Properties for RF Applications	Iron powder	57
Iron Powder Toroids for RF Applications	Iron powder	58 & 59
Iron Powder Rod Cores	Iron powder	60 & 61
Iron Powder Thread Cores	Iron powder	62 – 66
Iron Powder Bobbin Cores	Iron powder	67 – 69
Lamination Material Properties	Laminations	70 – 73
EI Laminations	Laminations	74 & 75
E and Long E Laminations	Laminations	76
EE Laminations	Laminations	77
Core size selection for power transformers	ALL	78
Formulas Used to Design Magnetics	ALL	79
References	ALL	79
Glossary of Terms	ALL	80 & 81
Customary to Metric Conversions	ALL	82
Cross Reference of TSC International Parts	ALL	83
Formulas for Quality Metrics	ALL	84
Disclaimer & Warranties	ALL	84
Quality & Dimensional Metrics Conversions	ALL	Inside Back Cover



TSC Ferrite International

Ferrite Manufacturing Overview

Test raw material (MnO, ZnO. Fe_2O_3)
Inspect for purity
↓
Weigh & mix raw materials
Control Composition
↓
Spray dry
Obtain a powder form
Control bulk density
↓
Calcine Powder (Pre-firing)
Control magnetic saturation
↓
Wet mill
Control particle size
↓
Spray dry to obtain a pressable powder
Control bulk density
↓
Form
(Compact powder into “green cores”)
Control pressed density
↓
Sinter
(fire “green cores” to obtain a ceramic with a spinel crystal lattice structure)
Control grain growth
↓
Finish (grind, tumble, coat)
Control gap and surface finish
↓
Audit to insure that all parts meet all the customers requirements
↓
Pack & Ship

The process of manufacturing Soft Ferrites is made up of four basic steps: powder preparation, forming, sintering and finishing. At Ferrite International raw materials (manganese oxide, zinc oxide and iron oxide) are tested for purity levels. After the raw materials are approved they are weighed and wet mixed, and spray dried to a powder form then calcined. Calcining is pre-firing the material at a selected temperature between 800 degrees and 1100 degrees C thus creating a partial spinel structure and partially densifying the powder so that the pressed part will shrink less during the final sintering process. The calcined material is then wet milled to a specific particle size range. This particle size reduction enables better control of grain growth that occurs during the final sintering process. An organic binding agent is added to the slurry for the purpose of holding the pressed part intact. The slurry is then spray dried to provide a dry moldable powder composed of discreet spherical agglomerates with uniform characteristics.

The forming operation transforms the powder into a soft "clay like" material in the desired configuration. In this form they are called "green cores". The forming is done using presses and powder compaction tools. Because tool steels do not last under the wear of the abrasive Ferrite powder, carbide tools are used for large quantity items. The size, weight and thus the density of the green compact are all controlled within very tight tolerances.

To create the desired physical and magnetic characteristics the "green cores" are sintered in large kilns at temperatures between 1300 and 1450 degrees Centigrade. Close temperature and atmospheric control during sintering is critical. The sintering is divided into three stages. In the first stage the binders are driven off. The second stage is when the actual sintering takes place. The spinal crystal latus structure forms, the product shrinks and the magnetic characteristics are realized. The final stage is devoted to reoxidation and cool-down. Volume shrinkage is affected by the size, shape and the chemical composition. Each part must be molded oversize. A typical material may shrink 15% in any one linear dimension (approximately 50% of total volume).

Cores that will be assembled require machining. This process is critical to removing the final surface layer of reactive Ferrite (called skin) that result from sintering and to minimize any air gaps by insuring smooth flat and parallel surfaces. Some cores sets require gaps with tight tolerances in their flux path. This can be accomplished by grinding a pot core's center post or an E core's center leg. Because of the extremely hard, brittle and abrasive nature of the ceramic material diamond wheels and large amounts of liquid coolant are required for all machining operations.

Sintered toroidal cores are tumbled and sometimes coated with epoxy to eliminate any sharp corners or burrs that could damage wire insulation during the ensuing operation.

Finally the cores are tested electrically, inspected for dimensional and visual conformance and packed to be shipped to our customer.

TSC Ferrite International

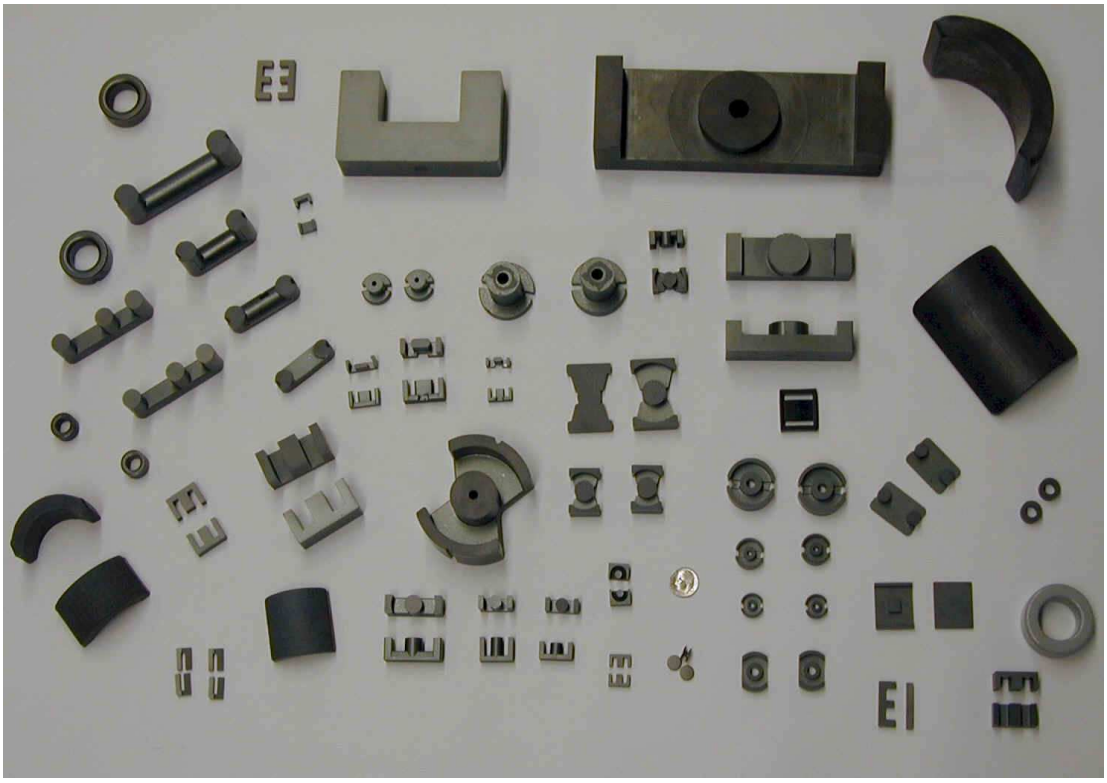
Definition of a soft ferrite core

Soft Ferrites are ceramic electromagnetic material dark gray or black in appearance and very hard and brittle. The terms "SOFT" has nothing to do with their physical properties but refers to their magnetic characteristics. Soft magnetic materials also called electromagnetic exhibit magnetic properties only when they are subject to a magnetizing force such as the magnetic field created when current is passed through wire surrounding a soft magnetic core. This differs from hard magnetic (Permanent Magnets) in that once a hard magnetic material is magnetized by exposure to a magnetizing force it exhibits magnetic properties permanently.

A Soft Ferrite's magnetic properties arise from interactions between metallic ions occupying particular positions relative to the oxygen ions in its spinel crystalline structure. The magnetic domain theory suggests these interactions create magnetic domains, which are microscopic magnetized regions within the material. When no magnetizing force is present the magnetic domains are random and the net flux contribution is zero even though local domains are fully magnetized. When a magnetizing force is present the magnetic domains align in the direction of the magnetizing force resulting in a large net flux contribution.

Soft Ferrites are also semi-conductors meaning they are somewhere between conductors and insulators in their ability to conduct electron flow through the material.

Advantages Soft Ferrites have over other electro magnetic materials include their inherent high resistivity, which results in low eddy current losses over wide frequency ranges, high permeability and stability over wide temperature ranges. For inductor cores, transformer cores and other applications where electro magnetic materials are required to operate at high frequencies these advantages make Soft Ferrites paramount over all other magnetic materials.



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Test Instrumentation & Methods

Core Loss
Published values of core loss have been measured on E21 size (41-16-12) double E cores. The cores are driven with an ENI Model 2100L RF Amplifier and measured using Clarke-Hess Model 2335 VAW meters under sine wave conditions. Flux densities were calculated using rms voltage values and effective core set parameters calculated per MMPA standard No. EUI310. Core loss density was calculated per the same standard. These curves are applicable to all sizes and configurations as long as the correct effective core set parameters are assumed. Data and graphical curves of core loss vs. temperature measured on ungapped core sets are included for each kiln firing and lot with each shipment of our products.

Initial Permeability
Published values of initial permeability have been calculated from measured inductance values at 5 gauss on toroids (OD=.870, ID=.540, HT=.250) using Wayne-Kerr model 6425 or model 3245 LCR meters. Flux density and permeability were both calculated using effective core set parameters (Le, Ae and Ve) calculated per MMPA Toroid Standard No. FTC410.

Power Permeability
(Permeability vs. Flux Density)
Published values of Power Permeability have been calculated from measured values of rms currents and voltages on 25-10-06 size double E cores using Clarke-Hess model 2335 VAW meters.

$$\mu = (L / Lair) = ((0.45*Erms)/(f*Irms*2.829))/((0.004*\Pi*Ae*10^{-6})/Le)$$

Saturation Flux Density
Published values of saturation flux density have been calculated from integrated voltage measurements on 25-10-06 size double E cores induced by a specific magnetizing force (15 oersteds).

Inductance Index (AL Value)
Published Al Values were measured on Wayne-Kerr model 6425 or model 3245 LCR meters using 100 turn coils. Mated cores have a clamp pressure of approximately 5 pounds per square inch of mating surface. Statistical data including a histogram and capability indexes of the AL value on gapped and ungapped core sets are included with each shipment of our products.

Total Harmonic Distortion
We measure harmonic distortion on an Audio Precision System Two (SYS-2022) in accordance to our customer's part specific specification. The test circuit primary series resistance, output load resistance, frequency and drive level in Db, Vrms or Vpp are specified by our customers.

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Ordering Gapped Cores

Gapped Cores can be ordered 3 ways:

1. To a mechanical dimension.
2. Two gapped cores mated together to yield a specific AL value.
3. One gapped core mated with one ungapped core to yield a specific AL value.

When ordering cores to an AL value, it is important to specify whether 2 gapped cores are mated together or if 1 gapped core is mated with 1 ungapped core. It is also helpful if each customer supplies us with their coil to avoid differences in fringing flux that would result in a difference in AL measurements between the customer and the manufacturer. On our throughput grinder, we are capable of holding mechanical gap tolerances of +/- .0007". Because the relationship between AL and gap depth is a decaying exponential, the AL tolerance we are capable of is dependent upon the depth of the gap (larger gaps yield smaller AL values with tighter tolerances then do smaller gaps).

Tolerances

Problems periodically arise concerning magnetic and mechanical tolerances of ferrites. The nominal and spread of a sample lot is not always indicative of production lots. As an example, toroids are supplied to a nominal AL value based on material grade, and a tolerance of +-25%. The nominal AL value for a large number of production lots is considered to be at 0.0%, then the total spread of a large number of shipments will be +-25% around this nominal.

Sample parts with given characteristics positioned at some desired point within the normal spread cannot be easily produced because chemical processes cannot be controlled this closely. For this reason, it is difficult to fill requests for “maximum” and “minimum” samples. Every TSC Ferrite International sample is supplied with data showing our measured values on each sample compared to the specification upper and lower limits.

TSC Ferrite International

Material Grade	Initial Permeability	Saturation Flux Density @15 oersteds	Curie Temperature	
	μ_0	B_s (Gauss)	Tc (^oC)	
TSF-50ALL "Flat Line" ASTM P5025-100	3,000	5,000	>230	Low loss & stable perm over wide temperature range
TSF-5099 ASTM P5099	2,000	5,000	>210	Low core loss
TSF-7099 ASTM P7099	2,000	5,000	>210	For high ambient temperature applications
TSF-7070 ASTM P7070	2,200	5,000	>210	For potted applications
TSF-8040 ASTM P8040 ASTMF3000	3,100	5,100	>210	All purpose material for integrated magnetics
TSF-5000 ASTM F5000	5,000	4,300	>170	For filter inductors
TSF-010K ASTM F010K	10,000	4,300	>125	For low harmonic distortion
TSF-Boost	2,000	5,000	>210	For dc bias applications
TSF-0850	850	3,000	~140	NiZn for suppression of 30MHz to 200MHz signals
TSF-0125	125	3600	~350	NiZn usable permeability up to 100MHz
TSF-0040	40	2,600	~450	NiZn usable permeability up to 300MHz

Soft Ferrite Material Constants	
Specific Heat	0.25 cal / g / ^oC
Thermal Conductivity	10 x 10^{-3} cal / sec / cm / ^oC
Coefficient of Linear Expansion	8 to 10 x 10^{-6} / ^oC
Tensile Strength	7 X 10^3 lbs / in^2
Compressive Strength	60 X 10^3 lbs / in^2
Young's Modules	18 X 10^3 lbs / in^2
Hardness (Knoop)	650
Density	4.8 g / cm^3

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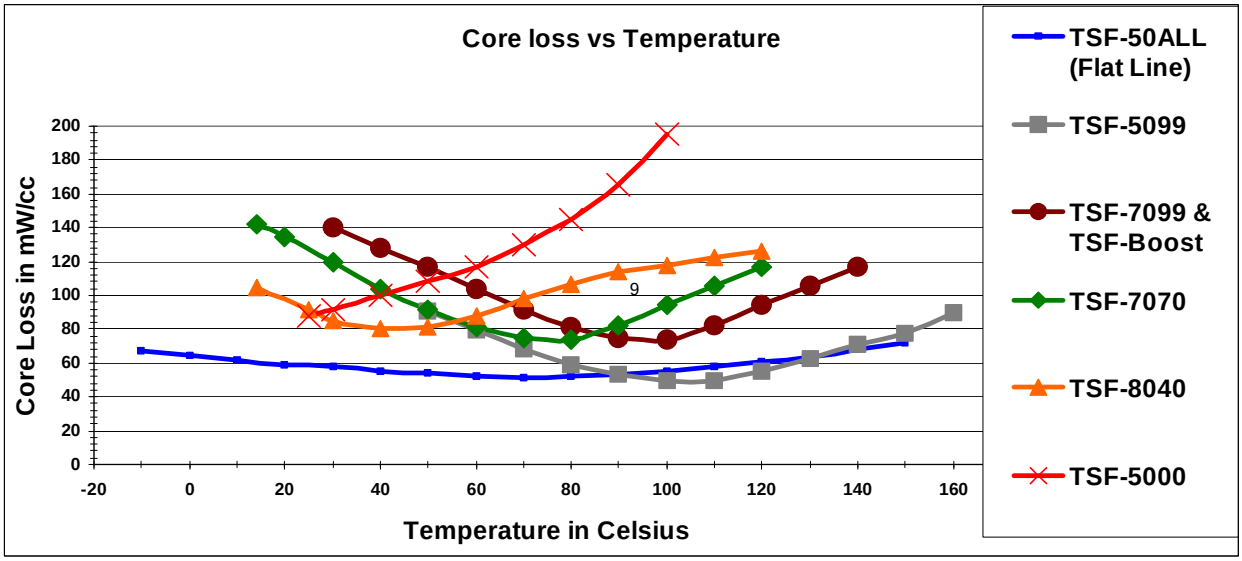

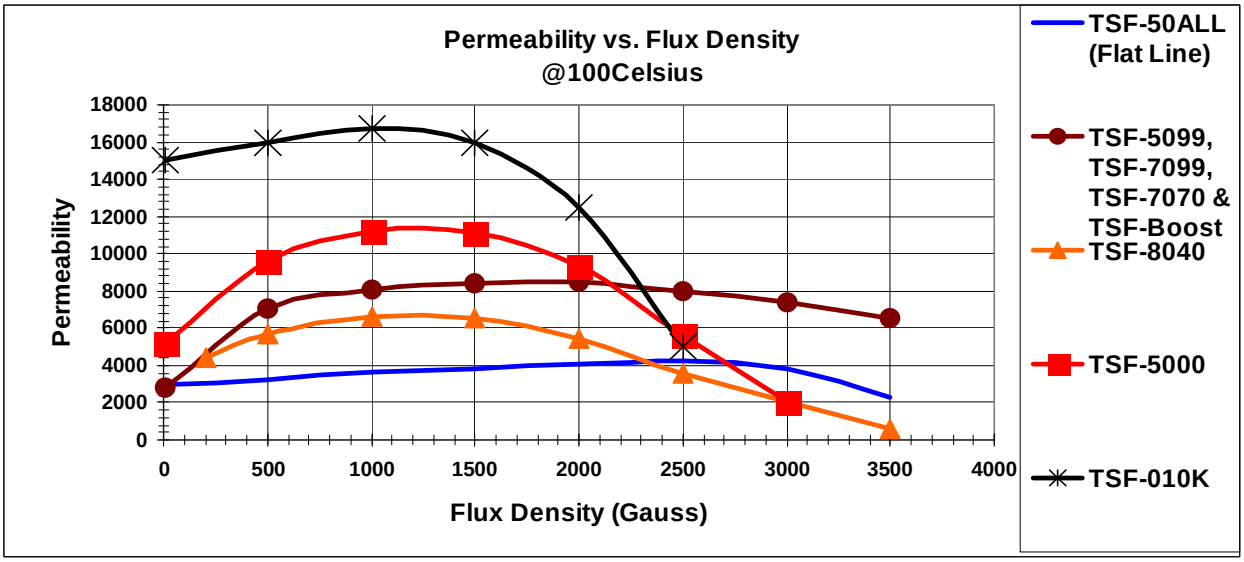

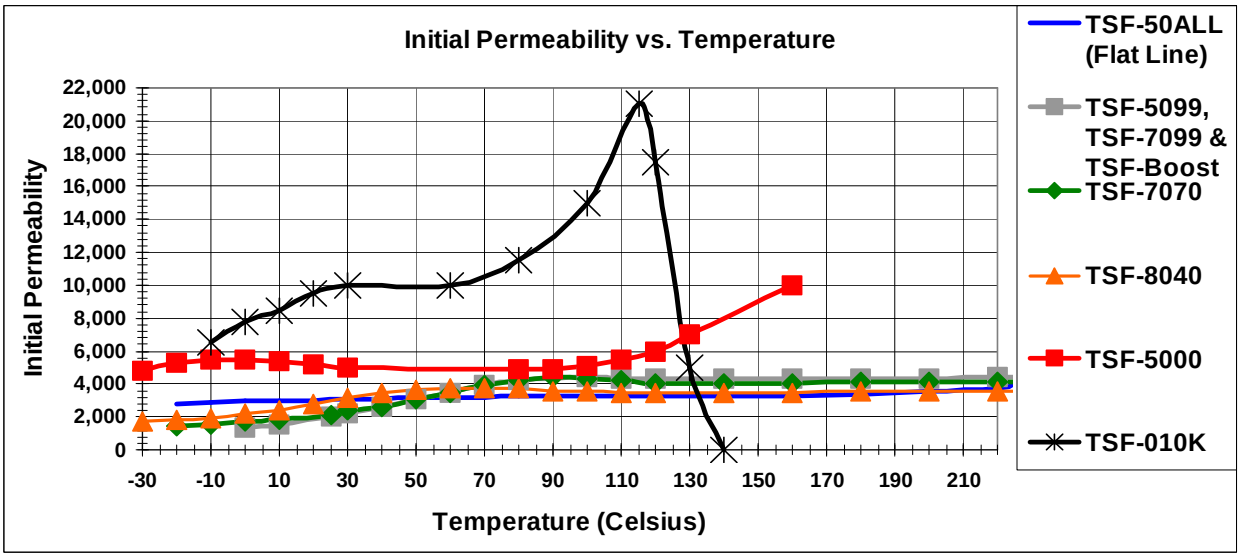

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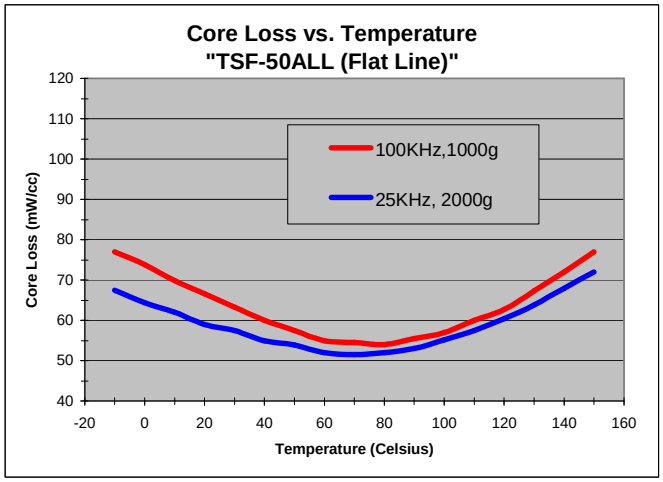
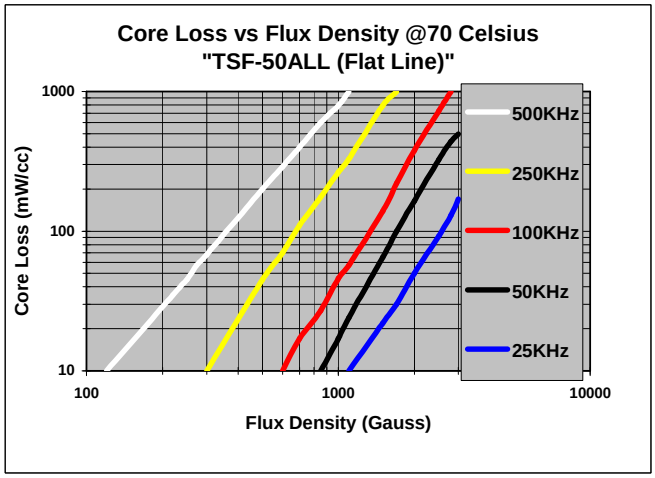
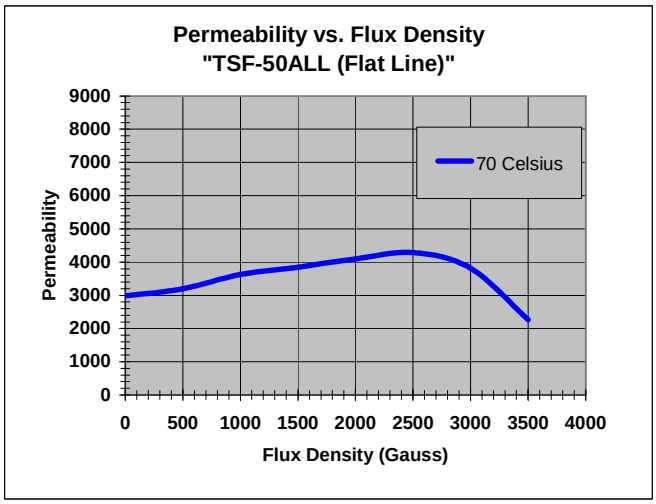
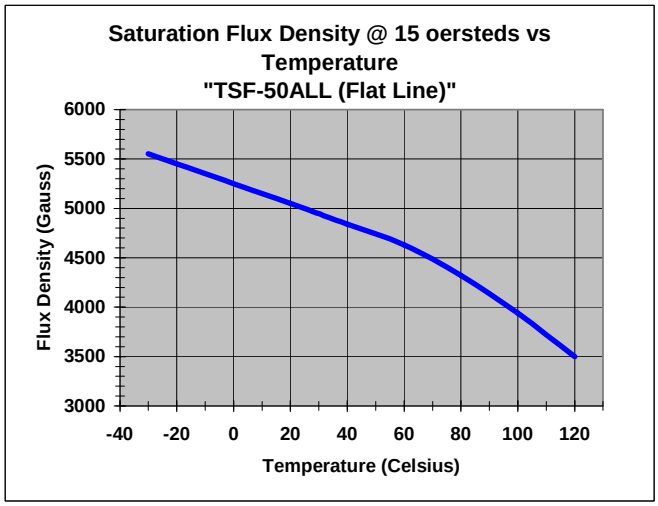
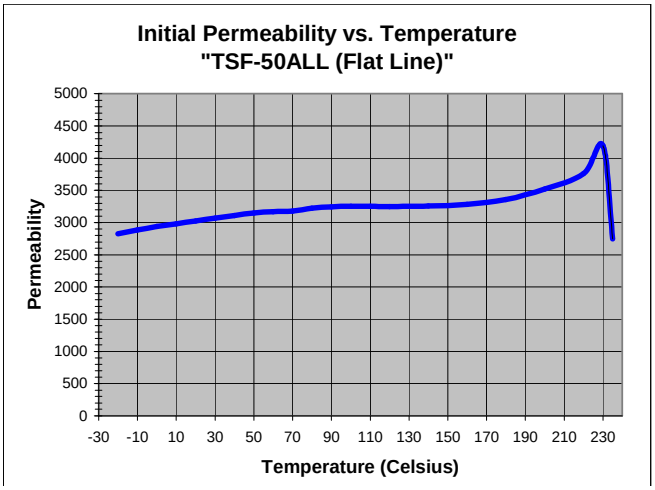
ASTM Material Type P5025-100
TSC Ferrite Material Grade TSF-50ALL Flat Line
Stable low core loss & stable permeability over wide temperature range
Initial Permeability 3,000 +-25%
Curie Temperature >230 Celsius
Core Loss Density = $P_c = 0.08\ f^{1.39}\ B^{2.91}$ in mW/cc 25 through 100 Celsius

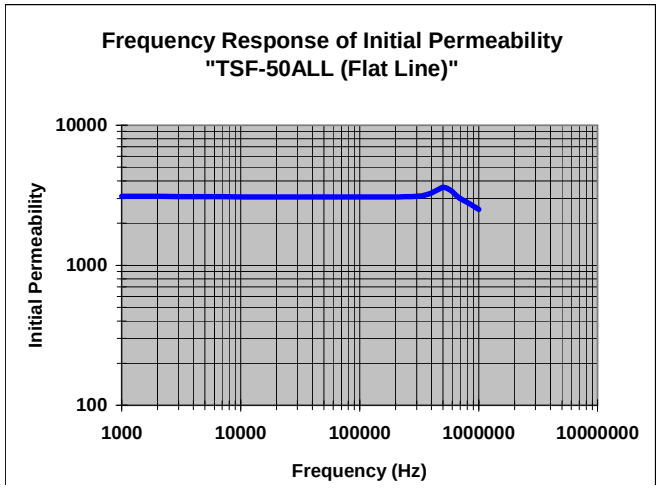












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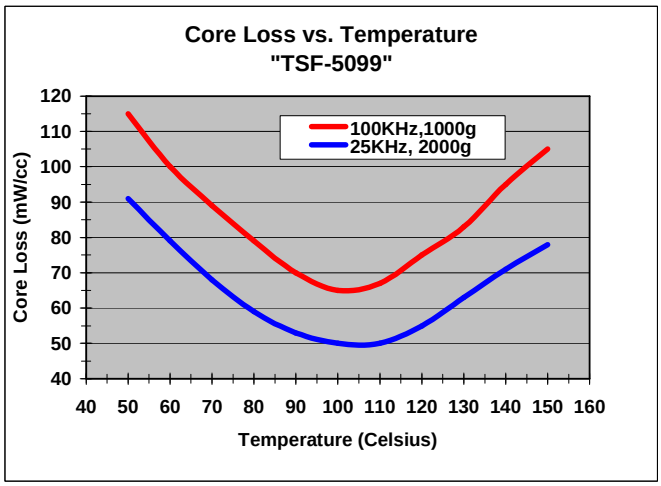
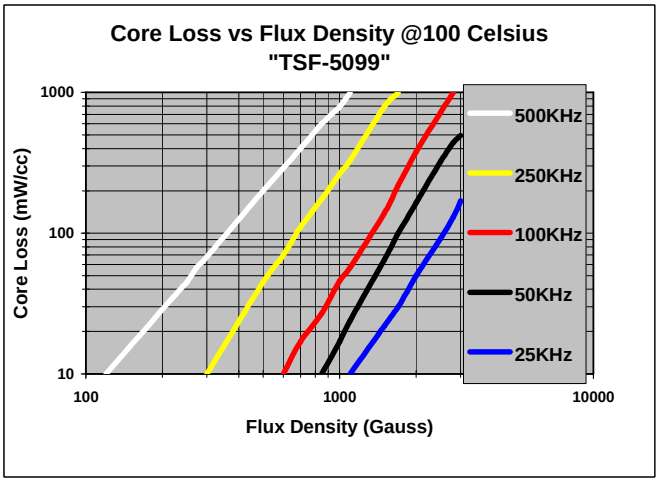
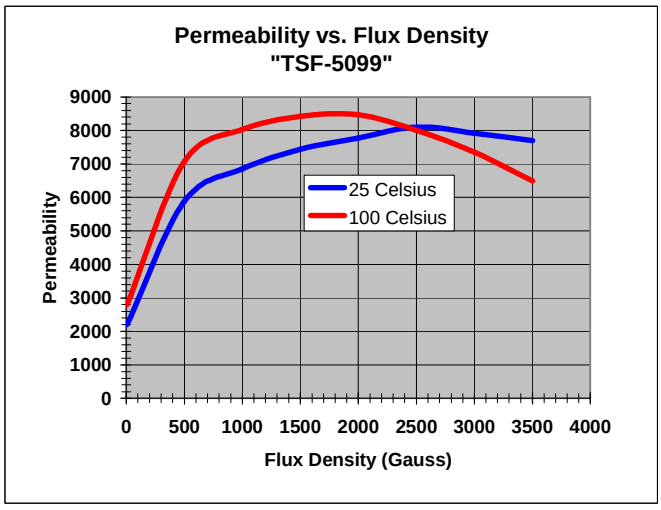
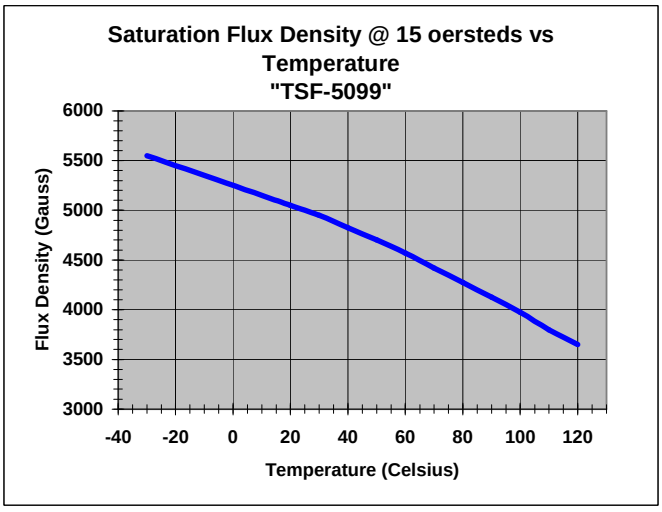
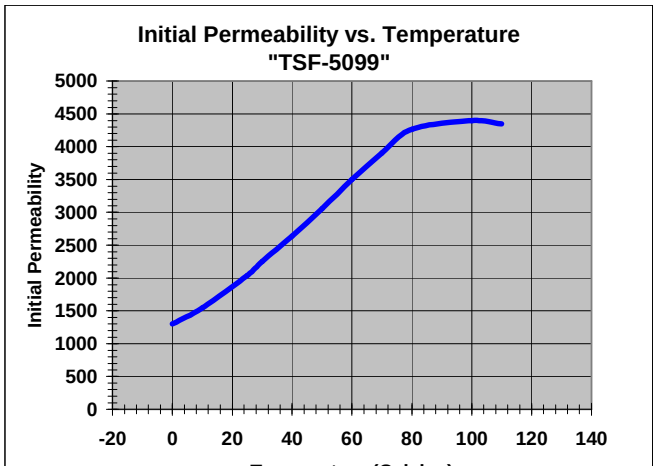
ASTM Material Type P5099
TSC Ferrite Material Grade TSF-5099
Extremely Low Core Loss, minimum at 100 Celsius
Initial Permeability 2,000 +-25%
Curie Temperature >210 Celsius
Core Loss Density = $P_c = 0.08\ f^{1.39}\ B^{2.91}$ in mW/cc at 100 Celsius

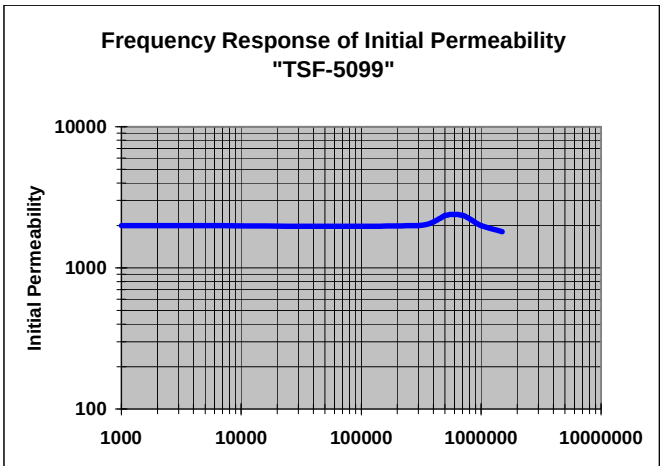






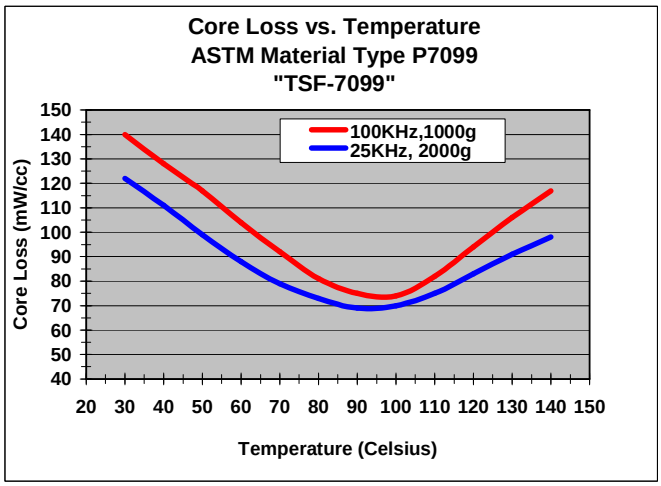


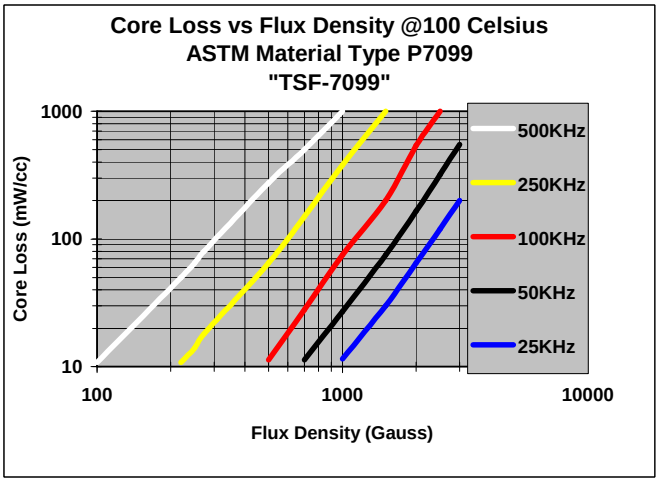


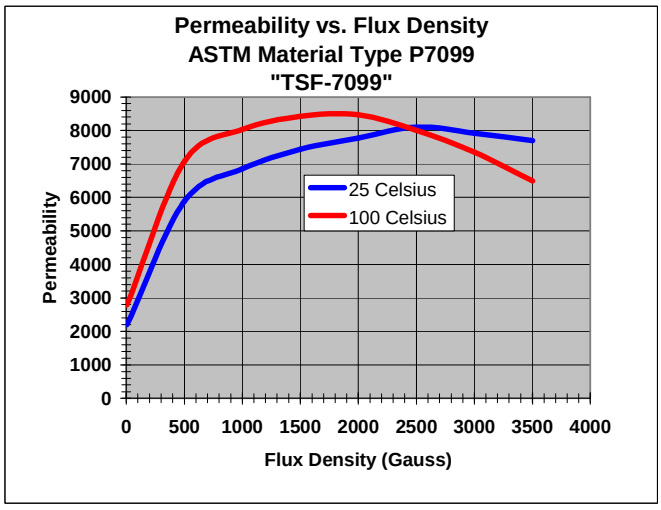


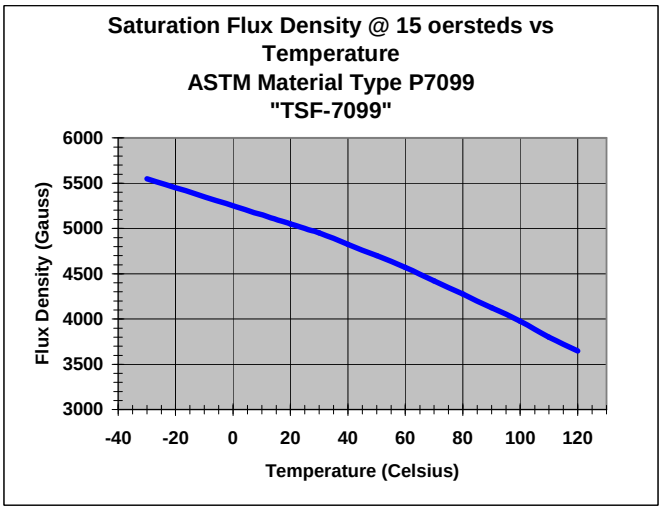
TSC Ferrite International

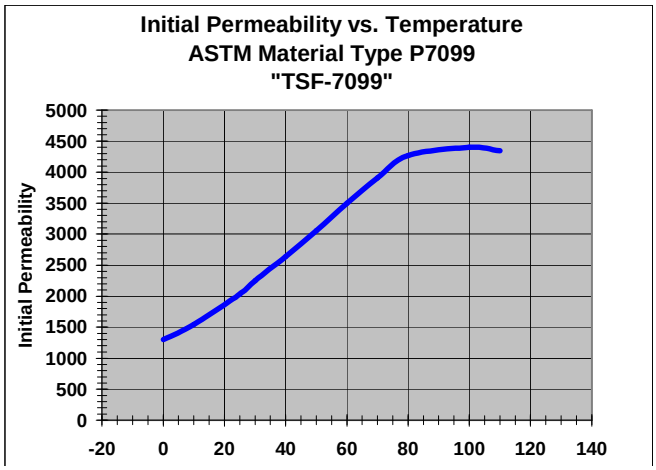
ASTM Material Type P7099
TSC Ferrite Material Grade TSF-7099
Low Core Loss, minimum at 100 Celsius
Initial Permeability 2,000 +-25%
Curie Temperature >210 Celsius
Core Loss Density = $P_c = 0.147\ f^{1.34}\ B^{2.54}$ in mW/cc at 100 Cesius

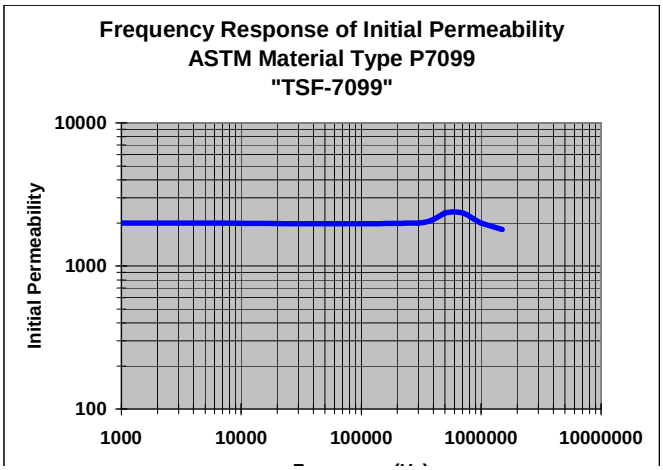






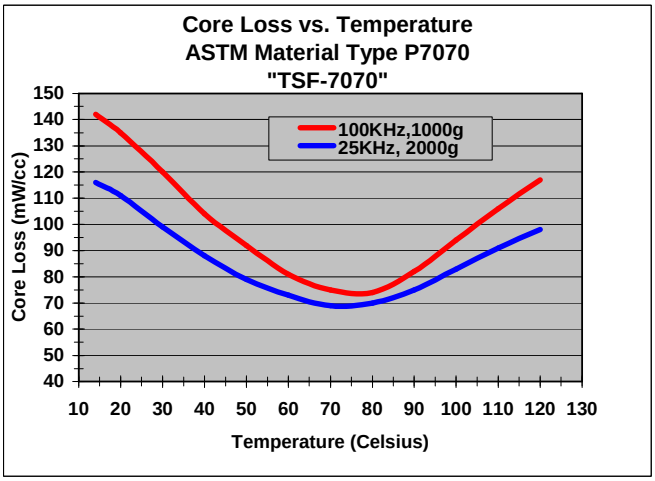


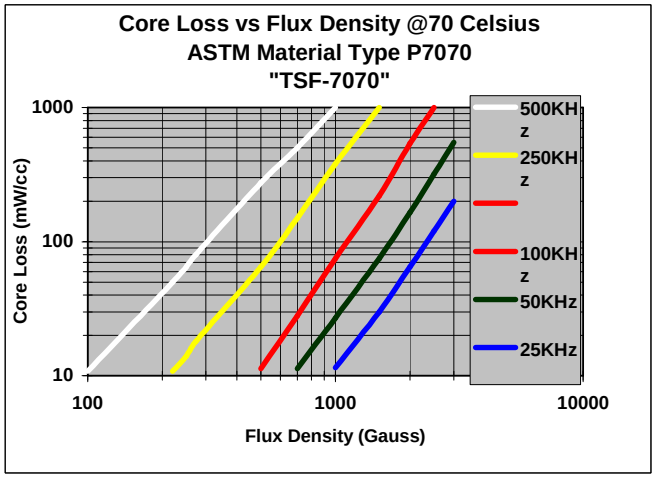


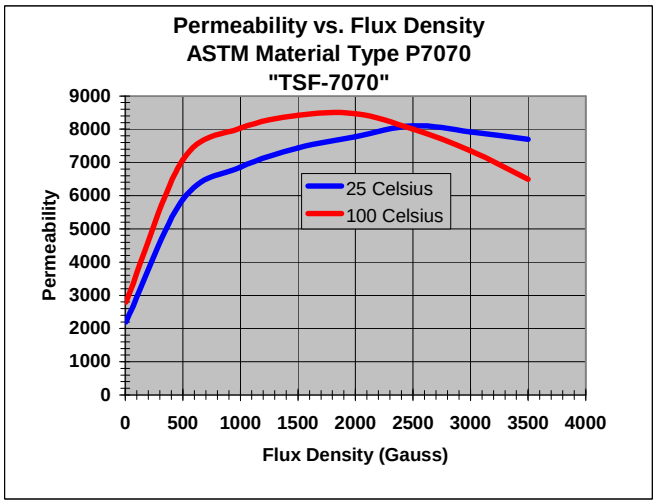


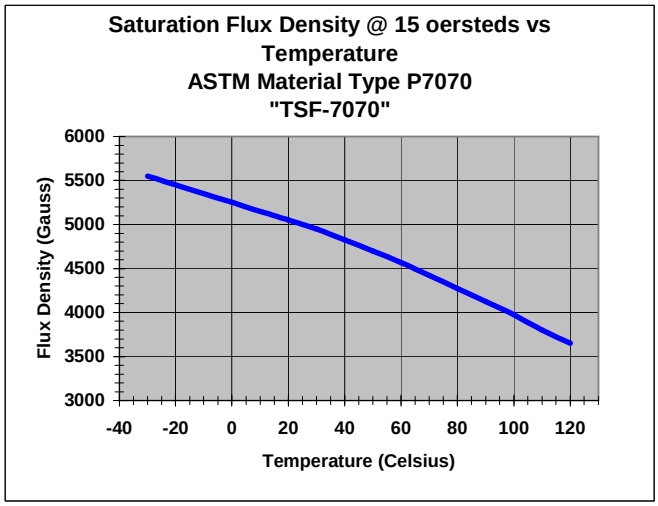
TSC Ferrite International

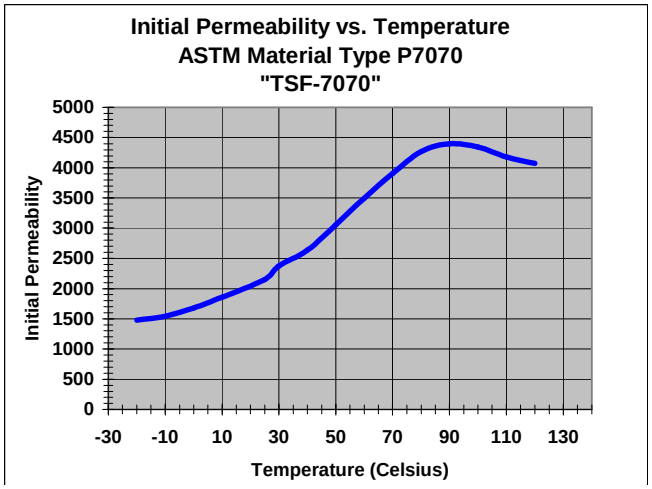
ASTM Material Type P7070
TSC Ferrite Material Grade TSF-7070
Low Core Loss, minimum at 70 Celsius
Initial Permeability 2,200 +-20%
Curie Temperature >210 Celsius
Core Loss Density = $P_c = 0.147\ f^{1.34}\ B^{2.54}$ in mW/cc at 70 Cesius

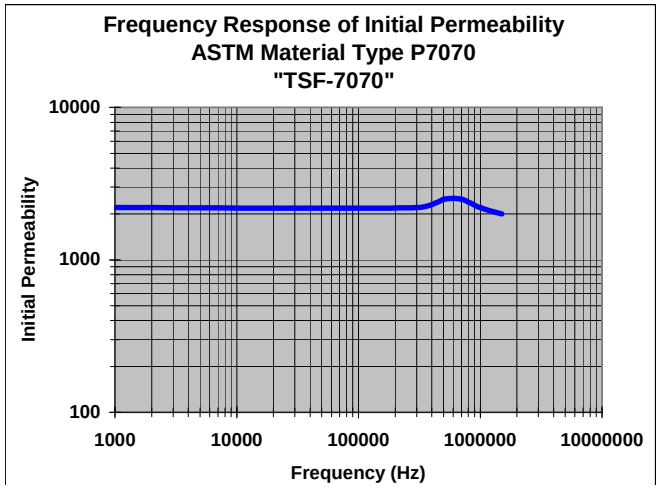






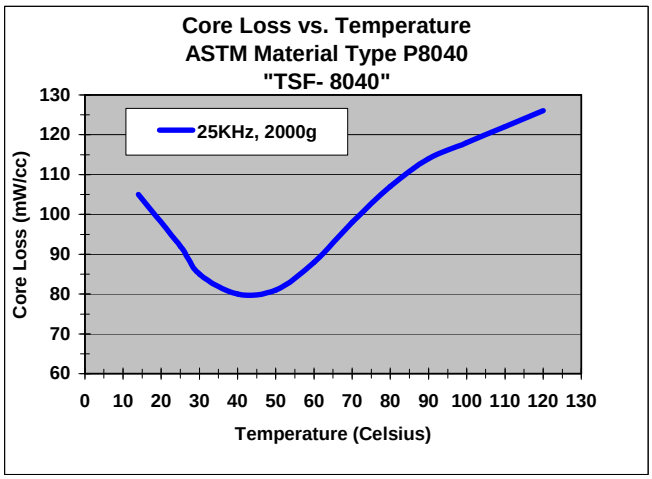


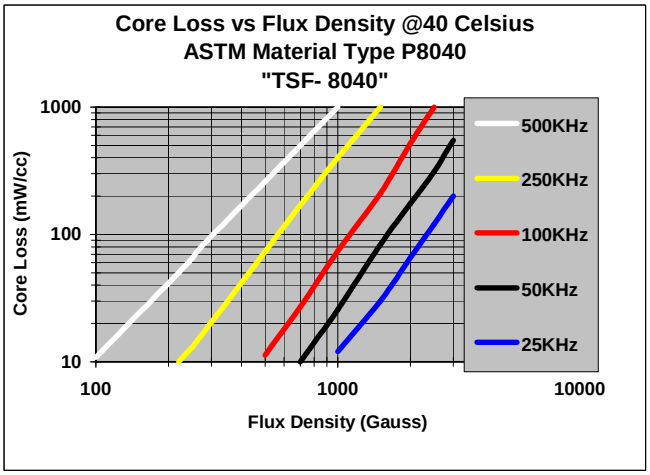


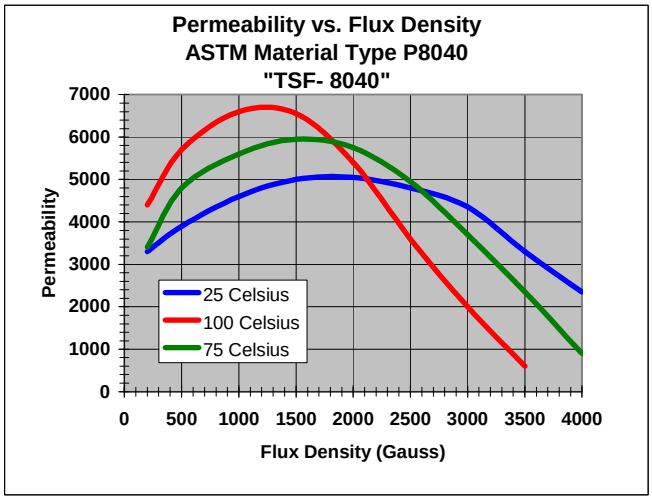


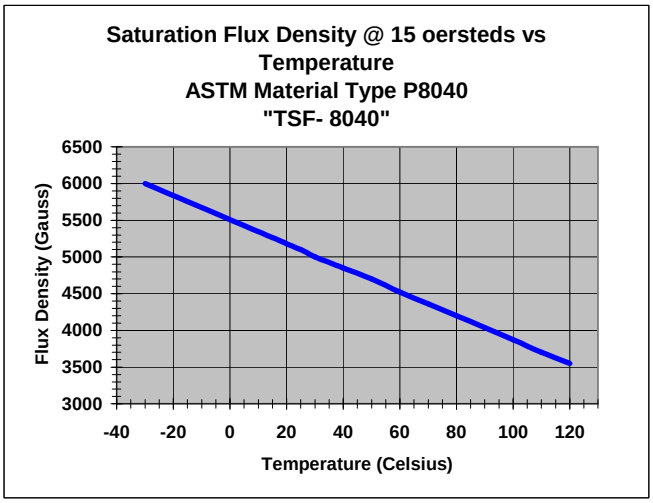
TSC Ferrite International

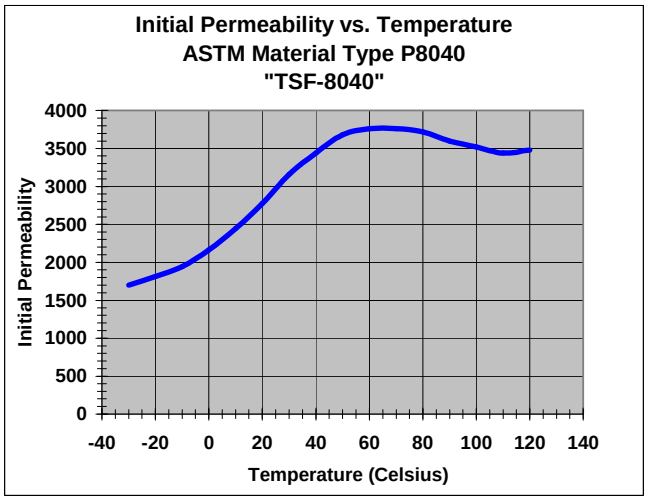
ASTM Material Types P8040 & F3000
TSC Ferrite Material Grade TSF-8040
All purpose material for integrated magnetics
Initial Permeability 3,000 +-25%
Curie Temperature >210 Celsius

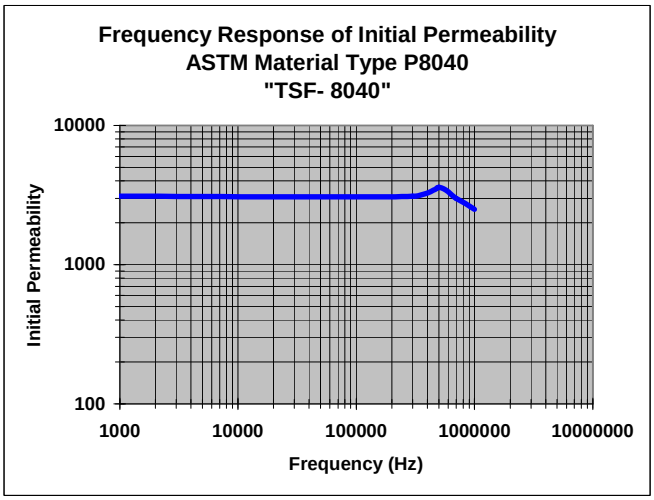






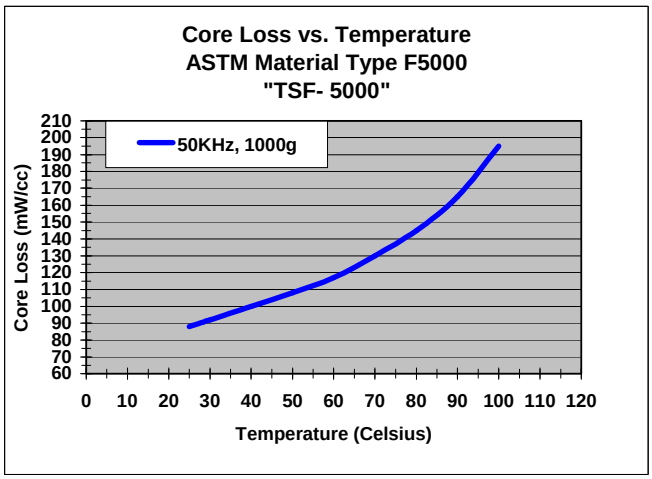


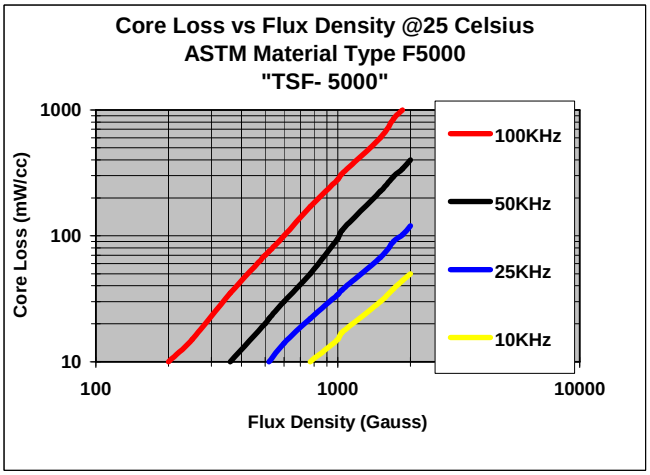


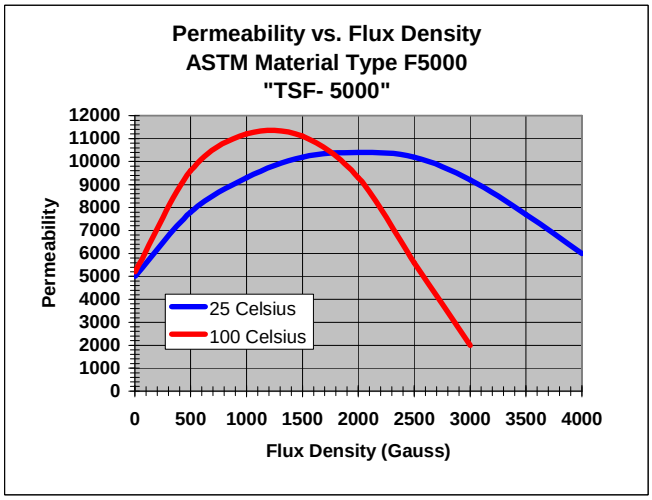


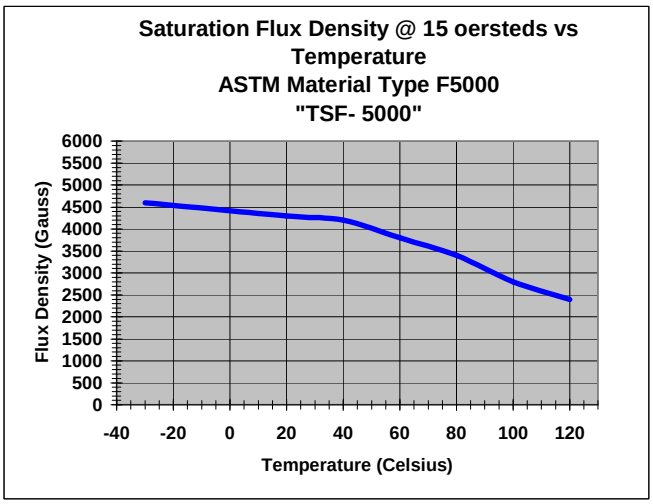
TSC Ferrite International

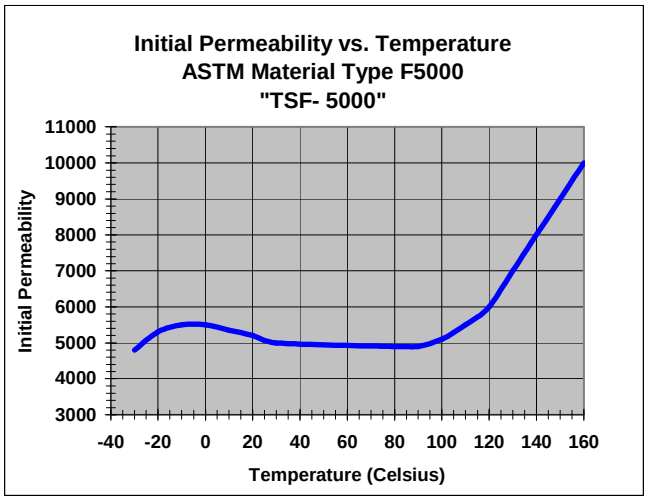
ASTM Material Type F5000
TSC Ferrite Material Grade TSF-5000
Filter material for input inductors & pulse transformers
Initial Permeability 5,000 +-25%
Curie Temperature >170 Celsius

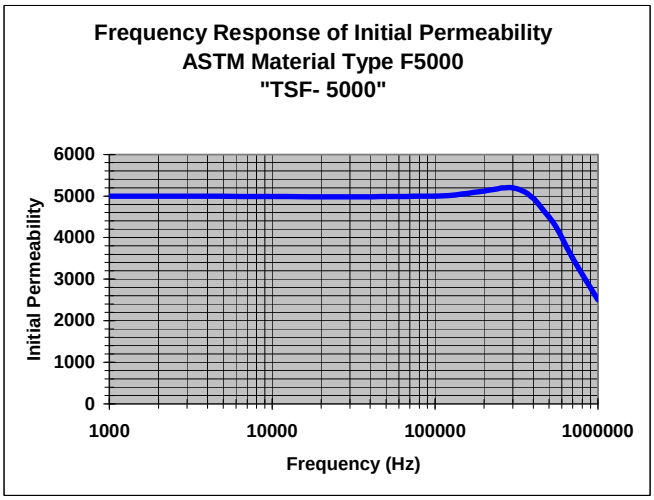








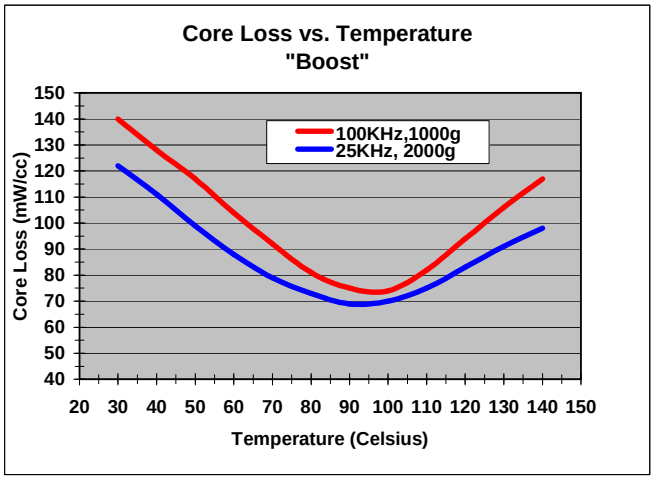


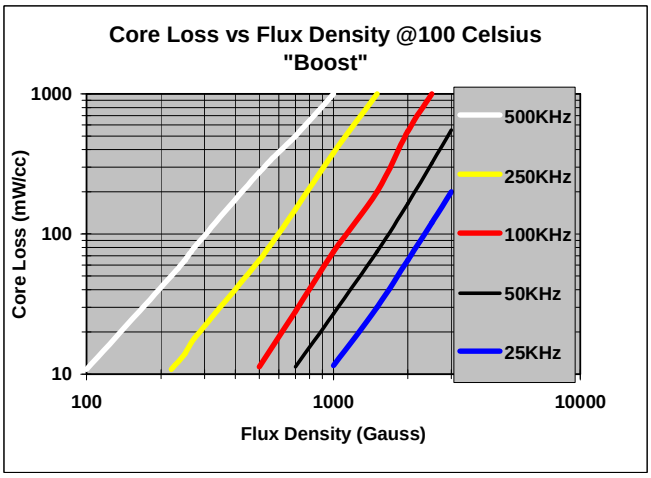


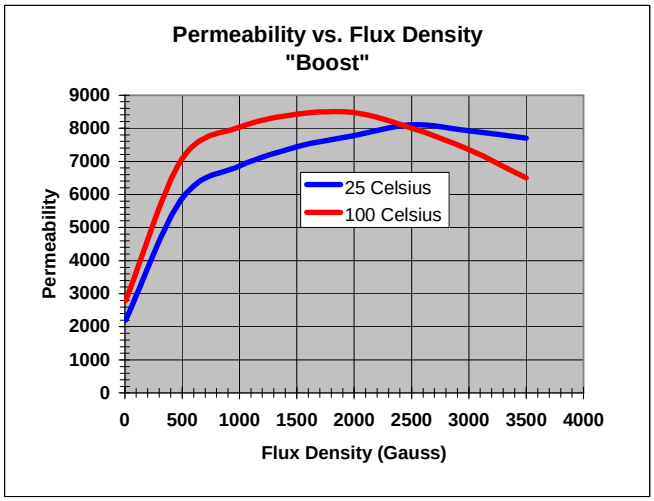
39105 North Magnetics Blvd. Wadsworth, IL 60083 TEL (847) 249-4900 • FAX (847) 249-4988 www.tscinternational.com

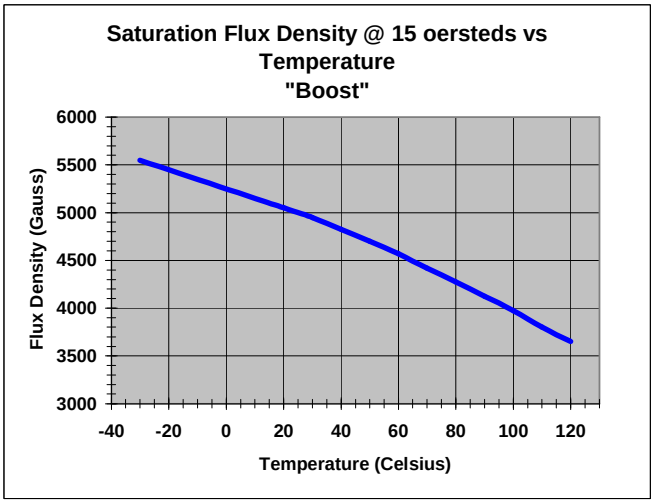
TSC Ferrite International

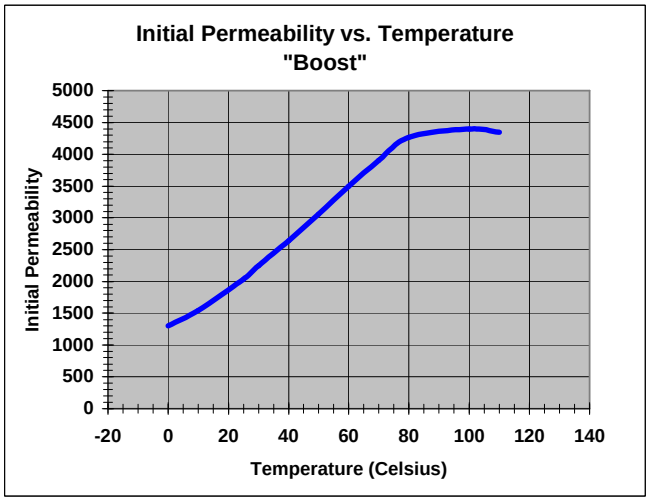
TSC Ferrite Material Grade TSF-Boost
High Saturation Flux for flyback transformers and output inductors that need to support large bias current
Initial Permeability 2,000 +-25%
Curie Temperature >210 Celsius

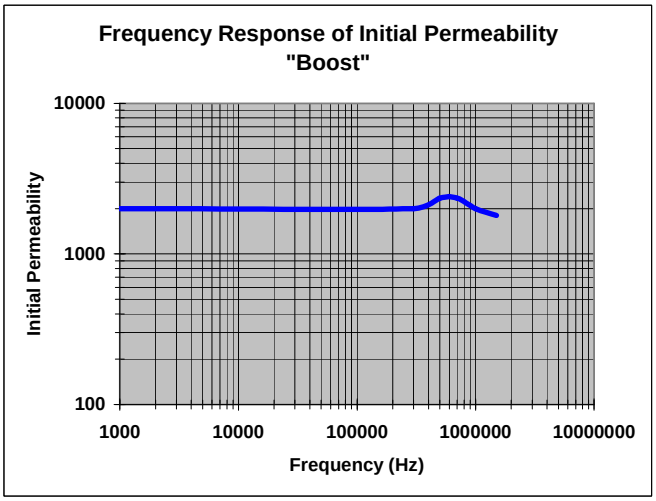




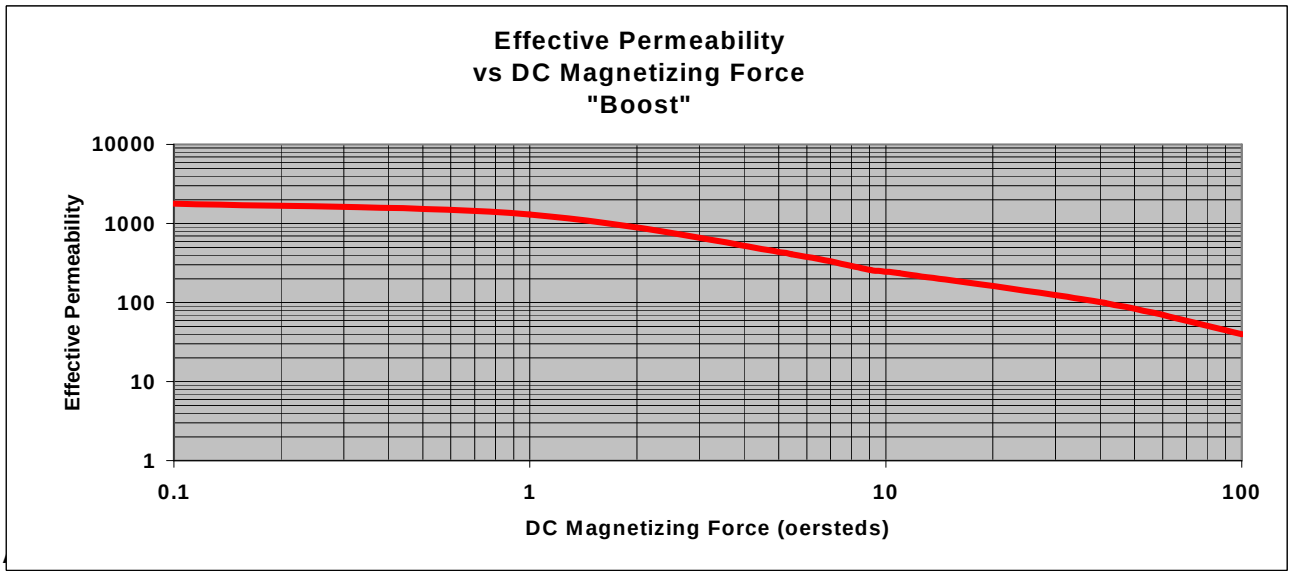


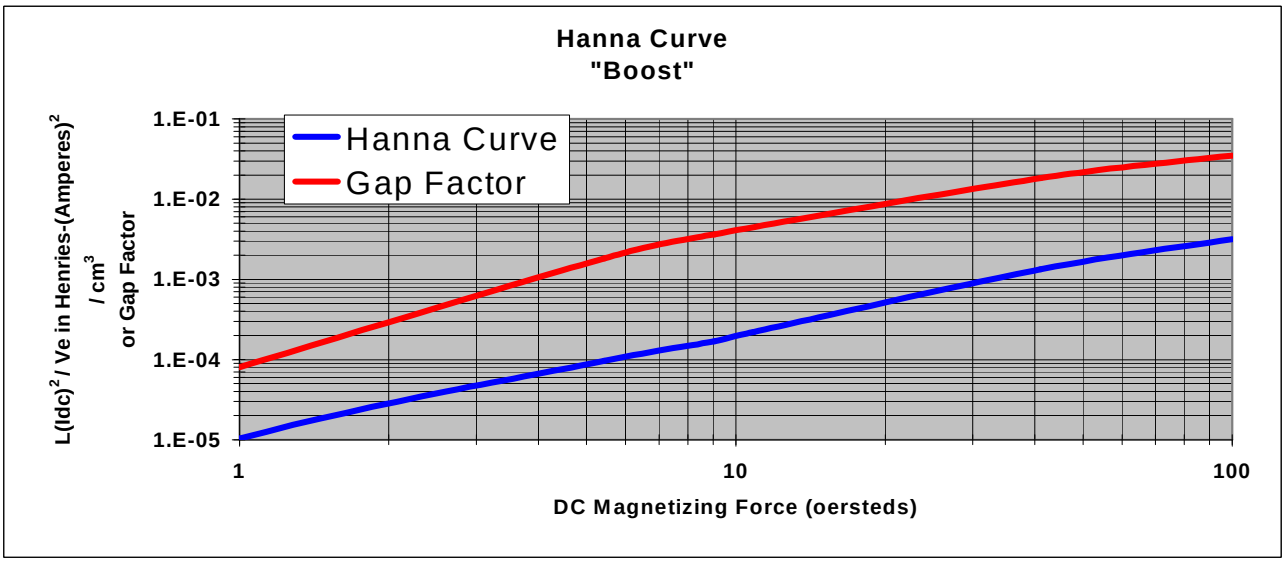






TSC Ferrite International





Above graph represents the maximum DC bias field with no more than 10% reduction in inductance

Calculate $L(Idc)^2$ / Ve in Henries-$Amperes^2/cm^3$

Read DC Magnetizing force (H in oersteds) at the value where $(L(Idc)^2 / Ve)$ intersects Hanna Curve

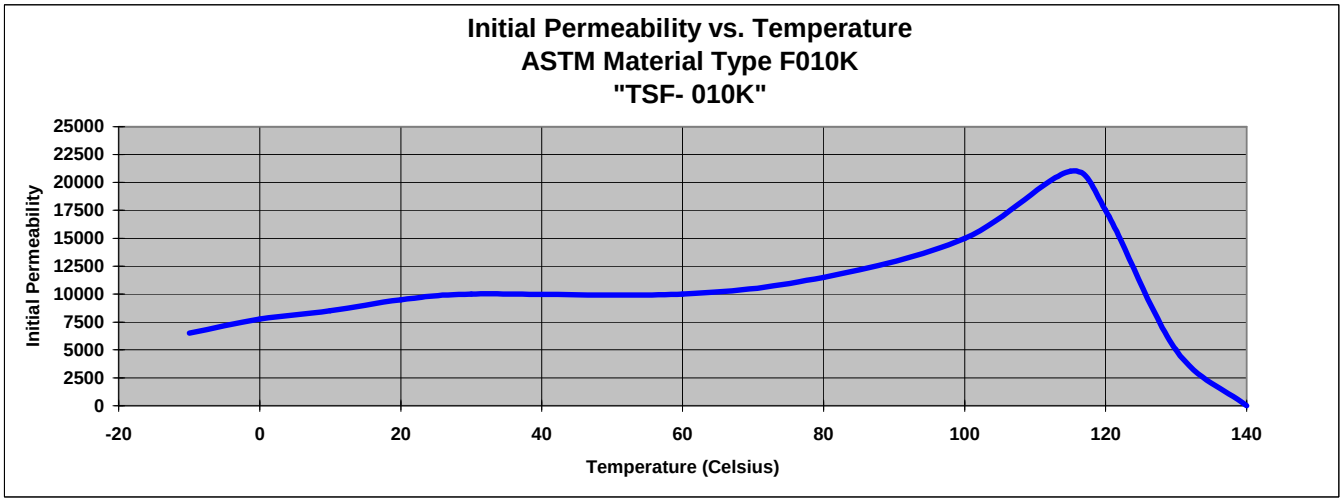
CalculateTurns N = (H Le) / (0.4 π Idc)

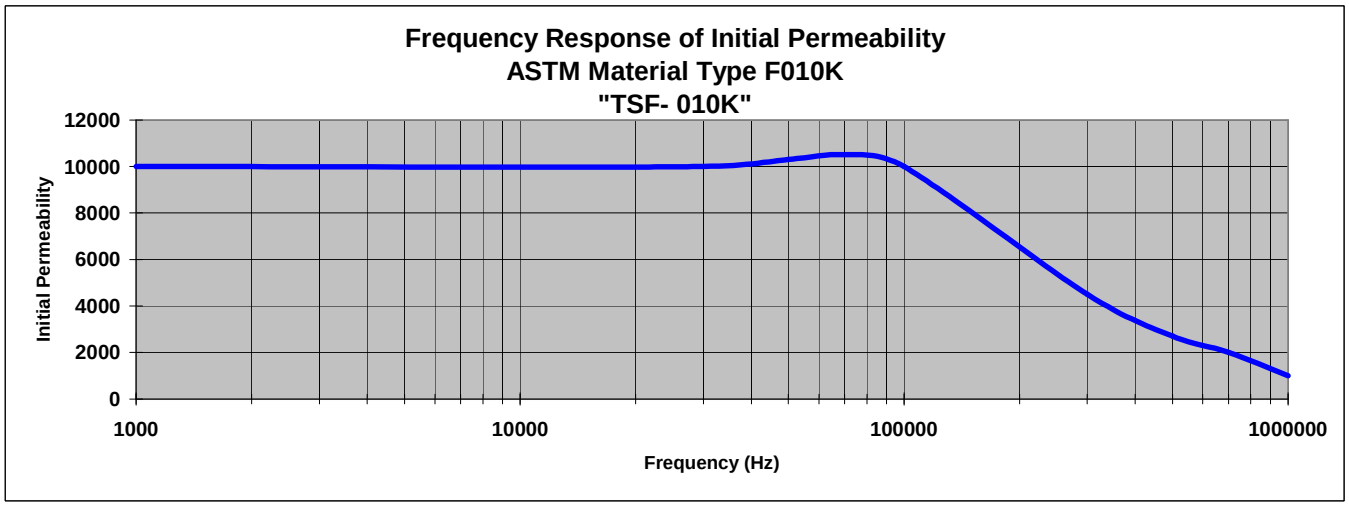
Calculate Gap = (Gap Factor) (Le / 2.54)

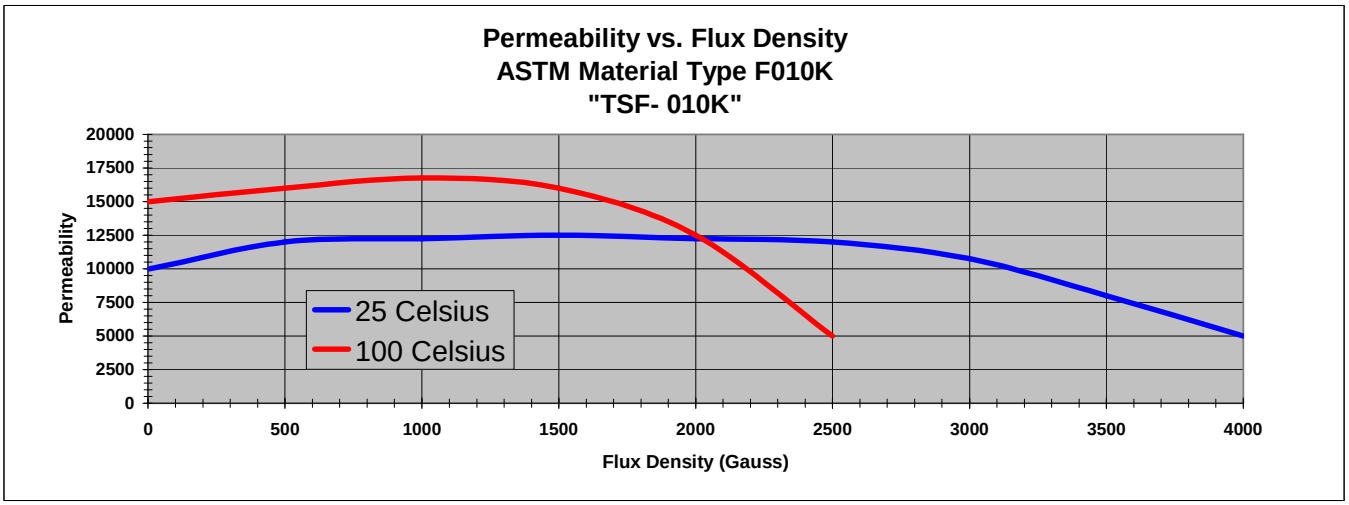
L = desired Inductance in Henries
Idc = dc bias current in amps
Ve = effective core volume in cm^3
N = turns on coil
H = magnetizing force in oersteds from Hanna Curve
Le = magnetic path length in cm
Gap = core gap in inches
Gap Factor = value from gap factor curve at same DC Magnetizing Force as Hanna curve

TSC Ferrite International

ASTM Material Type F010K
TSC Ferrite Material Grade TSF-010K
Filter material for input inductors
Initial Permeability 10,000 +-30%
Curie Temperature >125 Celsius







TSC Ferrite International

FERRITE PART NUMBERING SYSTEM

Our material grade names have been chosen to make them meaningful to our customers.

These meaningful grade names, like the meaningful dimensional portion of our part numbering system, are meant to help our customers identify important characteristics of our parts by the part number alone.

TSF-50ALL
- Temperature of low core loss (<room to >100°C)
- Core loss at 100KHz, 1000 gauss (50 mw/cm^3)

TSF-5099
- Temperature of minimum core loss (100°C)
- Core loss at 100KHz, 1000 gauss (50 mw/cm^3)

TSF-7099
- Temperature of minimum core loss (100°C)
- Core loss at 100KHz, 1000 gauss (70 mw/cm^3)

TSF-7070
- Temperature of minimum core loss (70°C)
- Core loss at 100KHz, 1000 gauss (70 mw/cm^3)

TSF-8040
- Temperature of minimum core loss (40°C)
- Core loss at 100KHz, 1000 gauss (80 mw/cm^3)

TSF-5000
- 5,000 permeability

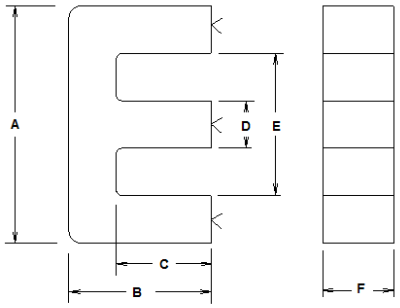
TSF-010K
- 10,000 permeability

E CORES TSF-5099-25-10-06-0000
- Gap code (-0000 for ungapped)
- Nominal thickness of core (F dimension) in rounded mm
- Overall leg length of one core (B dimension) in rounded mm
- Back length (A dimension) in rounded mm
- Core material (TSF-5099)

POT CORES TSF-8040-14-08-00-0000
- Gap code (-0000 for ungapped)
- Nominal pair height (2 x B dimension) in rounded mm
- Nominal outside diameter (A dimension) in rounded mm
- Core material (TSF-8040)

TOROIDS TSF-5000-10-05-03-0000
- Coating code (-0000 for uncoated)
- Height of core (C dimension) in rounded mm
- Inside diameter (B dimension) in rounded mm
- Outside diameter (A dimension) in rounded mm
- Core material (TSF-5000)

TSC Ferrite International



TSC FERRITE INTERNATIONAL E CORE DIMENSIONS

		A		B		C		D		E		F	
	PART #	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	10-06-05	0.403 +-0.008	10.24 +-0.21	0.220 +-0.005	5.59 +-0.13	0.165 +-0.006	4.19 +-0.16	0.096 +-0.002	2.44 +-0.05	0.309 +-0.006	7.85 +-0.16	0.187 +-0.004	4.75 +-0.10
	12-08-04	0.485 +-0.010	12.32 +-0.25	0.305 +-0.005	7.75 +-0.13	0.220 +-0.007	5.59 +-0.17	0.105 +-0.002	2.67 +-0.05	0.315 +-0.006	8.00 +-0.16	0.170 +-0.003	4.32 +-0.09
	13-06-03	0.500 +-0.010	12.70 +-0.25	0.224 +-0.005	5.69 +-0.13	0.161 +-0.006	4.09 +-0.16	0.125 +-0.003	3.18 +-0.06	0.375 +-0.008	9.53 +-0.19	0.125 +-0.003	3.18 +-0.06
EF 12.6	13-06-04	0.500 +-0.010	12.70 +-0.25	0.252 +-0.005	6.40 +-0.13	0.183 +-0.006	4.65 +-0.16	0.144 +-0.003	3.66 +-0.07	0.356 +-0.007	9.04 +-0.18	0.142 +-0.003	3.61 +-0.07
	13-06-06	0.500 +-0.010	12.70 +-0.25	0.224 +-0.005	5.69 +-0.13	0.161 +-0.006	4.09 +-0.16	0.125 +-0.003	3.18 +-0.06	0.375 +-0.008	9.53 +-0.19	0.250 +-0.005	6.35 +-0.13
EE16	16-07-05	0.630 +-0.013	16.00 +-0.32	0.283 +-0.005	7.19 +-0.13	0.204 +-0.007	5.18 +-0.17	0.157 +-0.003	3.99 +-0.080	0.461 +-0.009	11.71 +-0.23	0.189 +-0.004	4.80 +-0.10
EF 16	16-08-05	0.634 +-0.013	16.10 +-0.32	0.317 +-0.005	8.05 +-0.13	0.232 +-0.007	5.89 +-0.17	0.179 +-0.004	4.55 +-0.09	0.460 +-0.009	11.68 +-0.23	0.177 +-0.004	4.50 +-0.09
	16-08-08	0.634 +-0.013	16.10 +-0.32	0.317 +-0.005	8.05 +-0.13	0.232 +-0.007	5.89 +-0.17	0.179 +-0.004	4.55 +-0.09	0.460 +-0.009	11.68 +-0.23	0.310 +-0.006	7.870 +-0.16
	19-07-05	0.750 +-0.015	19.05 +-0.38	0.299 +-0.005	7.60 +-0.13	0.206 +-0.007	5.230 +-0.17	0.187 +-0.004	4.75 +-0.10	0.564 +-0.011	14.33 +-0.29	0.187 +-0.004	4.75 +-0.10
E187 (3/16x3/16)	19-08-05	0.750 +-0.015	19.05 +-0.38	0.317 +-0.005	8.05 +-0.13	0.224 +-0.007	5.69 +-0.17	0.187 +-0.004	4.75 +-0.10	0.564 +-0.011	14.33 +-0.29	0.187 +-0.004	4.75 +-0.10
	19-08-09	0.750 +-0.015	19.05 +-0.38	0.317 +-0.005	8.05 +-0.13	0.224 +-0.007	5.69 +-0.17	0.187 +-0.004	4.75 +-0.10	0.564 +-0.011	14.33 +-0.29	0.343 +-0.007	8.71 +-0.17
EF 20	20-10-06	0.787 +-0.016	19.99 +-0.40	0.390 +-0.005	9.91 +-0.13	0.283 +-0.007	7.19 +-0.18	0.224 +-0.004	5.69 +-0.11	0.566 +-0.011	14.38 +-0.29	0.222 +-0.004	5.64 +-0.11
	20-10-10	0.787 +-0.016	19.99 +-0.40	0.390 +-0.005	9.91 +-0.13	0.283 +-0.007	7.19 +-0.18	0.224 +-0.004	5.69 +-0.11	0.566 +-0.011	14.38 +-0.29	0.346 +-0.007	8.790 +-0.18
E2425 (1/4x1/4)	25-10-06	1.000 +-0.020	25.40 +-0.51	0.380 +-0.005	9.65 +-0.13	0.260 +-0.007	6.60 +-0.19	0.250 +-0.005	6.35 +-0.13	0.757 +-0.015	19.23 +-0.39	0.250 +-0.005	6.35 +-0.13
E(1/4x1/2)	25-10-13	1.000 +-0.020	25.40 +-0.51	0.380 +-0.005	9.65 +-0.13	0.260 +-0.007	6.60 +-0.19	0.250 +-0.005	6.35 +-0.13	0.757 +-0.015	19.23 +-0.39	0.500 +-0.010	12.70 +-0.25
	25-12-06	1.000 +-0.020	25.40 +-0.51	0.470 +-0.005	11.94 +-0.13	0.350 +-0.007	8.89 +-0.19	0.250 +-0.005	6.35 +-0.13	0.757 +-0.015	19.23 +-0.39	0.250 +-0.005	6.35 +-0.13
EF 25	25-13-07	0.986 +-0.020	25.05 +-0.50	0.494 +-0.005	12.55 +-0.13	0.352 +-0.008	8.95 +-0.20	0.285 +-0.006	7.25 +-0.15	0.706 +-0.014	17.98 +-0.36	0.283 +-0.006	7.19 +-0.14
	25-13-10	0.986 +-0.020	25.05 +-0.50	0.494 +-0.005	12.55 +-0.13	0.352 +-0.008	8.95 +-0.20	0.285 +-0.006	7.25 +-0.15	0.706 +-0.014	17.98 +-0.36	0.423 +-0.008	10.74 +-0.22
EL2425	25-16-06	1.000 +-0.020	25.40 +-0.51	0.630 +-0.005	16.00 +-0.13	0.505 +-0.008	12.83 +-0.19	0.250 +-0.005	6.35 +-0.13	0.757 +-0.015	19.23 +-0.39	0.250 +-0.005	6.35 +-0.13
	25-16-13	1.000 +-0.020	25.40 +-0.51	0.630 +-0.005	16.00 +-0.13	0.505 +-0.008	12.83 +-0.19	0.250 +-0.005	6.35 +-0.13	0.757 +-0.015	19.23 +-0.39	0.500 +-0.010	12.70 +-0.25
	28-11-11	1.102 +-0.022	27.99 +-0.56	0.415 +-0.005	10.54 +-0.13	0.224 +-0.009	5.69 +-0.23	0.303 +-0.006	7.70 +-0.15	0.760 +-0.015	19.30 +-0.39	0.440 +-0.009	11.18 +-0.22

TSC Ferrite International

	TSF FERRITE INTERNATIONAL E CORE EFFECTIVE CORE SET PARAMETERS						INDUCTANCE INDEX AL nH/N^2				
							ASTM Material Type				
							ASTM P7099 ASTM P5099	ASTM P7070	ASTM P8040 ASTM F3000 P5025-100	ASTM F5000	ASTM F010K
							TSC Ferrite Material Grade				
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	CORE SET WEIGHT	TSF-BOOST TSF-7099 TSF-5099		TSF-8040 TSF-50ALL Flat Line		
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	GRAMS	+-25%	TSF-7070 +-20%	+-25%	TSF-5000 +-25%	TSF-010K +-30%
10-06-05	2.617	0.119	0.311	0.227	0.027	1.6	955	1,060	1,305	1,445	1,800
12-08-04	3.208	0.145	0.464	0.298	0.043	2.7	950	1,040	1,300	1,440	1,800
13-06-03	2.771	0.101	0.280	0.260	0.026	1.4	750	850	1,050	1,170	1,475
13-06-04	2.959	0.130	0.386	0.250	0.033	2.0	935	1,075	1,360	1,510	1,900
13-06-06	2.771	0.202	0.560	0.260	0.052	2.8	1,550	1,715	2,110	2,470	2,870
16-07-05	3.482	0.196	0.684	0.400	0.079	3.5	1,290	1,440	1,818	2,240	2,800
16-08-05	3.761	0.199	0.750	0.421	0.084	3.8	1,210	1,340	1,650	2,085	2,600
16-08-08	3.761	0.349	1.313	0.421	0.147	6.7	2,235	2,485	3,145	4,000	5,000
19-07-05	3.794	0.225	0.853	0.501	0.113	4.3	1,380	1,530	1,935	2,430	3,040
19-08-05	3.977	0.225	0.894	0.545	0.122	4.5	1,175	1,450	1,815	2,345	2,930
19-08-09	3.977	0.412	1.640	0.545	0.225	8.3	2,400	2,650	3,330	4,680	5,850
20-10-06	4.614	0.315	1.454	0.525	0.162	7.273	1,625	1,780	2,280	2,960	3,700
20-10-10	4.614	0.491	2.265	0.624	0.307	11.5	2,590	2,875	3,645	4,860	6,075
25-10-06	4.899	0.394	1.928	0.850	0.335	9.8	1,890	2,100	2,690	3,465	4,330
25-10-13	4.899	0.787	3.856	0.850	0.669	19.6	3,850	4,225	5,380	6,900	8,650
25-12-06	5.813	0.394	2.291	1.145	0.451	11.6	1,625	1,780	2,285	2,990	3,750
25-13-07	5.775	0.517	2.983	0.956	0.494	15.2	2,175	2,415	2,995	4,070	5,100
25-13-10	5.775	0.772	4.459	0.956	0.738	22.7	3,270	3,640	4,610	6,210	7,750
25-16-06	7.408	0.399	2.954	1.652	0.659	14.708	1,315	1,450	1,830	2,325	2,900
25-16-13	7.408	0.798	5.908	1.652	1.318	29.6	2,635	2,900	3,650	4,650	5,800
28-11-11	4.808	0.967	4.651	0.660	0.639	24.7	4,950	5,420	6,820	8,665	13,000

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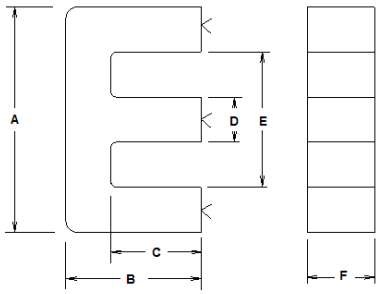

TSC FERRITE INTERNATIONAL E CORE DIMENSIONS

		A		B		C		D		E		F	
	PART #	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	28-12-09	1.100	27.94	0.478	12.14	0.320	8.13	0.350	8.89	0.785	19.94	0.350	8.89
		+-0.022	+-0.56	+-0.005	+-0.13	+-0.008	+-0.21	+-0.007	+-0.18	+-0.016	+-0.40	+-0.007	+-0.18
	30-13-08	1.185	30.10	0.517	13.13	0.320	8.13	0.421	10.69	0.801	20.35	0.320	8.13
		+-0.024	+-0.60	+-0.005	+-0.13	+-0.009	+-0.23	+-0.008	+-0.21	+-0.016	+-0.41	+-0.006	+-0.16
EE 30/11mm	30-13-11	1.185	30.10	0.517	13.13	0.320	8.13	0.421	10.69	0.801	20.35	0.421	10.69
		+-0.024	+-0.60	+-0.005	+-0.13	+-0.009	+-0.23	+-0.008	+-0.21	+-0.016	+-0.41	+-0.008	+-0.21
EE 30.5mm	30-14-09	1.200	30.48	0.526	13.36	0.356	9.04	0.363	9.22	0.878	22.30	0.363	9.22
		+-0.024	+-0.61	+-0.005	+-0.13	+-0.008	+-0.21	+-0.007	+-0.18	+-0.018	+-0.45	+-0.007	+-0.18
EE 30/15mm	30-15-07	1.181	30.00	0.587	14.91	0.399	10.13	0.270	6.86	0.792	20.12	0.272	6.91
		+-0.024	+-0.60	+-0.005	+-0.13	+-0.009	+-0.22	+-0.005	+-0.14	+-0.016	+-0.40	+-0.005	+-0.14
	30-17-07	1.181	30.00	0.678	17.22	0.490	12.45	0.270	6.86	0.792	20.12	0.272	6.91
		+-0.024	+-0.60	+-0.005	+-0.13	+-0.009	+-0.22	+-0.005	+-0.14	+-0.016	+-0.40	+-0.005	+-0.14
EL 30/11 mm	30-21-11	1.181	30.00	0.837	21.26	0.640	16.26	0.421	10.69	0.787	19.99	0.421	10.69
		+-0.024	+-0.60	+-0.005	+-0.13	+-0.009	+-0.23	+-0.008	+-0.21	+-0.016	+-0.40	+-0.008	+-0.21
EF 32	32-16-09	1.264	32.11	0.634	16.10	0.457	11.61	0.362	9.19	0.918	23.32	0.360	9.15
		+-0.025	+-0.64	+-0.005	+-0.13	+-0.009	+-0.22	+-0.007	+-0.18	+-0.018	+-0.47	+-0.007	+-0.18
	32-16-11	1.264	32.11	0.634	16.10	0.457	11.61	0.362	9.19	0.918	23.32	0.419	10.64
		+-0.025	+-0.64	+-0.005	+-0.13	+-0.009	+-0.22	+-0.007	+-0.18	+-0.018	+-0.47	+-0.008	+-0.21
	33-14-13	1.307	33.20	0.557	14.15	0.380	9.65	0.386	9.80	0.952	24.18	0.500	12.70
		+-0.026	+-0.66	+-0.005	+-0.13	+-0.009	+-0.22	+-0.008	+-0.20	+-0.019	+-0.48	+-0.010	+-0.25
E375	34-14-09	1.351	34.32	0.556	14.12	0.385	9.78	0.367	9.32	1.025	26.04	0.367	9.32
(3/8x3/8)		+-0.027	+-0.69	+-0.005	+-0.13	+-0.008	+-0.21	+-0.007	+-0.19	+-0.021	+-0.52	+-0.007	+-0.19
E(3/8X1/2)	34-14-13	1.351	34.32	0.556	14.12	0.385	9.78	0.367	9.32	1.025	26.04	0.500	12.70
		+-0.027	+-0.69	+-0.005	+-0.13	+-0.008	+-0.21	+-0.007	+-0.19	+-0.021	+-0.52	+-0.010	+-0.25
EF35	35-18-13	1.378	35.00	0.689	17.50	0.492	12.50	0.394	10.00	0.984	24.99	0.394	10.00
		+-0.028	+-0.70	+-0.005	+-0.13	+-0.009	+-0.23	+-0.008	+-0.20	+-0.020	+-0.50	+-0.008	+-0.20
EL375	35-24-10	1.375	34.93	0.937	23.80	0.750	19.05	0.375	9.53	1.007	25.58	0.375	9.53
		+-0.028	+-0.70	+-0.005	+-0.13	+-0.009	+-0.22	+-0.008	+-0.19	+-0.020	+-0.51	+-0.008	+-0.19
	36-19-09	1.400	35.56	0.750	19.05	0.515	13.08	0.490	12.45	0.950	24.13	0.367	9.32
		+-0.028	+-0.71	+-0.005	+-0.13	+-0.010	+-0.25	+-0.010	+-0.25	+-0.019	+-0.48	+-0.007	+-0.19
EE40	40-17-11	1.575	40.01	0.669	16.99	0.404	10.26	0.421	10.69	1.103	28.02	0.421	10.69
		+-0.032	+-0.80	+-0.005	+-0.13	+-0.010	+-0.26	+-0.008	+-0.21	+-0.022	+-0.56	+-0.008	+-0.21
E(1/2X1/4)	41-16-06	1.600	40.64	0.649	16.48	0.415	10.54	0.490	12.45	1.145	29.08	0.250	6.35
		+-0.032	+-0.81	+-0.005	+-0.13	+-0.010	+-0.25	+-0.010	+-0.25	+-0.023	+-0.58	+-0.005	+-0.13
E21	41-16-12	1.600	40.64	0.649	16.48	0.415	10.54	0.490	12.45	1.145	29.08	0.490	12.45
		+-0.032	+-0.81	+-0.005	+-0.13	+-0.010	+-0.25	+-0.010	+-0.25	+-0.023	+-0.58	+-0.010	+-0.25
E(1/2x1/2)	41-16-13	1.600	40.64	0.649	16.48	0.415	10.54	0.490	12.45	1.145	29.08	0.500	12.70
		+-0.032	+-0.81	+-0.005	+-0.13	+-0.010	+-0.25	+-0.010	+-0.25	+-0.023	+-0.58	+-0.010	+-0.25
E 42/15mm	42-21-15	1.653	41.99	0.823	20.90	0.597	15.16	0.466	11.84	1.185	30.10	0.608	15.44
		+-0.033	+-0.84	+-0.005	+-0.13	+-0.010	+-0.24	+-0.009	+-0.24	+-0.024	+-0.60	+-0.012	+-0.31
E 42/20mm	42-21-20	1.653	41.99	0.823	20.90	0.597	15.16	0.466	11.84	1.185	30.10	0.772	19.61
		+-0.033	+-0.84	+-0.005	+-0.13	+-0.010	+-0.24	+-0.009	+-0.24	+-0.024	+-0.60	+-0.015	+-0.39

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							INDUCTANCE INDEX AL nH/N^2				
							ASTM Material Type				
							ASTM P7099 ASTM P5099	ASTM P7070	ASTM P8040 ASTM F3000 P5025-100	ASTM F5000	ASTM F010K
	TSF FERRITE INTERNATIONAL E CORE EFFECTIVE CORE SET PARAMETERS						TSC Ferrite Material Grade				
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	CORE SET WEIGHT	TSF-BOOST TSF-7099 TSF-5099		TSF-8040 TSF-50ALL Flat Line		
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	GRAMS	+-25%	+-20%	+-25%	+-25%	+-30%
28-12-09	5.638	0.736	4.151	0.898	0.661	21.4	3,200	3,555	4,502	5,750	8,500
30-13-08	5.797	0.824	4.774	0.785	0.646	24.9	3,485	3,870	4,905	6,250	9,000
30-13-11	5.797	1.083	6.281	0.785	0.850	32.7	4,500	4,975	6,440	8,050	12,000
30-14-09	6.272	0.797	4.998	1.183	0.943	25.7	3,115	3,460	4,380	5,475	8,200
30-15-07	6.607	0.573	3.785	1.344	0.770	20.752	2,105	2,330	2,940	4,035	6,000
30-17-07	7.499	0.569	4.266	1.650	0.939	23.5	1,840	2,035	2,590	3,440	5,100
30-21-11	9.022	1.098	9.904	1.511	1.659	50.3	2,990	3,260	4,125	5,675	8,500
32-16-09	7.465	0.822	6.134	1.639	1.347	31.2	2,695	2,950	3,735	5,100	10,000
32-16-11	7.465	0.956	7.139	1.639	1.567	36.3	3,145	3,495	4,425	5,970	
33-14-13	6.734	1.175	7.912	1.388	1.630	40.6	4,290	4,770	6,040	8,175	16,000
34-14-09	6.942	0.813	5.646	1.634	1.329	28.9	2,870	3,230	4,050	5,450	10,000
34-14-13	6.942	1.108	7.693	1.634	1.811	39.4	3,925	4,410	5,520	7,425	14,000
35-18-13	8.069	1.002	8.082	1.873	1.876	41.1	3,045	3,385	4,285	5,780	11,000
35-24-10	10.712	0.900	9.640	3.058	2.752	48.3	2,055	2,320	2,910	3,880	7,700
36-19-09	8.266	1.110	9.176	1.528	1.697	47.2	3,300	3,670	4,645	6,275	12,000
40-17-11	7.731	1.274	9.850	1.778	2.265	51.9	4,055	4,500	5,695	7,725	15,000
41-16-06	7.750	0.758	5.878	1.754	1.330	30.3	2,390	2,705	3,380	4,515	8,000
41-16-12	7.750	1.487	11.521	1.754	2.607	59.5	4,725	5,300	6,630	9,185	18,000
41-16-13	7.750	1.517	11.754	1.754	2.660	60.7	4,825	5,400	6,755	9,360	18,360
42-21-15	9.723	1.815	17.644	2.769	5.025	89.6	4,600	5,155	6,570	8,795	17,000
42-21-20	9.723	2.304	22.404	2.769	6.381	113.8	5,845	6,555	8,340	11,165	22,000

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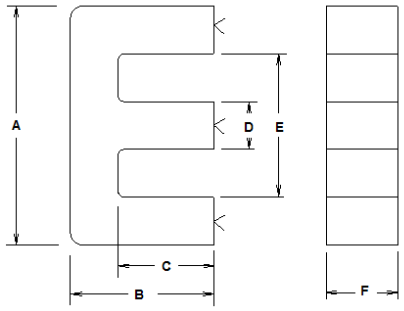

TSC FERRITE INTERNATIONAL E CORE DIMENSIONS

		A		B		C		D		E		F	
	PART #	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	42-33-20	1.665 +-0.033	42.29 +-0.85	1.283 +-0.005	32.59 +-0.13	1.043 +-0.010	26.49 +-0.25	0.470 +-0.009	11.94 +-0.24	1.189 +-0.024	30.20 +-0.60	0.768 +-0.015	19.51 +-0.39
	43-21-15	1.687 +-0.034	42.85 +-0.86	0.831 +-0.005	21.11 +-0.13	0.596 +-0.010	15.14 +-0.25	0.468 +-0.009	11.89 +-0.24	1.219 +-0.024	30.96 +-0.62	0.608 +-0.012	15.44 +-0.31
	43-21-20	1.687 +-0.034	42.85 +-0.86	0.831 +-0.005	21.11 +-0.13	0.596 +-0.010	15.14 +-0.25	0.468 +-0.009	11.89 +-0.24	1.219 +-0.024	30.96 +-0.62	0.772 +-0.015	19.61 +-0.39
	43-21-22	1.687 +-0.034	42.85 +-0.86	0.831 +-0.005	21.11 +-0.13	0.596 +-0.010	15.14 +-0.25	0.468 +-0.009	11.89 +-0.24	1.219 +-0.024	30.96 +-0.62	0.875 +-0.018	22.23 +-0.45
	46-19-09	1.825 +-0.037	46.36 +-0.93	0.730 +-0.005	18.54 +-0.13	0.450 +-0.011	11.43 +-0.27	0.625 +-0.013	15.88 +-0.32	1.265 +-0.025	32.13 +-0.64	0.370 +-0.007	9.40 +-0.19
E625 (5/8x5/8)	47-21-16	1.845 +-0.037	46.86 +-0.94	0.773 +-0.005	19.63 +-0.13	0.480 +-0.011	12.19 +-0.28	0.615 +-0.012	15.62 +-0.31	1.270 +-0.025	32.26 +-0.65	0.615 +-0.012	15.62 +-0.31
	47-21-32	1.845 +-0.037	46.86 +-0.94	0.773 +-0.005	19.63 +-0.13	0.480 +-0.011	12.19 +-0.28	0.615 +-0.012	15.62 +-0.31	1.270 +-0.025	32.26 +-0.65	1.230 +-0.025	31.24 +-0.63
	49-23-11	1.920 +-0.038	48.77 +-0.98	0.900 +-0.005	22.86 +-0.13	0.600 +-0.011	15.24 +-0.28	0.620 +-0.012	15.75 +-0.32	1.327 +-0.027	33.71 +-0.67	0.445 +-0.009	11.30 +-0.23
E 55/21mm	55-28-21	2.170 +-0.043	55.12 +-1.10	1.083 +-0.005	27.51 +-0.13	0.740 +-0.012	18.80 +-0.30	0.667 +-0.013	16.94 +-0.34	1.500 +-0.030	38.10 +-0.76	0.815 +-0.016	20.70 +-0.41
E 55/25mm	55-28-25	2.170 +-0.043	55.12 +-1.10	1.083 +-0.005	27.51 +-0.13	0.740 +-0.012	18.80 +-0.30	0.667 +-0.013	16.94 +-0.34	1.500 +-0.030	38.10 +-0.76	1.000 +-0.020	25.40 +-0.51
	55-28-31	2.170 +-0.043	55.12 +-1.10	1.083 +-0.005	27.51 +-0.13	0.740 +-0.012	18.80 +-0.30	0.667 +-0.013	16.94 +-0.34	1.500 +-0.030	38.10 +-0.76	1.218 +-0.024	30.94 +-0.62
	55-28-42	2.170 +-0.043	55.12 +-1.10	1.083 +-0.005	27.51 +-0.13	0.740 +-0.012	18.80 +-0.30	0.667 +-0.013	16.94 +-0.34	1.500 +-0.030	38.10 +-0.76	1.610 +-0.032	40.89 +-0.82
E(3/4X3/4)	56-24-19	2.210 +-0.044	56.13 +-1.12	0.929 +-0.005	23.60 +-0.13	0.575 +-0.012	14.61 +-0.31	0.740 +-0.015	18.80 +-0.38	1.520 +-0.030	38.61 +-0.77	0.740 +-0.015	18.80 +-0.38
	59-25-19	2.312 +-0.046	58.72 +-1.17	0.972 +-0.005	24.69 +-0.13	0.575 +-0.013	14.61 +-0.33	0.724 +-0.014	18.39 +-0.37	1.518 +-0.030	38.56 +-0.77	0.735 +-0.015	18.67 +-0.37
EE65	65-33-27	2.565 +-0.051	65.15 +-1.30	1.280 +-0.005	32.51 +-0.13	0.890 +-0.013	22.61 +-0.33	0.774 +-0.015	19.66 +-0.38	1.770 +-0.035	44.96 +-0.89	1.067 +-0.021	27.10 +-0.53
	70-54-32	2.750 +-0.055	69.85 +-1.40	2.125 +-0.005	53.98 +-0.13	1.687 +-0.014	42.85 +-0.35	0.875 +-0.018	22.23 +-0.45	1.876 +-0.038	47.65 +-0.95	1.250 +-0.025	31.75 +-0.64
	71-33-20	2.775 +-0.056	70.49 +-1.41	1.297 +-0.005	32.94 +-0.13	0.876 +-0.013	22.25 +-0.34	0.852 +-0.017	21.64 +-0.43	1.919 +-0.038	48.74 +-0.98	0.799 0.016	20,30 +-0.41
	71-33-32	2.775 +-0.056	70.49 +-1.41	1.297 +-0.005	32.94 +-0.13	0.876 +-0.013	22.25 +-0.34	0.852 +-0.017	21.64 +-0.43	1.919 +-0.038	48.74 +-0.98	1.244 0.025	31.60 +-0.63
	72-28-19	2.850 +-0.057	72.39 +-1.45	1.100 +-0.005	27.94 +-0.13	0.710 +-0.013	18.03 +-0.33	0.750 +-0.015	19.05 +-0.38	2.100 +-0.042	53.34 +-1.07	0.750 +-0.015	19.05 +-0.38
EE80	80-38-20	3.150 +-0.063	80.01 +-1.60	1.500 +-0.005	38.10 +-0.13	1.110 +-0.013	28.19 +-0.33	0.780 +-0.016	19.81 +-0.40	2.370 +-0.047	60.20 +-1.20	0.780 +-0.016	19.81 +-0.40

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							INDUCTANCE INDEX AL nH/N^2				
							ASTM Material Type				
							ASTM P7099 ASTM P5099	ASTM P7070	ASTM P8040 ASTM F3000 P5025-100	ASTM F5000	ASTM F010K
	TSF FERRITE INTERNATIONAL E CORE EFFECTIVE CORE SET PARAMETERS						TSC Ferrite Material Grade				
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	CORE SET WEIGHT	TSF-BOOST TSF-7099 TSF-5099		TSF-8040 TSF-50ALL Flat Line		
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	GRAMS	+-25%	TSF-7070 +-20%	+-25%	TSF-5000 +-25%	TSF-010K +-30%
42-33-20	14.323	2.350	33.661	4.838	11.370	168.5	4,045	4,495	5,775	7,720	15,000
43-21-15	9.834	1.838	18.075	2.888	5.308	91.8	4,605	5,180	6,600	8,790	17,000
43-21-20	9.834	2.334	22.951	2.888	6.739	116.6	5,855	6,575	8,370	11,185	22,000
43-21-22	9.834	2.645	26.013	2.888	7.639	132.2	6,640	7,435	9,485	12,685	25,000
46-19-09	8.478	1.383	11.726	1.858	2.570	61.2	4,015	4,460	5,650	7,650	15,000
47-21-16	8.890	2.346	20.858	2.028	4.759	108.2	6,510	7,290	9,290	12,440	24,000
47-21-32	8.890	4.690	41.715	2.028	9.508	216.5	13,030	14,480	18,350	24,940	49,000
49-23-11	10.295	1.739	17.859	2.737	4.747	91.8	4,150	4,625	5,840	7,920	15,000
55-28-21	12.335	3.540	43.668	3.977	14.079	223.7	7,085	7,930	10,100	13,545	27,000
55-28-25	12.335	4.344	53.580	3.977	17.275	274.4	8,695	9,735	12,390	16,630	33,000
55-28-31	12.335	5.291	65.261	3.977	21.040	334.3	10,595	11,770	14,910	20,265	40,000
55-28-42	12.335	6.993	86.264	3.977	27.812	441.9	14,000	15,720	19,900	26,795	53,000
56-24-19	10.650	3.398	36.202	2.894	9.832	188.0	7,875	8,820	11,220	15,055	30,000
59-25-19	10.939	3.642	39.937	2.945	10.727	208.3	8,220	8,820	11,200	15,720	31,000
65-33-27	14.691	5.390	79.194	5.719	30.828	404.8	9,062	10,069	12,754	17,333	
70-54-32	23.175	7.055	163.488	10.895	76.858	822.2	7,520	8,275	10,580	14,380	
71-33-20	14.993	4.384	65.727	6.030	26.435	337.0	7,220	8,020	10,160	13,800	
71-33-32	14.993	6.825	102.337	6.030	41.158	524.7	11,245	12,495	15,825	21,510	
72-28-19	13.691	3.680	50.379	6.184	22.754	258.4	6,635	7,450	9,485	12,685	
80-38-20	18.428	3.925	72.334	11.386	44.693	365.5	5,260	5,880	7,110	10,050	

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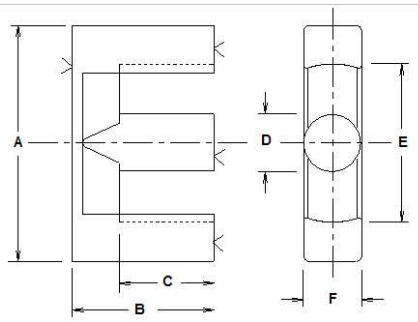

TSC FERRITE INTERNATIONAL ETD & EER CORE DIMENSIONS

		A		B		C		D		E		F	
	PART #	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
	20-10-08	0.787	19.99	0.396	10.06	0.278	7.06	0.300	7.62	0.551	14.00	0.300	7.62
		+-0.016	+-0.40	+-0.005	+-0.13	+-0.007	+-0.19	+-0.006	+-0.15	+-0.011	+-0.28	+-0.006	+-0.15
	20-13-08	0.787	19.99	0.527	13.39	0.409	10.39	0.300	7.62	0.551	14.00	0.300	7.62
		+-0.016	+-0.40	+-0.005	+-0.13	+-0.007	+-0.19	+-0.006	+-0.15	+-0.011	+-0.28	+-0.006	+-0.15
ETD29	29-00-00	1.178	29.92	0.622	15.80	0.432	10.97	0.374	9.50	0.890	22.61	0.374	9.50
		+-0.024	+- 0.61	+-0.008	+-0.20	+-0.011	+-0.28	+-0.012	+-0.30	+-0.024	+-0.61	+-0.012	+-0.30
EER28	29-14-11	1.124	28.55	0.551	14.00	0.380	9.65	0.390	9.91	0.852	21.64	0.449	11.40
		+-0.022	+-0.57	+-0.005	+-0.13	+-0.008	+-0.21	+-0.008	+-0.20	+-0.017	+-0.43	+-0.010	+-0.25
EER28L	29-17-11	1.124	28.55	0.665	16.89	0.493	12.52	0.390	9.91	0.852	21.64	0.449	11.40
		+-0.022	+-0.57	+-0.005	+-0.13	+-0.008	+-0.21	+-0.008	+-0.20	+-0.017	+-0.43	+-0.010	+-0.25
ETD34	34-00-00	1.347	34.21	0.681	17.30	0.476	12.09	0.425	10.80	1.036	26.31	0.425	10.80
		+-0.027	+-0.69	+-0.008	+-0.20	+-0.011	+-0.28	+-0.012	+-0.30	+-0.027	+-0.69	+-0.012	+-0.30
EER35	35-21-11	1.378	35.00	0.835	21.21	0.610	15.49	0.445	11.30	1.039	26.39	0.445	11.30
		+-0.028	+-0.70	+-0.005	+-0.13	+-0.010	+-0.24	+-0.009	+-0.23	+-0.021	+-0.53	+-0.009	+-0.23
ETD39	39-00-00	1.539	39.09	0.779	19.79	0.575	14.61	0.492	12.50	1.185	30.10	0.492	12.50
		+-0.031	+-0.79	+-0.008	+-0.20	+-0.015	+-0.38	+-0.012	+-0.30	+-0.031	+-0.79	+-0.012	+-0.30
ETD44	44-00-00	1.732	43.99	0.878	22.30	0.650	16.51	0.583	14.81	1.311	33.30	0.583	14.81
		+-0.035	+-0.89	+-0.008	+-0.20	+-0.015	+-0.38	+-0.015	+-0.38	+-0.032	+-0.81	+-0.015	+-0.38
ETD49	49-00-00	1.917	48.69	0.972	24.69	0.712	18.08	0.642	16.31	1.457	37.01	0.642	16.31
		+-0.043	+-1.09	+-0.008	+-0.20	+-0.016	+-0.41	+-0.015	+-0.38	+-0.035	+-0.89	+-0.015	+-0.38
ETD59	59-00-00	2.355	59.82	1.221	31.01	0.886	22.50	0.853	21.67	1.760	44.70	0.863	21.92
		+-0.047	+-1.20	+-0.005	+-0.13	+-0.012	+-0.30	+-0.017	+-0.43	+-0.035	+-0.89	+-0.017	+-0.44

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	TSF FERRITE INTERNATIONAL ETD & EER CORE EFFECTIVE CORE SET PARAMETERS						INDUCTANCE INDEX AL nH/N^2 ASTM Material Type		
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	CORE SET WEIGHT	ASTM P7099 ASTM P5099 TSF-BOOST TSF-7099 TSF-5099	ASTM P7070 TSF-7070	ASTM P8040 ASTM F3000 P5025-100 TSF-8040 TSF-50ALL Flat Line
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	GRAMS	+-25%	+-20%	+-25%
20-10-08	4.484	0.456	2.047	0.444	0.203	11.4	2,470	2,750	3,475
20-13-08	5.856	0.456	2.673	0.662	0.302	14.8	1,880	2,090	2,650
29-00-00	7.200	0.760	5.50	1.438	1.093	15.0	2,580	2,850	3,610
29-14-11	6.355	0.867	5.567	1.133	0.992	35.1	3,380	3,760	4,760
29-17-11	7.494	0.867	6.495	1.469	1.273	41.1	2,835	3,150	3,985
34-00-00	7.976	0.973	7.770	1.876	1.826	39.7	2,310	3,210	4,070
35-21-11	9.381	1.044	9.793	2.338	2.440	55.5	2,730	3,034	3,842
39-00-00	9.350	1.249	11.702	2.571	3.211	58.5	3,170	3,520	4,460
44-00-00	10.475	1.732	18.112	3.053	5.288	90.8	3,250	4,360	5,520
49-00-00	11.562	2.114	24.467	3.744	7.914	122.4	4,340	4,825	6,110
59-00-00	14.212	3.545	50.382	5.185	18.379	283.0	6,160	6,840	8,665

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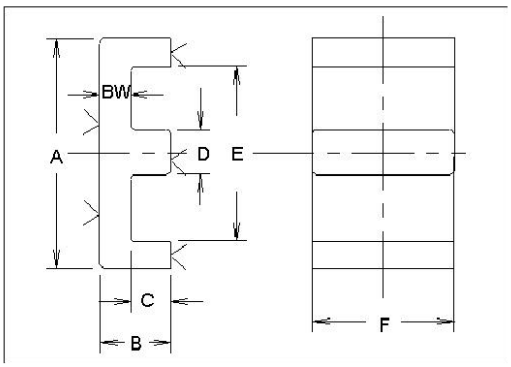

FIGURE 1

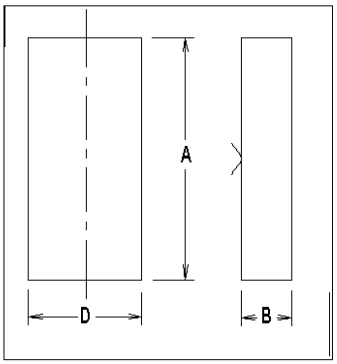

FIGURE 2

TSC FERRITE INTERNATIONAL PLANAR E CORE DIMENSIONS

PART #	Figure	A		B		C		D		E		F	
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
14-02-05 I	#2	0.551 +-0.011	14.00 +-0.28	0.059 +-0.005	1.50 +-0.13			0.197 +-0.004	5.00 +-0.10				
14-04-05 E	#1	0.551 +-0.011	14.00 +-0.28	0.138 +-0.005	3.50 +-0.13	0.079 +-0.006	2.00 +-0.15	0.118 +-0.002	3.00 +-0.05	0.433 +-0.009	11.00 +-0.23	0.197 +-0.004	5.00 +-0.10
18-02-10 I	#2	0.709 +-0.014	18.00 +-0.36	0.079 +-0.005	2.00 +-0.13			0.394 +-0.008	10.00 +-0.20				
18-04-10 E	#1	0.709 +-0.014	18.00 +-0.36	0.157 +-0.005	3.99 +-0.13	0.078 +-0.007	1.98 +-0.18	0.157 +-0.003	3.99 +-0.07	0.551 +-0.011	14.00 +-0.28	0.394 +-0.008	10.00 +-0.20
22-03-17 I	#2	0.850 +-0.017	21.59 +-0.43	0.098 +-0.005	2.49 +-0.13			0.625 +-0.013	15.88 +-0.33				
22-06-17 E	#1	0.850 +-0.017	21.59 +-0.43	0.225 +-0.005	5.72 +-0.13	0.125 +-0.005	3.32 +-0.13	0.200 +-0.004	5.08 +-0.10	0.650 +-0.013	16.51 +-0.33	0.625 +-0.013	15.88 +-0.33
32-03-20 I	#2	1.252 +-0.025	31.80 +-0.64	0.126 +-0.005	3.20 +-0.13			0.800 +-0.016	20.32 +-0.41				
32-06-20 E	#1	1.252 +-0.025	31.80 +-0.64	0.250 +-0.005	6.35 +-0.13	0.125 +-0.008	3.18 +-0.20	0.250 +-0.005	6.35 +-0.13	1.000 +-0.020	25.40 +-0.51	0.800 +-0.016	20.32 +-0.41

	TSC FERRITE INTERNATIONAL LP CORE EFFECTIVE CORE SET PARAMETERS						INDUCTANCE INDEX AL nH/N^2		
							ASTM Material Type		
							ASTM P7099 ASTM P5099	ASTM P7070	ASTM P8040 ASTM F3000 P5025-100
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	CORE SET WEIGHT	TSC Ferrite Material Grade TSF-BOOST TSF-7099 TSF-5099		TSF-8040 TSF-50ALL Flat Line
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	GRAMS	+-25%	+-25%	+-25%
14-02-05 I	1.672	0.15	0.251	0.08	0.012	1.304	1,300	1,445	2,800
14-04-05 E	2.074	0.15	0.311	0.161	0.024	1.595	1,050	1,165	2,120
18-02-10 I	2.026	0.401	0.813	0.099	0.04	4.26	3,100	3,445	6,740
18-04-10 E	2.423	0.401	0.972	0.198	0.08	5.026	2,590	2,880	5,580
22-03-17 I	2.587	0.789	2.042	0.189	0.149	10.688	5,000	5,555	10,510
22-06-17 E	3.24	0.787	2.549	0.377	0.297	13.134	3,980	4,425	8,330
32-03-20 I	3.541	1.295	4.588	0.302	0.392	23.872	5,310	5,900	12,640
32-06-20 E	4.174	1.292	5.395	0.605	0.782	27.766	4,495	4,995	10,670

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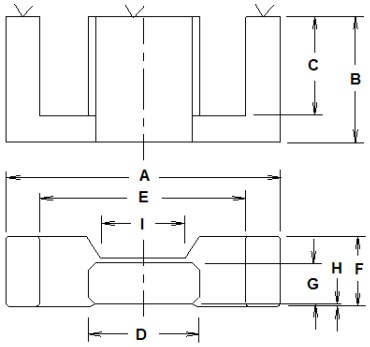

TSC FERRITE INTERNATIONAL EFD CORE DIMENSIONS

		A		B		C		D		E		F		G	
	PART #	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
EFD15	15-08-05	0.591	15.00	0.292	7.42	0.217	5.50	0.209	5.30	0.433	11.00	0.182	4.62	0.093	2.36
		+-0.012	+-0.30	+-0.005	+-0.13	+-0.007	+-0.17	+-0.004	+-0.11	+-0.009	+-0.22	+-0.004	+-0.09	+-0.002	+-0.05
EFD20	20-10-07	0.787	20.00	0.394	10.00	0.303	7.70	0.350	8.90	0.606	15.40	0.262	6.65	0.142	3.60
		+-0.016	+-0.40	+-0.005	+-0.13	+-0.007	+-0.17	+-0.007	+-0.18	+-0.012	+-0.31	+-0.005	+-0.13	+-0.003	+-0.07
EFD25	25-13-09	0.984	25.00	0.492	12.50	0.366	9.30	0.449	11.40	0.736	18.70	0.358	9.10	0.205	5.20
		+-0.020	+-0.50	+-0.005	+-0.13	+-0.008	+-0.19	+-0.009	+-0.23	+-0.015	+-0.37	+-0.007	+-0.18	+-0.004	+-0.10
EFD30	30-15-09	1.181	30.00	0.590	15.00	0.441	11.20	0.575	14.60	0.882	22.40	0.358	9.10	0.193	4.90
		+-0.024	+-0.60	+-0.005	+-0.13	+-0.008	+-0.20	+-0.012	+-0.29	+-0.018	+-0.45	+-0.007	+-0.18	+-0.004	+-0.10

							INDUCTANCE INDEX AL nH/N^2				
							ASTM Material Type				
							ASTM P7099 ASTM P5099	ASTM P7070	ASTM P8040 ASTM F3000 P5025-100	ASTM F5000	ASTM F010K
	TSC FERRITE INTERNATIONAL EFD CORE EFFECTIVE CORE SET PARAMETERS						TSC Ferrite Material Grade				
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	CORE SET WEIGHT	TSF-BOOST TSF-7099 TSF-5099	TSF-7070	TSF-8040 TSF-50ALL Flat Line	TSF-5000	TSF-010K
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	GRAMS	+/-25%	+/-20%	+-25%	+/-30%	+/-30%
15-08-05	3.40	0.15	0.51	0.31	0.05	2.8	700	1,065	1,345	1,520	2,000
20-10-07	4.70	0.31	1.46	0.50	0.16	7.0	1,330	1,740	2,202	2,850	3,000
25-13-09	5.70	0.58	3.31	0.68	0.39	16.1	2,480	2,755	3,486		
30-15-09	6.80	0.69	4.70	0.87	0.60	24.0	2,470	2,745	3,475		

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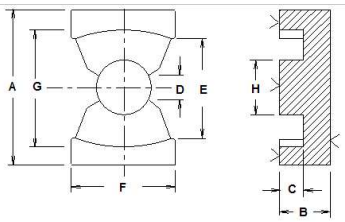

TSC FERRITE INTERNATIONAL PQ CORE DIMENSIONS

		A		B		C		D		E		F		G		H	
	PART #	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
PQ2016	20-16-00	0.837	21.26	0.319	8.10	0.203	5.16	0.158	4.01	0.472	11.99	0.551	14.00	0.709	18.01	0.348	8.84
		+-0.017	+-0.43	+-0.005	+-0.13	+-0.007	+-0.19	MIN	MIN	MIN	MIN	+-0.011	+-.28	+-0.016	+-0.41	+-0.007	+-0.18
PQ2020	20-20-00	0.837	21.26	0.398	10.11	0.282	7.16	0.158	4.01	0.472	11.99	0.551	14.00	0.709	18.01	0.348	8.84
		+-0.017	+-0.43	+-0.005	+-0.13	+-0.007	+-0.19	MIN	MIN	MIN	MIN	+-0.011	+-.28	+-0.016	+-0.41	+-0.007	+-0.18
PQ2620	26-20-00	1.073	27.25	0.397	10.08	0.226	5.74	0.236	5.99	0.610	15.49	0.748	19.00	0.886	22.50	0.472	11.99
		+-0.021	+-0.55	+-0.005	+-0.13	+-0.008	+-0.21	MIN	MIN	MIN	MIN	+-0.015	+-.38	+-0.018	+-0.45	+-0.009	+-0.24
PQ2625	26-25-00	1.073	27.25	0.487	12.37	0.317	8.05	0.236	5.99	0.610	15.49	0.748	19.00	0.886	22.50	0.472	11.99
		+-0.021	+-0.55	+-0.005	+-0.13	+-0.008	+-0.21	MIN	MIN	MIN	MIN	+-0.015	+-.38	+-0.018	+-0.45	+-0.009	+-0.24
PQ3220	32-20-00	1.300	33.02	0.405	10.29	0.226	5.74	0.216	5.49	0.748	19.00	0.866	22.00	1.083	27.51	0.53	13.46
		+-0.026	+-0.66	+-0.005	+-0.13	+-0.008	+-0.22	MIN	MIN	MIN	MIN	+-0.017	+-.44	+-0.022	+-0.55	+-0.011	+-0.27
PQ3230	32-30-00	1.3	33.02	0.597	15.16	0.419	10.64	0.216	5.49	0.748	19.00	0.866	22.00	1.083	27.51	0.53	13.46
		+-0.026	+-0.66	+-0.005	+-0.13	+-0.009	+-0.22	MIN	MIN	MIN	MIN	+-0.017	+-.44	+-0.022	+-0.55	+-0.011	+-0.27
PQ3535	35-35-00	1.422	36.12	0.684	17.37	0.492	12.50	0.235	5.97	0.925	23.50	1.024	26.01	1.26	32.00	0.565	14.35
		+-0.028	+-0.72	+-0.005	+-0.13	+-0.009	+-0.22	MIN	MIN	MIN	MIN	+-0.020	+-.52	+-0.025	+-0.64	+-0.011	+-0.29
PQ4040	40-40-00	1.633	41.48	0.782	19.86	0.581	14.76	0.250	6.35	1.102	27.99	1.102	27.99	1.457	37.01	0.587	14.91
		+-0.033	+-0.83	+-0.005	+-0.13	+-0.009	+-0.23	MIN	MIN	MIN	MIN	+-0.022	+-.56	+-0.029	+-0.74	+-0.012	+-0.30

	TSC FERRITE INTERNATIONAL PQ CORE EFFECTIVE CORE SET PARAMETERS						INDUCTANCE INDEX AL nH/N^2		
							ASTM Material Type		
							ASTM P7099 ASTM P5099	ASTM P7070	ASTM P8040 ASTM F3000 P5025-100
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	CORE SET WEIGHT	TSC Ferrite Material Grade TSF-BOOST TSF-7099 TSF-5099 +-25%	TSF-7070 +-20%	TSF-8040 TSF-50ALL Flat Line +-25%
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	GRAMS			
20-16-00	3.74	0.62	2.31	0.47	0.29	14.1	3,295	3,660	4,900
20-20-00	4.54	0.62	2.79	0.66	0.41	16.9	2,720	3,025	4,120
26-20-00	4.63	1.19	5.49	0.6	0.72	32.3	5,675	6,390	7,750
26-25-00	5.55	1.18	6.53	0.85	1	37.9	4,690	5,290	6,550
32-20-00	5.55	1.7	9.42	0.81	1.37	45.7	7,215	7,220	9,430
32-30-00	7.46	1.61	11.97	1.49	2.41	60.8	4,760	5,360	6,780
35-35-00	8.79	1.96	17.26	2.21	4.32	77.7	4,915	5,695	7,010
40-40-00	10.19	2.01	20.45	3.26	6.55	105.6	4,640	5,310	6,320

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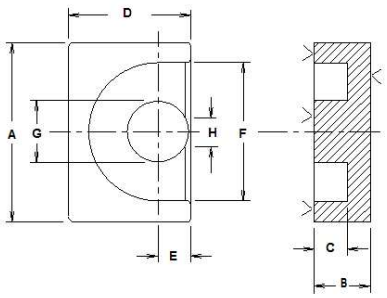

TSC FERRITE INTERNATIONAL EP CORE DIMENSIONS

		A		B		C		D		E		F		G	
	PART #	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
EP7	09-04-06	0.362 +-0.007	9.20 +-0.18	0.146 +-0.003	3.71 +-0.01	0.100 +-0.002	2.54 +-0.05	0.250 +-0.005	6.35 +-0.13	0.067 +-0.004	1.70 +-0.10	0.291 +-0.008	7.39 +-0.02	0.130 +-0.004	3.30 +-0.10
EP10	12-05-08	0.453 +-0.012	11.50 +-0.3	0.202 +-0.004	5.13 +-0.10	0.145 +-0.003	3.68 +-0.07	0.301 +-0.008	7.60 +-0.20	0.073 +-0.004	1.85 +-0.10	0.369 +-0.007	9.37 +-0.18	0.133 +-0.003	3.38 +-0.08
EP13	13-06-09	0.492 +-0.011	12.50 +-0.28	0.253 +-0.005	6.43 +_0.13	0.181 +-0.004	4.60 +-0.1	0.346 +-0.008	8.79 +-0.20	0.093 +-0.005	2.36 +-0.13	0.391 +-0.008	9.93 +-0.20	0.171 +-0.003	4.34 +-0.08
EP17	18-08-11	0.709 +-0.014	18.00 +-0.35	0.331 +-0.003	8.41 +-0.08	0.224 +-0.004	5.69 +-0.10	0.433 +-0.009	11.00 +-0.23	0.128 +-0.003	3.25 +-0.08	0.472 +-0.009	11.99 +-0.23	0.224 +-0.004	5.69 +-0.10

								INDUCTANCE INDEX AL nH/N^2				
								ASTM Material Type				
								ASTM P7099 ASTM P5099	ASTM P7070	ASTM P8040 ASTM F3000 P5025-100	ASTM F5000	ASTM F010K
								TSC Ferrite Material Grade				
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	CORE SET WEIGHT		TSF-BOOST TSF-7099 TSF-5099	TSF-7070	TSF-8040 TSF-50ALL Flat Line	TSF-5000	TSF-010K
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	GRAMS		+/-25%	+/-20%	+-25%	+/-30%	+/-30%
09-04-06	1.57	0.10	0.16	0.04	0.00	1.4		1,100	1,120	1,240	2,575	5,140
12-05-08	1.92	0.11	0.22	0.09	0.01	2.8		1,060	1,080	1,200	2,315	4,611
13-06-09	2.42	0.20	0.47	0.15	0.03	5.1		1,565	1,590	2,000	3,170	6,313
18-08-11	2.85	0.34	0.97	0.24	0.08	11.6		2,400	2,655	3,100	4,679	9,319

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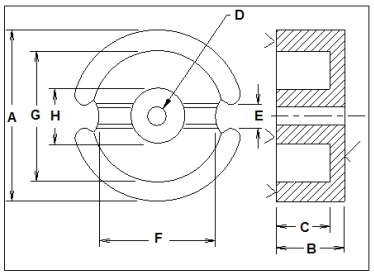

FIGURE 1

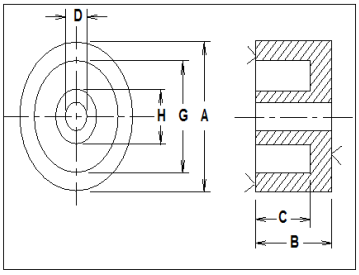

FIGURE 2

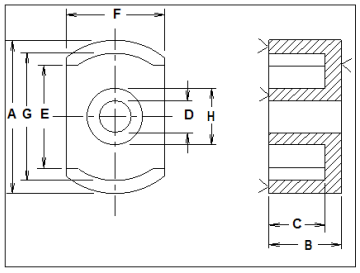

FIGURE 3

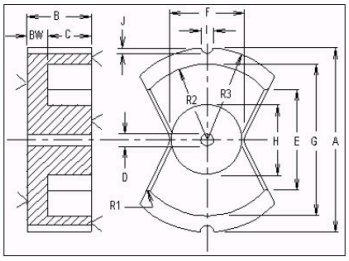

FIGURE 4

TSC FERRITE INTERNATIONAL POT CORE DIMENSIONS

		A		B		C		D		E		F		G		H	
PART #	Figure	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
14-08-00	#1	0.551	14.00	0.165	4.19	0.114	2.90	0.122	3.10	0.120	3.05	0.376	9.60	0.465	11.81	0.232	5.89
		+-0.008	+-0.20	+-0.003	+-0.08	+-0.004	+-0.10	+-0.003	+-0.07	MIN	MIN	NOM	NOM	+-0.008	+-0.20	+-0.004	+-0.10
14-09-08	#3	0.551	14.00	0.165	4.19	0.114	2.90	0.122	3.10	0.300	7.67	0.370	9.40	0.465	11.81	0.232	5.89
		+-0.008	+-0.20	+-0.003	+-0.08	+-0.004	+-0.10	+-0.003	+-0.07	MIN	MIN	+-0.008	+-0.20	+-0.008	+-0.20	+-0.004	+-0.10
18-11-00	#1	0.709	18.00	0.208	5.28	0.146	3.71	0.122	3.10	0.142	3.60	0.503	12.78	0.598	15.20	0.293	7.44
		+-0.012	+-0.30	+-0.003	+-0.08	+-0.004	+-0.10	+-0.003	+-0.08	MIN	MIN	NOM	NOM	+-0.010	+-0.25	+-0.006	+-0.15
18-11-11	#3	0.709	18.00	0.208	5.28	0.146	3.71	0.122	3.10	0.413	10.50	0.470	11.94	0.598	15.20	0.293	7.44
		+-0.012	+-0.30	+-0.003	+-0.08	+-0.004	+-0.10	+-0.003	+-0.08	MIN	MIN	+-0.008	+-0.20	+-0.010	+-0.25	+-0.006	+-0.15
22-13-00	#1	0.851	21.62	0.264	6.71	0.185	4.70	0.179	4.55	0.116	2.94	0.590	15.00	0.717	18.21	0.364	9.25
		+-0.015	+-0.38	+-0.004	+-0.10	+-0.004	+-0.10	+-0.004	+-0.10	MIN	MIN	NOM	NOM	+-0.012	+-0.30	+-0.006	+-0.15
23-11-00	#2	0.900	22.86	0.218	5.54	0.148	3.76	0.200	5.08					0.720	18.29	0.382	9.70
		+-0.018	+-0.46	+-0.005	+-0.13	+-0.005	+-0.13	+-0.004	+-0.10					+-0.014	+-0.36	+-0.008	+-0.20
23-13-11	#3	0.900	22.86	0.218	5.54	0.148	3.76	0.200	5.08	0.52	13.21	0.600	15.24	0.720	18.29	0.382	9.70
		+-0.018	+-0.46	+-0.005	+-0.13	+-0.005	+-0.13	+-0.004	+-0.10	MIN	MIN	+-0.010	+-0.25	+-0.014	+-0.36	+-0.008	+-0.20
23-18-00	#2	0.900	22.86	0.355	9.02	0.285	7.24	0.200	5.08					0.720	18.29	0.382	9.70
		+-0.018	+-0.46	+-0.007	+-0.18	+-0.007	+-0.18	+-0.004	+-0.10					+-0.014	+-0.36	+-0.008	+-0.20
23-13-18	#3	0.900	22.86	0.355	9.02	0.285	7.24	0.200	5.08	0.52	13.21	0.600	15.24	0.720	18.29	0.382	9.70
		+-0.018	+-0.46	+-0.007	+-0.18	+-0.007	+-0.18	+-0.004	+-0.10	MIN	MIN	+-0.010	+-0.25	+-0.014	+-0.36	+-0.008	+-0.20
26-16-00	#1	1.004	25.50	0.317	8.05	0.220	5.59	0.219	5.56	0.162	4.11	0.710	18.03	0.850	21.60	0.443	11.25
		+-0.020	+-0.51	+-0.004	+-0.10	+-0.004	+-0.10	+-0.004	+-0.10	MIN	MIN	NOM	NOM	+-0.016	+-0.41	+-0.008	+-0.20
30-19-00	#1	1.181	30.00	0.370	9.40	0.260	6.60	0.219	5.56	0.157	3.90	0.874	22.20	1.000	25.40	0.524	13.31
		+-0.020	+-0.50	+-0.004	+-0.10	+-0.004	+-0.10	+-0.004	+-0.10	MIN	MIN	NOM	NOM	+-0.016	+-0.41	+-0.008	+-0.20
36-22-00	#1	1.402	35.61	0.428	10.87	0.291	7.39	0.219	5.56	0.169	4.30	1.055	26.80	1.197	30.40	0.626	15.90
		+-0.020	+-0.51	+-0.006	+-0.15	+-0.004	+-0.10	+-0.004	+-0.10	MIN	MIN	NOM	NOM	+-0.020	+-0.51	+-0.012	+-0.30
62-49-00	#4	2.402	61.01	0.960	24.38	0.665	16.89	0.216	5.49	1.185	30.10	1.098	27.89	1.950	49.53	0.988	25.10
		+-0.048	+-1.22	+-0.005	+-0.13	+-0.011	+-0.28	+-0.004	+-0.10	+-0.024	+-0.61	+-0.024	+-0.61	+-0.039	+-0.99	+-0.020	+-0.51
74-59-00	#4	2.864	72.75	1.156	29.36	0.809	20.55	0.219	5.56	1.366	34.70	1.250	31.75	2.299	58.39	1.142	29.01
		+-0.057	+-1.45	+-0.005	+-0.13	+-0.012	+-0.30	+-0.004	+-0.10	+-0.027	+-0.69	+-0.025	+-0.64	+-0.046	+-1.17	+-0.023	+-0.58

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							INDUCTANCE INDEX AL nH/N^2		
							ASTM Material Type		
							ASTM P7099 ASTM P5099	ASTM P7070	ASTM P8040 P5025-100
	TSC FERRITE INTERNATIONAL POT CORE EFFECTIVE CORE SET PARAMETERS						TSC Ferrite Material Grade		
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	CORE SET WEIGHT	TSF-BOOST TSF-7099 TSF-5099	TSF-7070	TSF-8040 TSF-50ALL Flat Line
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	GRAMS	+/-25%	+/-20%	+-25%
14-08-00	1.98	0.25	0.50	0.17	0.04	3.3	2,100	2,350	2,540
14-09-08	2.25	0.22	0.50	0.17	0.04	2.5	1,625	1,820	1,965
18-11-00	2.59	0.43	1.11	0.29	0.12	7.1	3,125	3,440	4,120
18-11-11	2.72	0.41	1.11	0.29	0.12	6.0	2,840	3,120	3,740
22-13-00	3.13	0.64	2.00	0.42	0.27	13.3	3,805	4,230	5,050
23-11-00									
23-13-11	3.02	0.66	2.00	0.32	0.21	11.5	4,075	4,530	6,040
23-18-00									
23-13-18	4.24	0.66	2.75	0.62	0.41	16.5	2,900	3,220	4,300
26-16-00	3.77	0.93	3.50	0.58	0.54	22.3	5,670	6,300	6,795
30-19-00	4.52	1.36	6.15	0.80	1.09	36.9	6,915	7,685	9,190
36-22-00	5.21	1.99	10.34	1.07	2.13	61.8	8,785	9,760	11,660
62-49-00	10.9	5.7	62.0	4.1	23.5	280.0	8,280	9,200	11,040
74-59-00	12.8	7.9	101.0	6.4	50.6	460.0	9,000	10,000	12,000

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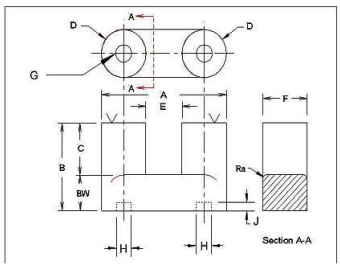

FIGURE 1

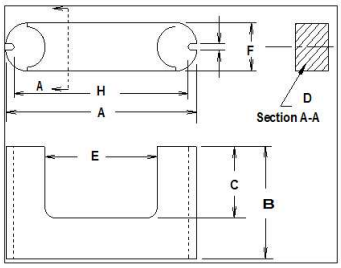

FIGURE 2

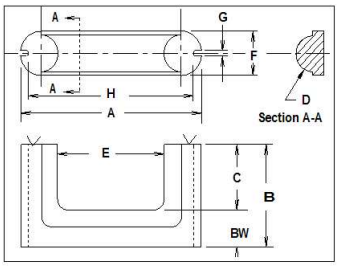

FIGURE 3

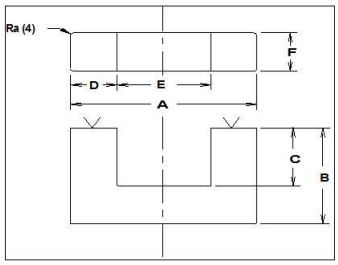

FIGURE 4

TSC FERRITE INTERNATIONAL U CORE DIMENSIONS

PART #	FIGURE	A		B		C		D		E		F		G		H	
		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
39-19-10	3	1.545	39.24	0.740	18.80	0.365	9.27	0.187	4.75	0.795	20.19	0.390	9.91	0.110	2.79	1.350	34.29
		+-0.031	+-0.78	+-0.005	+-0.13	+-0.013	+-0.32	REF	REF	+-0.016	+-0.40	+-0.008	+-0.20	+-0.002	+-0.06	+-0.27	+-0.69
41-10-11	I Bar	1.620	41.15	0.388	9.86							0.460	11.68	0.125	3.18	1.390	34.29
	2	+-0.032	+-0.82	+-0.005	+-0.13							+-0.009	+-0.23	+-0.003	+-0.06	REF	REF
41-21-11	2	1.620	41.15	0.812	20.62	0.437	11.10	0.230	5.84	0.750	19.05	0.460	11.68	0.125	3.18	1.390	34.29
		+-0.032	+-0.82	+-0.005	+-0.13	+-0.013	+-0.32	REF	REF	+-.015	+-0.38	+-0.009	+-0.23	+-0.003	+-0.06	REF	REF
41-22-11	2	1.620	41.15	0.875	22.23	0.500	12.70	0.230	5.84	0.750	19.05	0.460	11.68	0.125	3.18	1.390	34.29
		+-0.032	+-0.82	+-0.005	+-0.13	+-0.013	+-0.32	REF	REF	+-.015	+-0.38	+-0.009	+-0.23	+-0.003	+-0.06	REF	REF
41-25-11	2	1.620	41.15	1.000	25.40	0.625	15.88	0.230	5.84	0.750	19.05	0.460	11.68	0.125	3.18	1.390	34.29
		+-0.032	+-0.82	+-0.005	+-0.13	+-0.013	+-0.32	REF	REF	+-.015	+-0.38	+-0.009	+-0.23	+-0.003	+-0.06	REF	REF
41-30-11	2	1.620	41.15	1.200	30.48	0.825	20.96	0.230	5.84	0.750	19.05	0.460	11.68	0.125	3.18	1.390	34.29
		+-0.032	+-0.82	+-0.015	+-0.38	+-0.013	+-0.32	REF	REF	+-.015	+-0.38	+-0.009	+-0.23	+-0.003	+-0.06	REF	REF
64-40-24	U64	2.521	64.03	1.594	40.49	1.043	26.49	0.789	20.04	0.945	24.00	0.945	24.00	0.165	4.19	0.378	9.60
	1	+-0.050	+-1.27	+-0.005	+-0.13	+-0.016	+-0.41	+-0.106	+-2.69	+-0.019	+-0.48	+-0.019	+-0.48	+-0.003	+-0.08	+-0.008	+-0.20
69-24-14	3	2.726	69.24	0.953	24.20	0.500	12.70	0.257	6.53	1.705	43.31	0.545	13.84	0.140	3.56	2.483	63.07
		+-0.055	+-1.40	+-0.005	+-0.13	+-0.014	+-0.36	+-0.005	+-0.13	+-0.34	+-8.64	+-0.011	+-0.28	+-0.003	+-0.08	+-0.050	+-1.27
81-13-16	I Bar	3.205	81.36	0.500	12.70							0.625	15.88	0.140	3.56	2.990	75.95
	3	+-0.064	+-1.63	+-0.005	+-0.13							+-0.013	+-0.32	+-0.003	+-0.07	+-0.060	+-1.52
81-33-16	3	3.205	81.36	1.285	32.64	0.750	19.05	0.312	7.92	2.000	50.80	0.625	15.88	0.140	3.56	2.990	75.95
		+-0.064	+-1.63	+-0.005	+-0.13	+-0.010	+-0.25	REF	REF	+-0.030	+-0.76	+-0.013	+-0.32	+-0.003	+-0.07	+-0.060	+-1.52
93-28-16	I Bar	3.661	92.99	1.102	27.99							0.630	16.00				
	4	+-0.073	+-1.85	+-0.005	+-0.13							+-0.052	+-32				
93-76-16	4	3.661	92.99	2.992	76.00	1.890	48.01	1.102	27.99	1.457	37.01	0.630	16.00				
		+-0.073	+-1.85	+-0.005	+-0.13	+-0.27	+-0.69	-0.022	+-0.56	+-0.029	+-0.74	+-0.052	+-32				
93-28-30	I Bar	3.661	92.99	1.102	27.99							1.181	30.00				
	4	+-0.073	+-1.85	+-0.005	+-0.13							+-0.024	+-56				
93-76-30	4	3.661	92.99	2.992	76.00	1.890	48.01	1.102	27.99	1.457	37.01	1.181	30.00				
		+-0.073	+-1.85	+-0.005	+-0.13	+-0.27	+-0.69	-0.022	+-0.56	+-0.029	+-0.74	+-0.024	+-56				
102-25-25	I Bar	4.000	101.60	1.000	25.40							1.000	25.40				
	4	+-0.080	+-2.03	+-0.005	+-0.13							+-0.020	+-0.51				
102-57-25	4	4.000	101.60	2.250	57.15	1.250	31.75	1.000	25.40	2.000	50.80	1.000	25.40				
		+-0.080	+-2.03	+-0.005	+-0.13	+-0.025	+-0.64	+-0.020	+-0.51	+-0.040	+-1.02	+-0.020	+-0.51				

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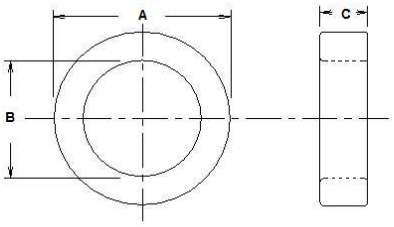
							INDUCTANCE INDEX AL nH/N^2	
							ASTM Material Type	
							ASTM P7099 ASTM P5099	ASTM P7070
	TSC FERRITE INTERNATIONAL U CORE EFFECTIVE CORE SET PARAMETERS						TSC Ferrite Material Grade	
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	CORE SET WEIGHT	TSF-BOOST TSF-7099 TSF-5099	
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	GRAMS	+-25%	TSF-7070 +-25%
39-19-10	10.79	0.78	8.42	3.74	2.92	44.60	1,796	1,995
41-10-11								
41-21-11	12.21	1.00	12.21	4.23	4.23	62.2	2,047	2,265
41-22-11	12.85	1.00	12.85	4.84	4.84	67.45	2,039	2,266
41-25-11	13.48	1.00	13.48	6.05	6.05	80.9	1,845	2,050
41-30-11	15.51	1.00	15.51	7.98	7.98	124.1	1,620	1,800
64-40-24	20.68	3.20	66.12	12.72	40.70	355	2,100	2,325
69-24-14	22.41	1.89	42.41	11.00	20.79	209.8	2,332	2,100
81-13-16								
81-33-16	22.41	1.91	42.80	19.35	36.97	259.06	2,099	2,332
93-28-16								
93-76-16	35.40	4.48	158.55	35.53	159.15	817.77	3,122	3,469
93-28-30								
93-76-30	35.40	8.40	297.22	35.53	298.34	1533	5,860	6,510
102-25-25								
102-57-25	25.76	6.45	166.15	32.26	208.06	1028.94	6,183	6,870

TSC Ferrite International



TSC FERRITE INTERNATIONAL TOROID DIMEN

PART #	A		B		C	
	in	mm	in	mm	in	mm
10-05-03	0.375 +-0.010	9.53 +-0.25	0.187 +-0.005	4.75 +-0.13	0.125 +-0.005	3.18 +-0.13
10-05-06	0.375 +-0.010	9.53 +-0.25	0.187 +-0.005	4.75 +-0.13	0.250 +-0.005	6.35 +-0.13
13-07-05	0.500 +-0.010	12.70 +-0.25	0.281 +-0.010	7.14 +-0.25	0.188 +-0.005	4.78 +-0.13
13-07-06	0.500 +-0.010	12.70 +-0.25	0.281 +-0.010	7.14 +-0.25	0.250 +-0.010	6.35 +-0.25
13-08-03	0.500 +-0.010	12.70 +-0.25	0.312 +-0.010	7.92 +-0.25	0.125 +-0.005	3.18 +-0.13
13-08-06	0.500 +-0.010	12.70 +-0.25	0.312 +-0.010	7.92 +-0.25	0.250 +-0.010	6.35 +-0.25
16-09-05	0.625 +-0.012	15.88 +-0.25	0.357 +-0.010	9.07 +-0.25	0.185 +-0.005	4.70 +-0.13
16-09-10	0.625 +-0.012	15.88 +-0.30	0.357 +-0.010	9.07 +-0.25	0.375 +-0.010	9.53 +-0.25
22-14-06	0.870 +-0.017	22.10 +-0.43	0.540 +-0.012	13.72 +-0.30	0.250 +-0.010	6.35 +-0.25
22-14-07	0.870 +-0.017	22.10 +-0.43	0.540 +-0.012	13.72 +-0.30	0.275 +-0.010	6.99 +-0.25
22-14-13	0.870 +-0.017	22.10 +-0.43	0.540 +-0.012	13.72 +-0.30	0.500 +-0.010	12.70 +-0.25
25-16-08	1.000 +-0.020	25.40 +-0.51	0.610 +-0.015	15.49 +-0.38	0.312 +-0.010	7.92 +-0.25
29-19-08	1.142 +-0.025	29.01 +-0.61	0.748 +-0.016	19.00 +-0.41	0.300 +-0.010	7.62 +-0.25
29-19-15	1.142 +-0.025	29.01 +-0.61	0.748 +-0.016	19.00 +-0.41	0.600 +-0.010	15.24 +-0.25
32-19-06	1.250 +-0.025	31.75 +-0.64	0.740 +-0.148	18.80 +-0.38	0.250 +-0.005	6.35 +-0.13
32-19-11	1.250 +-0.025	31.75 +-0.64	0.740 +-0.148	18.80 +-0.38	0.435 +-0.009	11.05 +-0.23
36-23-15	1.432 +-0.025	36.37 +-0.61	0.890 +-0.020	22.61 +-0.51	0.605 +-0.010	15.37 +-0.25
37-30-16	1.469 +-0.029	37.31 +-0.75	1.168 +-0.023	29.67 +-0.59	0.625 +-0.013	15.88 +-0.33
38-19-25	1.500 +-0.030	38.10 +-0.76	0.750 +-0.015	19.05 +-0.38	1.000 +-0.020	25.40 +-0.51
40-24-16	1.574 +-0.032	39.98 +-0.81	0.944 +-0.019	23.98 +-0.48	0.629 +-0.013	15.98 +-0.33
49-34-16	1.932 +-0.039	49.07 +-0.99	1.332 +-0.027	33.83 +-0.69	0.625 +-0.013	15.88 +-0.33
51-32-19	2.000 +-0.040	50.80 +-1.02	1.250 +-0.025	31.75 +-0.64	0.750 +-0.015	19.05 +-0.38

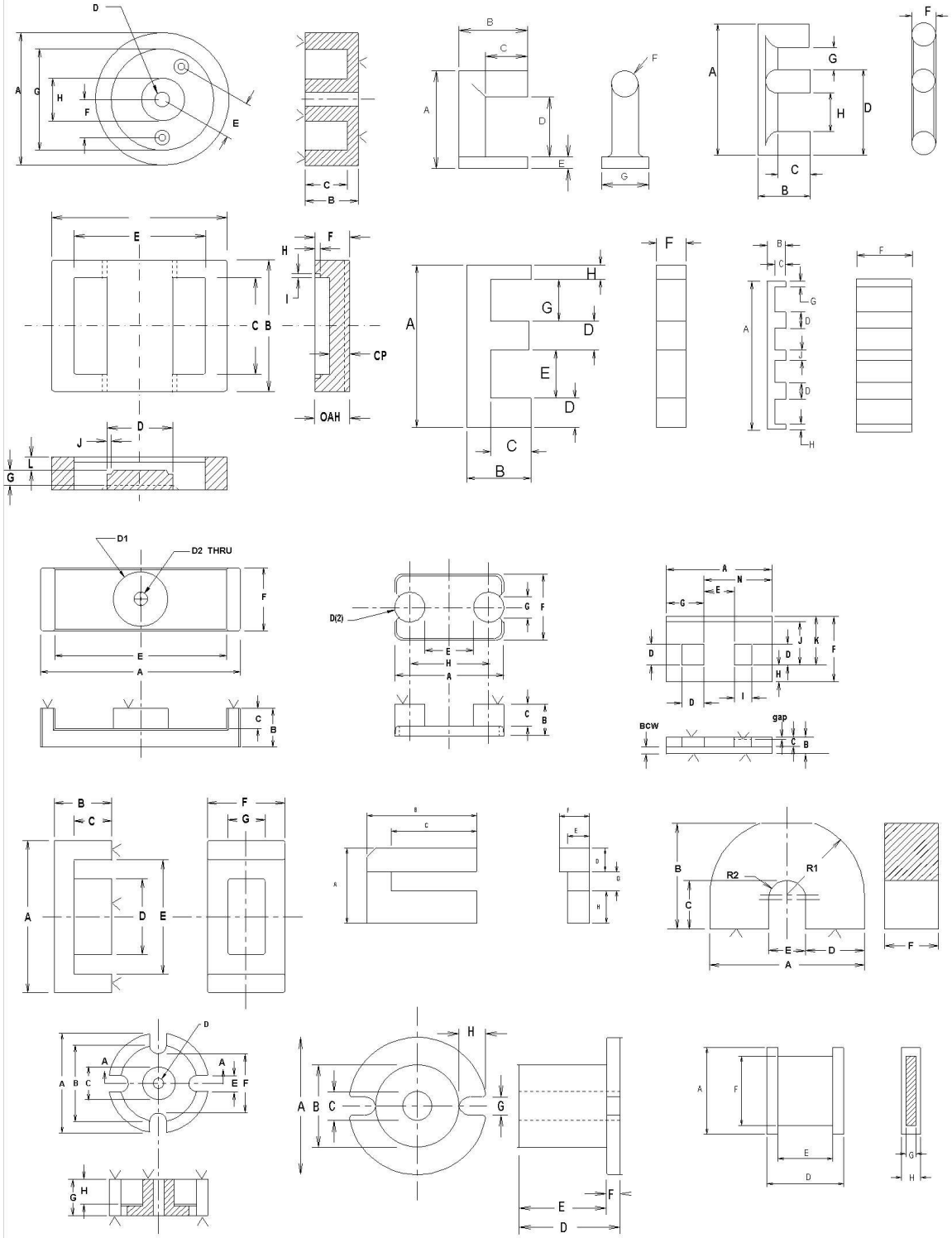
TSC Ferrite International

							INDUCTANCE INDEX AL nH/N^2				
							ASTM Material Type				
							ASTM P7099 ASTM P5099	ASTM P7070	ASTM P8040 ASTM F3000 P5025-100	ASTM F5000	ASTM F010K
	TSC FERRITE INTERNATIONAL TOROIDAL CORE EFFECTIVE PARAMETERS						TSC Ferrite Material Grade				
ISIONS	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	CORE WEIGHT	TSF-BOOST TSF-7099 TSF-5099		TSF-8040 TSF-50ALL Flat Line		
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	GRAMS	+-30%	TSF-7070 +-25%	+-25%	TSF-5000 +-25%	TSF-010K +-30%
10-05-03	2.07	0.07	0.15	0.18	0.01	0.8	885	972	1,370	2,209	4,390
10-05-06	2.07	0.15	0.30	0.18	0.03	1.6	1,765	1,944	2,740	4,419	6,615
13-07-05	2.95	0.13	0.38	0.40	0.05	2.0	1,100	1,210	1,706	2,752	5,430
13-07-06	2.95	0.17	0.51	0.40	0.07	2.6	1,465	1,610	2,269	3,659	7,225
13-08-03	3.12	0.07	0.23	0.49	0.04	1.2	600	659	928	1,497	2,975
13-08-06	3.13	0.15	0.47	0.49	0.07	2.4	1,200	1,318	1,857	2,995	5,935
16-09-05	3.72	0.16	0.58	0.65	0.10	3.0	1,050	1,158	1,632	2,632	5,520
16-09-10	3.72	0.32	1.18	0.65	0.20	6.1	2,130	2,347	3,307	5,334	11,040
22-14-06	5.42	0.26	1.42	1.48	0.39	7.2	1,210	1,333	1,878	3,029	6,040
22-14-07	5.42	0.29	1.56	1.48	0.42	7.9	1,330	1,466	2,065	3,331	6,645
22-14-13	5.42	0.52	2.83	1.48	0.77	14.4	2,420	2,665	3,755	6,057	12,080
25-16-08	6.17	0.39	2.37	1.89	0.73	12.1	1,565	1,724	2,429	3,917	7,825
29-19-08	7.32	0.38	2.75	2.84	1.07	13.8	1,290	1,419	1,999	3,224	6,340
29-19-15	7.32	0.75	5.50	2.84	2.13	27.8	2,580	2,837	3,998	6,447	12,895
32-19-06	7.59	0.40	3.05	2.78	1.12	15.7	1,330	1,465	2,064	3,329	6,105
32-19-11	7.59	0.70	5.31	2.78	1.84	27.3	2,315	2,549	3,591	5,793	11,580
36-23-15	8.92	1.04	9.26	4.01	4.17	47.0	2,925	3,216	4,531	7,309	13,400
37-30-16	10.43	0.60	6.30	6.91	4.18	30.6	1,455	1,602	2,257	3,640	7,280
38-19-25	8.30	2.32	19.29	2.85	6.61	104.9	7,045	7,750	10,915	17,600	35,210
40-24-16	9.62	1.25	12.04	4.52	5.65	61.6	3,270	3,595	5,064	8,168	16,330
49-34-16	12.73	1.20	15.22	8.99	10.79	75.6	2,365	2,600	3,660	5,900	11,805
51-32-19	12.50	1.78	22.27	7.92	14.10	112.9	3,580	3,940	5,551	8,954	17,900

TSC Ferrite International

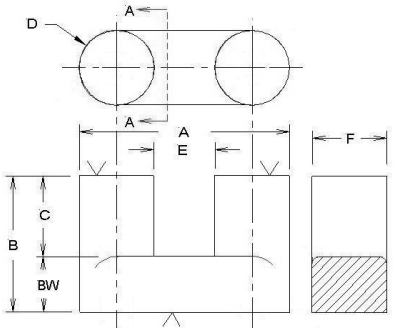
Custom Cores

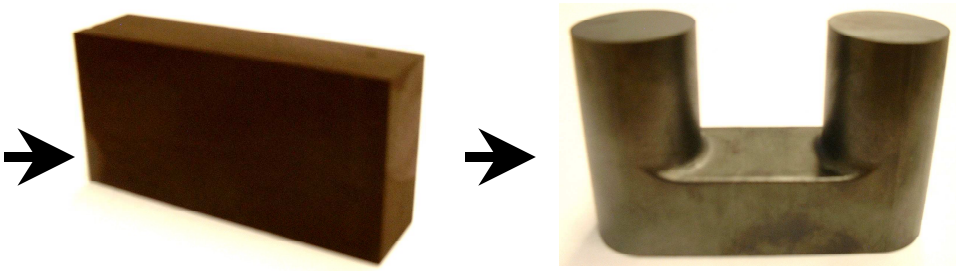
We design and fabricate our own carbide tooling to produce custom core sizes and shapes. We also make small quantities of custom cores for prototypes by machining a block of pressed ferrite material before it is sintered. These samples are machined oversize per the material shrinkage that will take place when they are sintered. Samples produced this way have the same characteristics as they would if they were molded in production (same dimensional tolerances, material permeability, core losses, etc.).

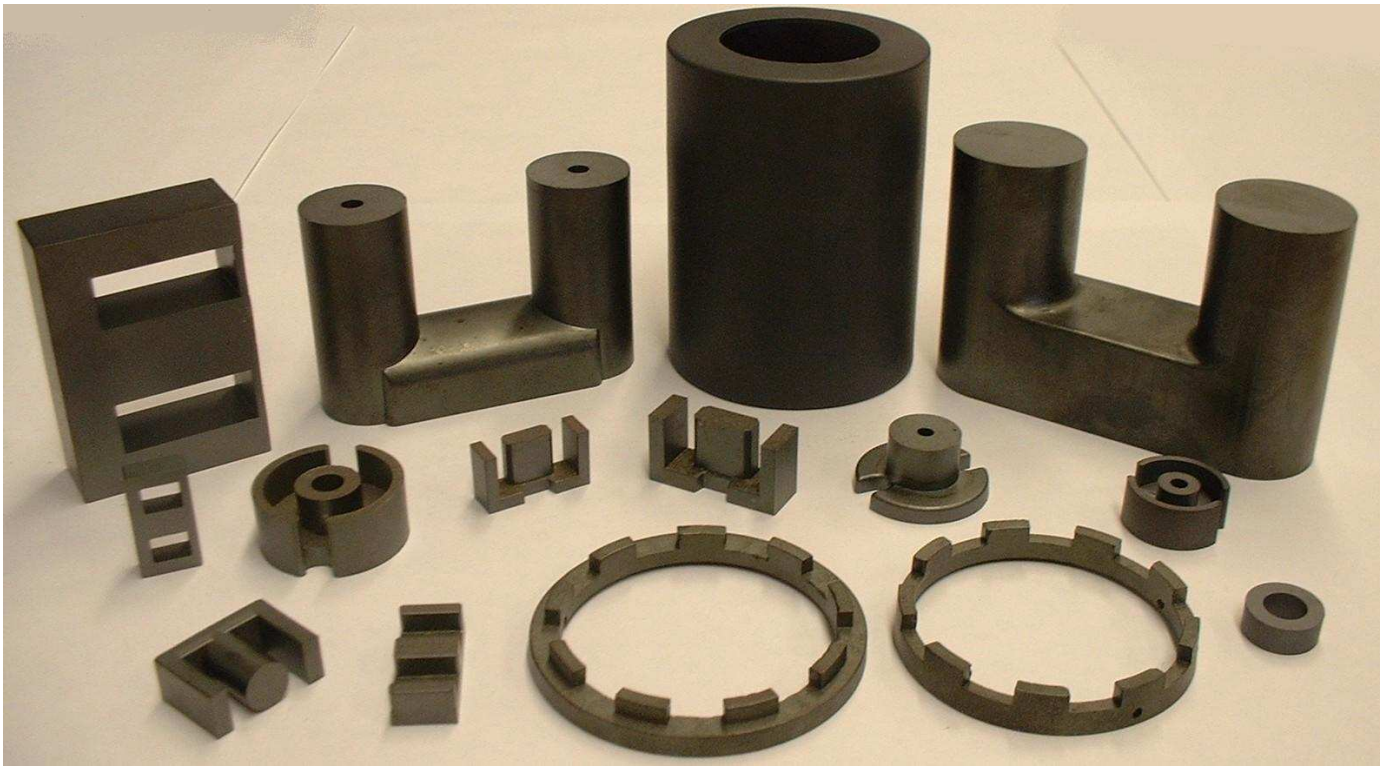


TSC Ferrite International

Custom Cores



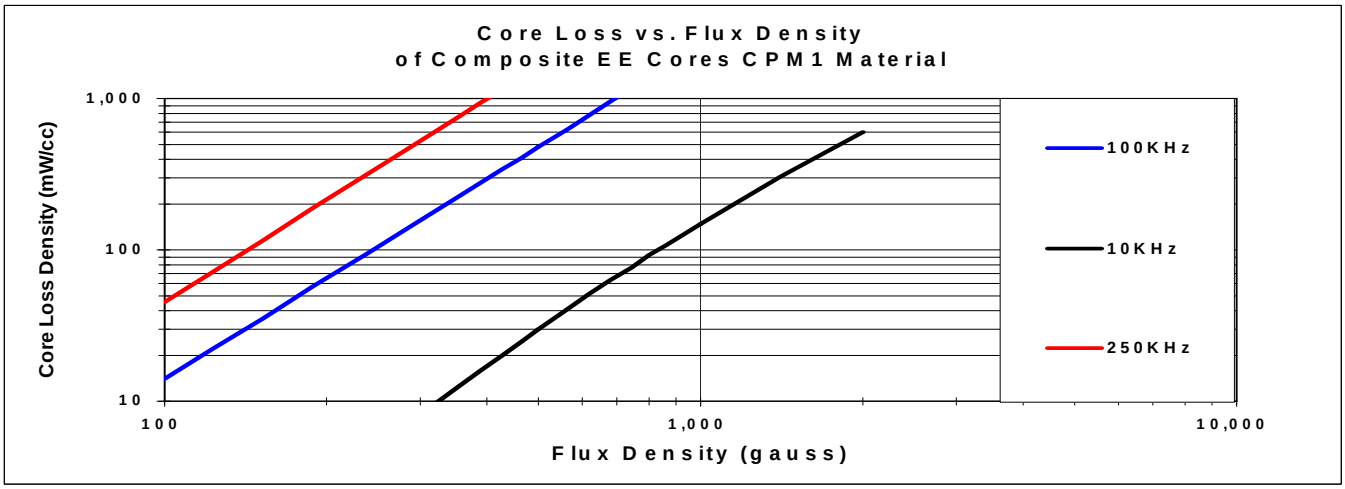


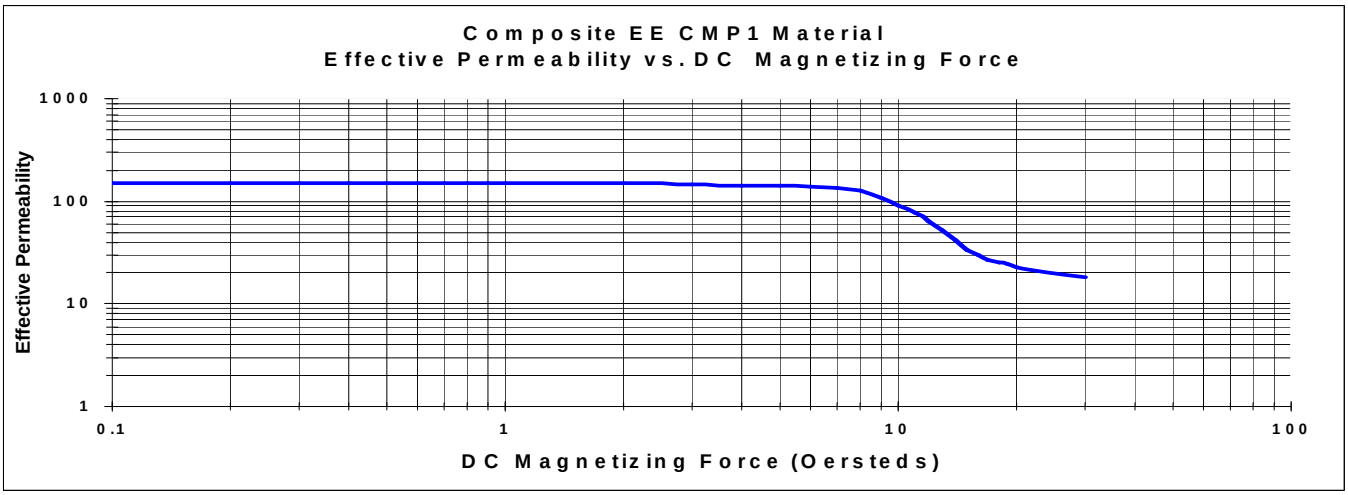


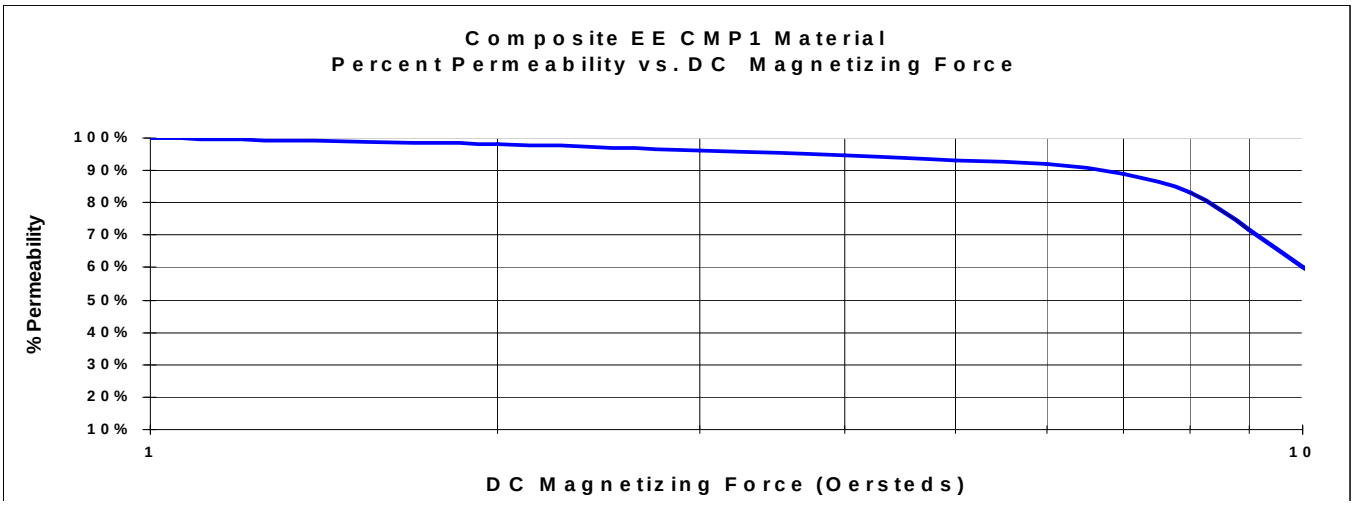
TSC Ferrite International

IRON POWDER / SOFT FERRITE COMPOSITE E CORES

TSC combines the low core loss of soft ferrite with the inherent distributed air gap of iron powder cores resulting in an E core set that has relatively high effective permeability. The permeability rolls off only minimally under large amounts of magnetizing force and supports large magnitudes of magnetizing force without saturating. The distributed air gap keeps the flux from fringing and the high resistivity of soft ferrite results in low core losses.

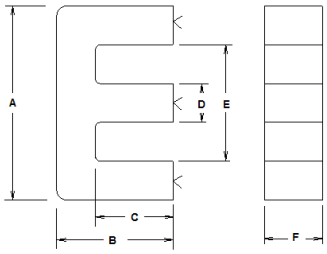






TSC Ferrite International

IRON POWDER / SOFT FERRITE COMPOSITE E CORES



TSC FERRITE INTERNATIONALCOMPOSITE E CORE DIMENSIONS

		A		B		C		D		E		F	
	PART #	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
EF 12.6	13-06-04-0051	0.500 +-0.012	12.70 +-0.30	0.252 +-0.005	6.40 +-0.13	0.183 +-0.006	4.65 +-0.15	0.144 +-0.009	3.66 +-0.23	0.356 +-0.019	9.04 +-0.48	0.142 +-0.008	3.61 +-0.20
EF 16	16-08-05-0063	0.634 +-0.013	16.10 +-0.61	0.317 +-0.006	8.05 +-0.15	0.232 +-0.008	5.89 +-0.20	0.179 +-0.008	4.55 +-0.20	0.460 +-0.009	11.68 +-0.23	0.177 +-0.008	4.50 +-0.20
E187	19-08-05-0075	0.750 +-0.015	19.05 +-0.38	0.317 +-0.006	8.05 +-0.15	0.224 +-0.006	5.69 +-0.15	0.187 +-0.007	4.75 +-0.18	0.564 +-0.012	14.33 +-0.30	0.187 +-0.007	4.75 +-0.18
EF 20	20-10-06-0080	0.787 +-0.018	19.99 +-0.46	0.390 +-0.007	9.91 +-0.17	0.283 +-0.013	7.19 +-0.33	0.224 +-0.013	5.69 +-0.33	0.566 +-0.016	14.38 +-0.41	0.222 +-0.013	5.64 +-0.33
E2425	25-10-06-0100	1.000 +-0.020	25.40 +-0.51	0.380 +-0.010	9.65 +-0.25	0.260 +-0.015	6.60 +-0.38	0.250 +-0.007	6.35 +-0.18	0.757 +-0.015	19.23 +-0.38	0.250 +-0.009	6.35 +-0.23
EF25	25-13-07-0099	0.986 +-0.020	25.05 +-0.50	0.494 +-0.005	12.55 +-0.13	0.352 +-0.008	8.95 +-0.20	0.285 +-0.006	7.25 +-0.15	0.706 +-0.014	17.98 +-0.36	0.283 +-0.006	7.19 +-0.14
EE 30/15mm	30-15-07-0118	1.181 +-0.024	30.00 +-0.61	0.587 +-0.011	14.91 +-0.28	0.399 +-0.013	10.13 +-0.33	0.270 +-0.015	6.86 +-0.38	0.792 +-0.016	20.12 +-0.41	0.272 +-0.011	6.91 +-0.28
E375	34-14-09-0137	1.351 +-0.034	34.32 +-0.86	0.556 +-0.012	14.12 +-0.30	0.385 +-0.021	9.78 +-0.53	0.367 +-0.015	9.32 +-0.38	1.025 +-0.035	26.04 +-0.89	0.367 +-0.015	9.32 +-0.38
E21	41-16-12-0162	1.600 +-0.035	40.64 +-0.89	0.649 +-0.005	16.48 +-0.13	0.415 +-0.008	10.54 +-0.20	0.490 +-0.017	12.45 +-0.43	1.145 +-0.030	29.08 +-0.76	0.490 +-0.017	12.45 +-0.43
E42/15	43-21-15-0168	1.687 +-0.034	42.85 +-0.86	0.831 +-0.005	21.11 +-0.13	0.596 +-0.014	15.14 +-0.36	0.468 +-0.014	11.89 +-0.35	1.219 +-0.029	30.96 +-0.74	0.608 +-0.012	15.44 +-0.30
E 42/20	43-21-20-168A	1.687 +-0.034	42.85 +-0.86	0.831 +-0.005	21.11 +-0.13	0.596 +-0.014	15.14 +-0.36	0.468 +-0.014	11.89 +-0.35	1.219 +-0.029	30.96 +-0.74	0.772 +-0.015	19.61 +-0.38

TSF FERRITE INTERNATIONAL COMPOSITE E CORE EFFECTIVE CORE SET PARAMETERS

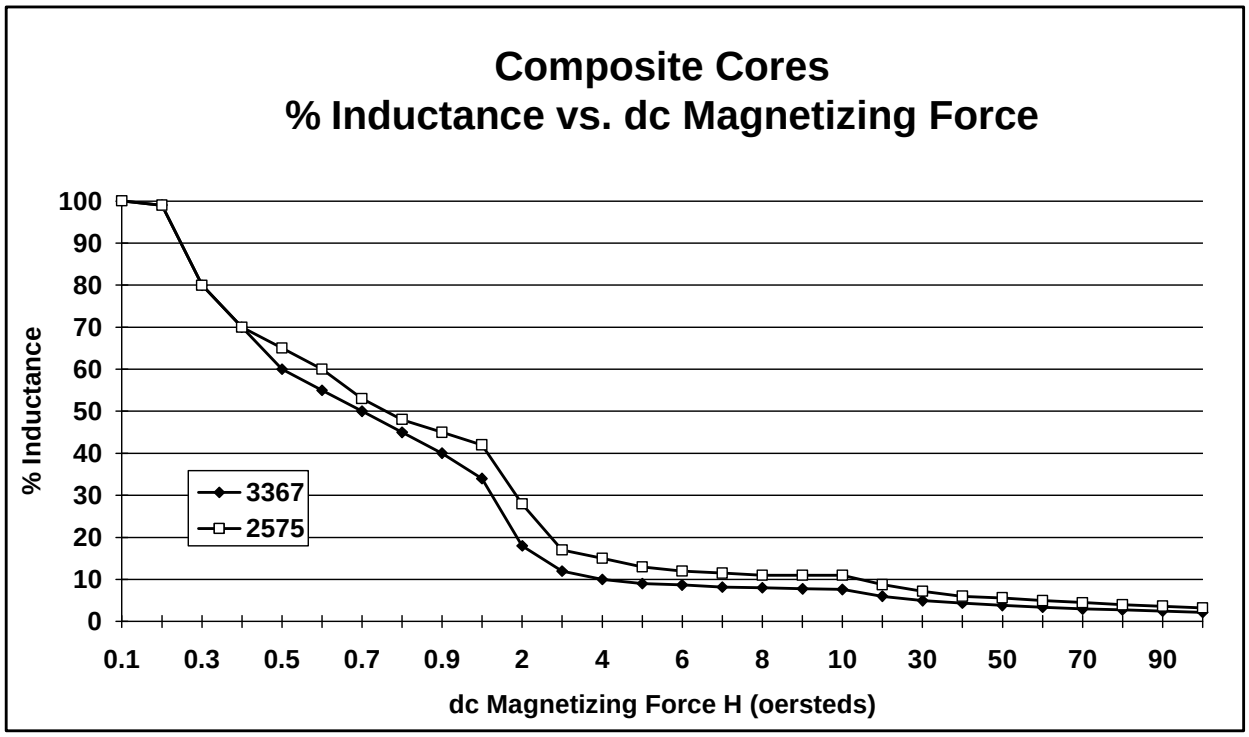
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	INDUCTANCE INDEX AL
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	CMP1 +-25%
13-06-04-0051	2.959	0.130	0.386	0.250	0.033	75
16-08-05-0063	3.761	0.199	0.750	0.398	0.082	100
19-08-05-0075	3.977	0.225	0.894	0.545	0.122	110
20-10-06-0080	4.614	0.315	1.454	0.525	0.162	120
25-10-06-0100	4.899	0.394	1.928	0.850	0.335	160
25-13-07-0099	5.775	0.517	2.983	0.956	0.494	160
30-15-07-0118	6.607	0.573	3.785	1.344	0.770	155
34-14-09-0137	6.942	0.813	5.646	1.634	1.329	230
41-16-12-0162	7.750	1.487	11.521	1.754	2.607	370
43-21-15-0168	9.834	1.838	18.075	2.888	5.308	335
43-21-20-168A	9.834	2.334	22.951	2.888	6.739	405

TSC Pyroferric

IRON POWDER / SOFT FERRITE COMPOSITE TOROIDS

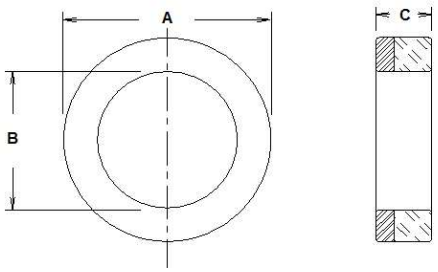
TSC combines the high permeability of soft ferrite material with the inherent distributed air gap of iron powder cores resulting in a toroidal core that produces high inductance values with low dc currents and moderately high inductance values with maximum dc currents.

Below shows the percent change of inductance with increasing dc magnetizing force. The percent of ferrite material to iron powder can be varied to change the shape of these curves. Higher percentages of ferrite result in higher initial inductance with low dc magnetizing forces. Higher percentages of iron powder result in larger inductance values under maximum dc current. Choose a standard composite core or contact us with your application requirements to optimally customize a core to meet your needs.



TSC Pyroferric

IRON POWDER / SOFT FERRITE COMPOSITE TOROIDS



TSC PYROFERRIC COMPOSITE TOROID DIM

PART #	A		B		C	
	in	mm	in	mm	in	mm
13-07-07-3367	0.510	12.95	0.290	7.37	0.280	7.112
	+-0.010	+-0.25	+-0.006	+-0.15	+-0.030	+-0.76
13-07-09-2575	0.510	12.95	0.290	7.37	0.365	9.271
	+-0.010	+-0.25	+-0.006	+-0.15	+-0.030	+-0.76
21-13-10-3367	0.835	21.21	0.510	12.95	0.400	10.16
	+-0.017	+-0.43	+-0.010	+-0.25	+-0.030	+-0.76
21-13-13-2575	0.835	21.21	0.510	12.95	0.525	13.34
	+-0.017	+-0.43	+-0.010	+-0.25	+-0.030	+-0.76
26-15-12-3367	1.025	26.04	0.600	15.24	0.475	12.07
	+-0.020	+-0.51	+-0.012	+-0.30	+-0.030	+-0.76
26-15-16-2575	1.025	26.04	0.600	15.24	0.625	15.88
	+-0.020	+-0.51	+-0.012	+-0.30	+-0.030	+-0.76
39-21-16-3367	1.520	38.61	0.835	21.21	0.625	15.88
	+-0.030	+-0.76	+-0.017	+-0.43	+-0.030	+-0.76
39-21-21-2575	1.520	38.61	0.835	21.21	0.825	20.96
	+-0.030	+-0.76	+-0.017	+-0.43	+-0.030	+-0.76
51-31-20-3367	2.010	51.05	1.240	31.50	0.775	19.69
	+-0.040	+-1.02	+-0.025	+-0.64	+-0.030	+-0.76
51-31-26-2575	2.010	51.05	1.240	31.50	1.025	26.04
	+-0.040	+-1.02	+-0.025	+-0.64	+-0.030	+-0.76

	TSC PYROFERRIC COMPOSITE TOROIDAL CORE EFFECTIVE PARAMETERS						
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	CORE WEIGHT	INDUCTANCE INDEX AL
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	GRAMS	nH/N^2 +-25%
13-07-07-3367	3.03	0.19	0.59	0.43	0.08	3.06	630
13-07-09-2575	3.03	0.25	0.76	0.43	0.11	3.99	650
21-13-10-3367	5.16	0.41	2.12	1.32	0.54	10.87	730
21-13-13-2575	5.16	0.54	2.78	1.32	0.71	14.27	725
26-15-12-3367	6.18	0.64	3.93	1.82	1.16	20.39	940
26-15-16-2575	6.18	0.84	5.17	1.82	1.53	26.83	1000
39-21-16-3367	8.86	1.34	11.87	3.53	4.74	62.68	1410
39-21-21-2575	8.86	1.77	15.67	3.53	6.25	82.73	1450
51-31-20-3367	12.48	1.89	23.56	7.79	14.71	120.56	1430
51-31-26-2575	12.48	2.50	31.15	7.79	19.46	159.45	1470

TSC Pyroferric

Evaluate raw materials for purity levels
↓
weigh and wet mix materials
↓
mill and classify powder
↓
form (press into "green" cores)
↓
low temperature cure
↓
finishing (tumble, machine, coat, etc.)
↓
audit to insure that all parts meet the customers' requirements
↓
pack and ship

Iron Powder Manufacturing Overview

The process of manufacturing iron powder cores is made up of four basic steps: powder preparation, forming, curing, and finishing. At TSC-Pyroferric raw materials are evaluated for purity levels. After the materials are accepted they are weighed and wet mixed. The powder is further processed to make ready for the pressing operation.

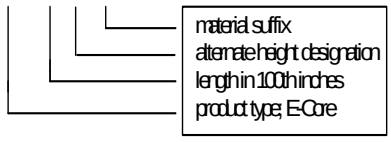
The prepared iron powder is then formed into compacts, "green" cores, using mechanical presses. The cores are then low-temperature cured to set-up the organic binders.

Depending on the core configuration and customer requirements, the cores go through finishing processes. This can include tumbling, machining, coating, etc. Examples: some sleeves are centerless ground to obtain the desired OD, toroids are tumbled and coated, and threaded cores are ground with threads. Throughout the manufacturing processes the cores are tested for quality assurance.

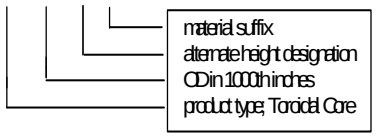
Finally the cores are tested electrically, inspected for dimensional and visual conformance and packed to be shipped to our customers.

Iron Powder Part Identification System

PE168A-75



PT1060A-75



Part Number Prefix	Product Type
P1-	Threaded Cores
P2-	Bobbin Cores
P3-	Plain Cores
P4-	Non-Standard Toroids
P5-	Beads/ Sleeves/ Hollow Cores
P6-	Cup Cores
P7-	Special Shapes
PE-	Standard E-Cores
PT-	Standard Toroids

TSC Pyroferric

Samples of our standard Iron Powder core offerings can usually be supplied from stock within 24 hours. In addition to the items listed in this catalog, TSC-Pyroferric can produce a wide variety of core sizes. Please consider the core sizes shown as merely a representation of our manufacturing capability.

- The core height can be varied to accommodate special requirements.
- Other sizes and limited metric tooling is available.
- Prototypes can be hand machined for preliminary evaluation.
- Our capabilities include custom tooling.

We will be pleased to quote to your drawings and specifications on any iron powder core. Please call or FAX us today. We welcome the opportunity to serve you.

Power Conversion and Line Filter Applications

MATERIAL CHART

Material Suffix	Permeability	Color Code	L Tolerance
-33	33	White/ Gray	± 10 %
-35	35	White/ Green	± 10 %
-60	60	Gray	± 10 %
-67	67	Gray/ Green	± 10 %
-75	75	Gray/ White	± 10 %
-LL	75	Gray/ Blue	± 10 %
-85	85	White	± 10 %

INDUCTANCE FACTOR

The permeability for each material is for reference only. The cores are manufactured to a specific A_L value. The A_L values are expressed in nanoheneries per turn squared (nH/ N^2). To calculate the required number of turns for a specified inductance (L), use the following formula:

$$\text{required number of turns} = [L\ (nH) / A_L\ (nH / N^2)]^{0.5}$$

For the cores listed in the catalog, the A_L values are based on measurements at a frequency of 10 KHz and peak AC flux density of 10 gauss (1 millitesla). The E-cores are tested with a 100 turn coil. The toroidal cores are tested with a full single-layer winding. This produces a uniform current sheet and minimizes leakage effects.

FINISH

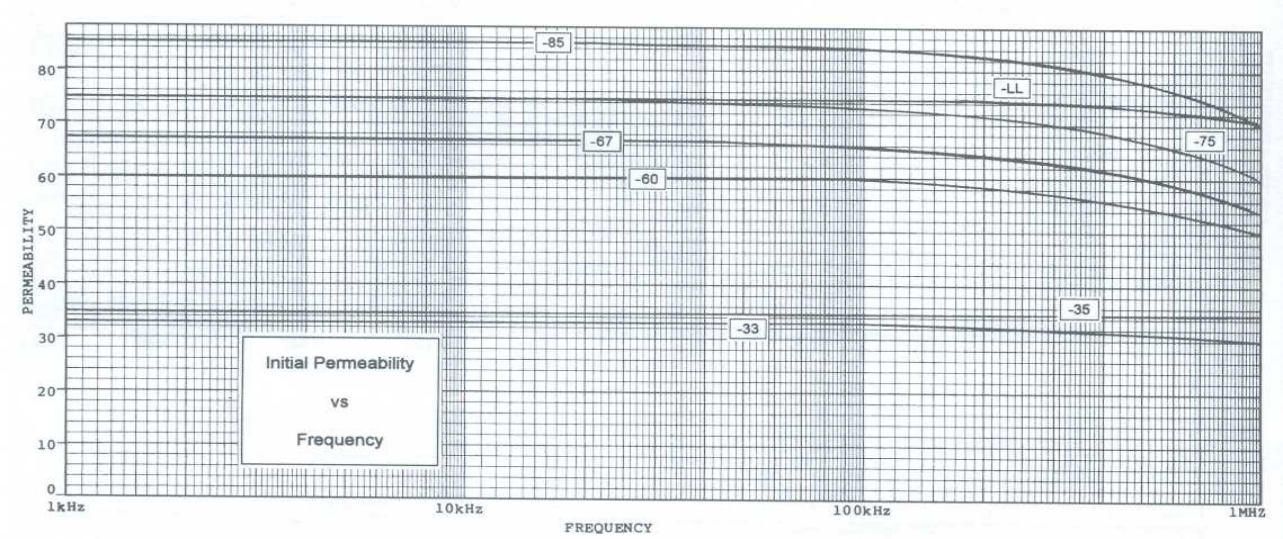
Toroidal core sizes PT 200 and PT 250 listed in this catalog are coated with Parylene C. The minimum dielectric strength is 250 volts.

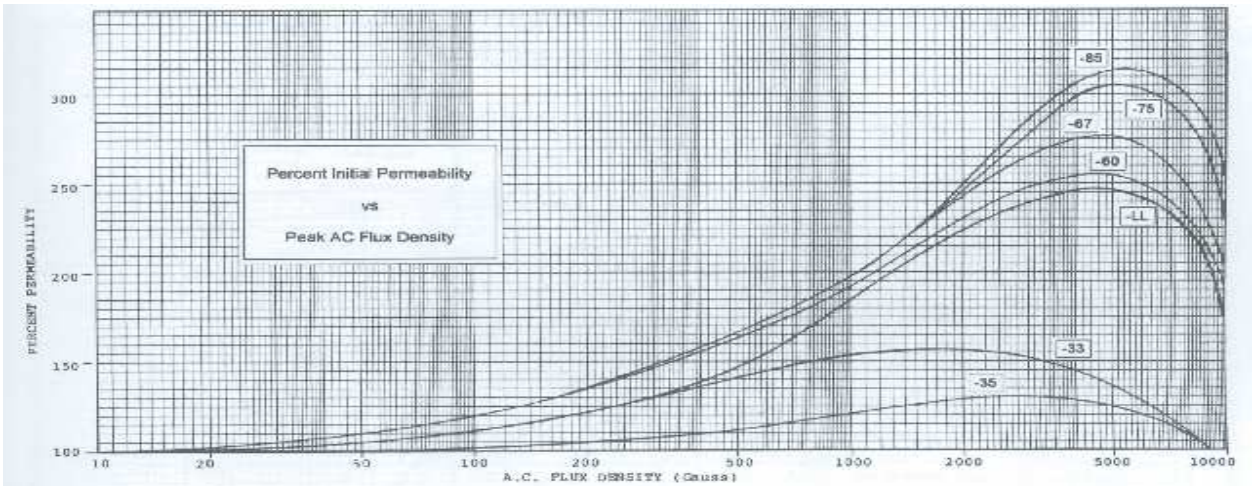
Toroidal core sizes PT 250A and larger are coated with a polyurethane enamel. The cores are color-coded in accordance to material. The minimum dielectric strength is 500 volts. The typical dry film thickness is 4-7 mil, 10 mil maximum.

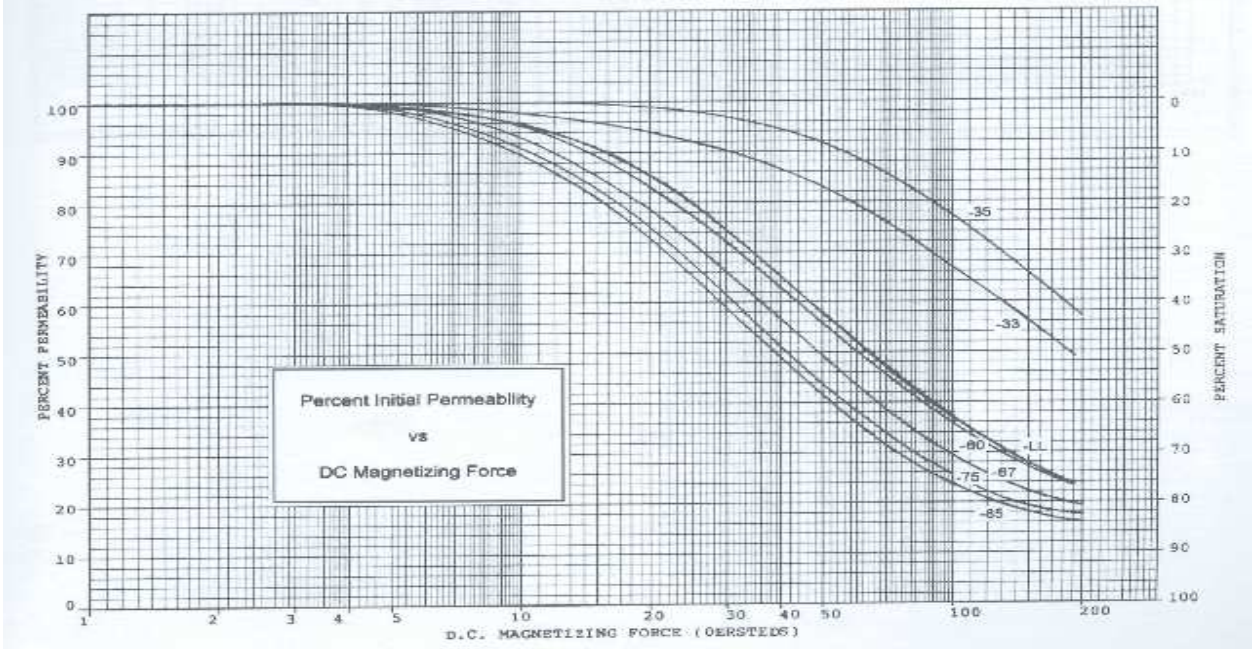
The E-cores are chemically treated to resist corrosion.

TSC Pyroferric

Iron Powder Magnetic Properties

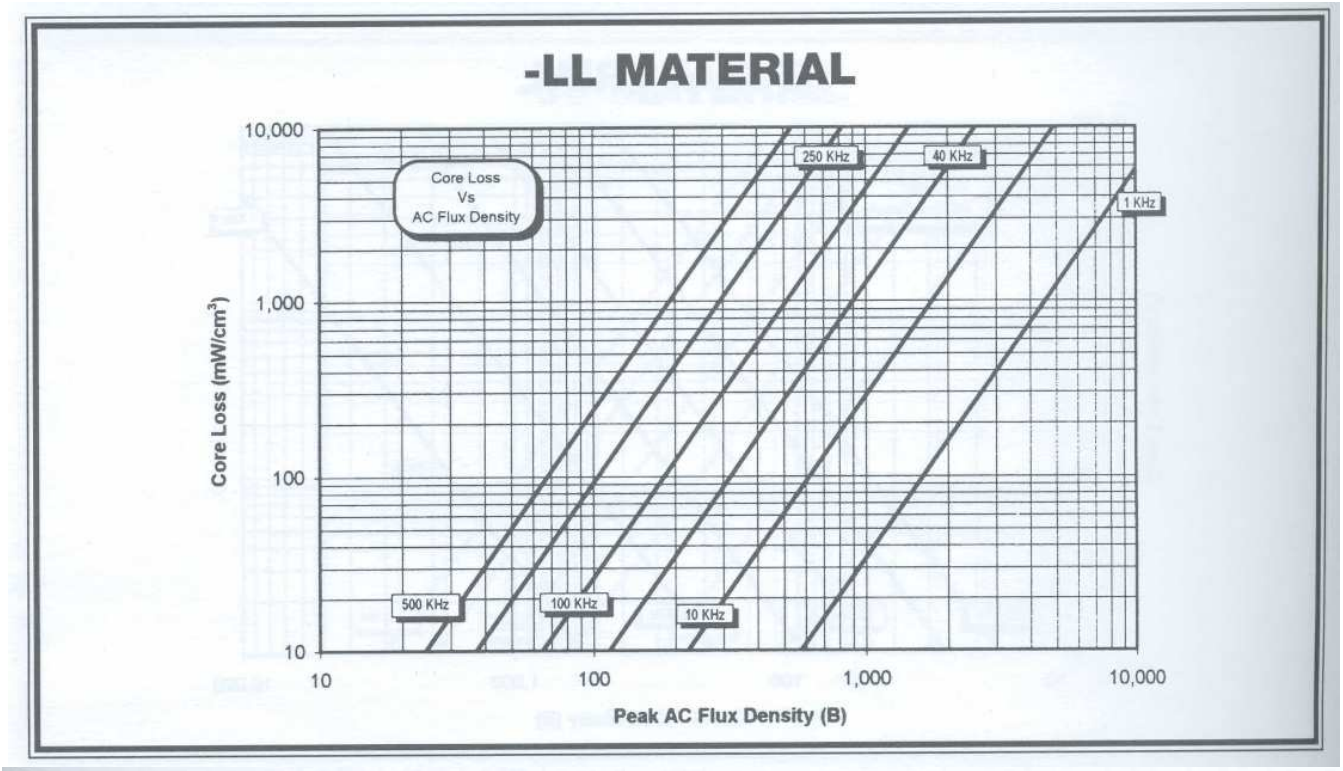


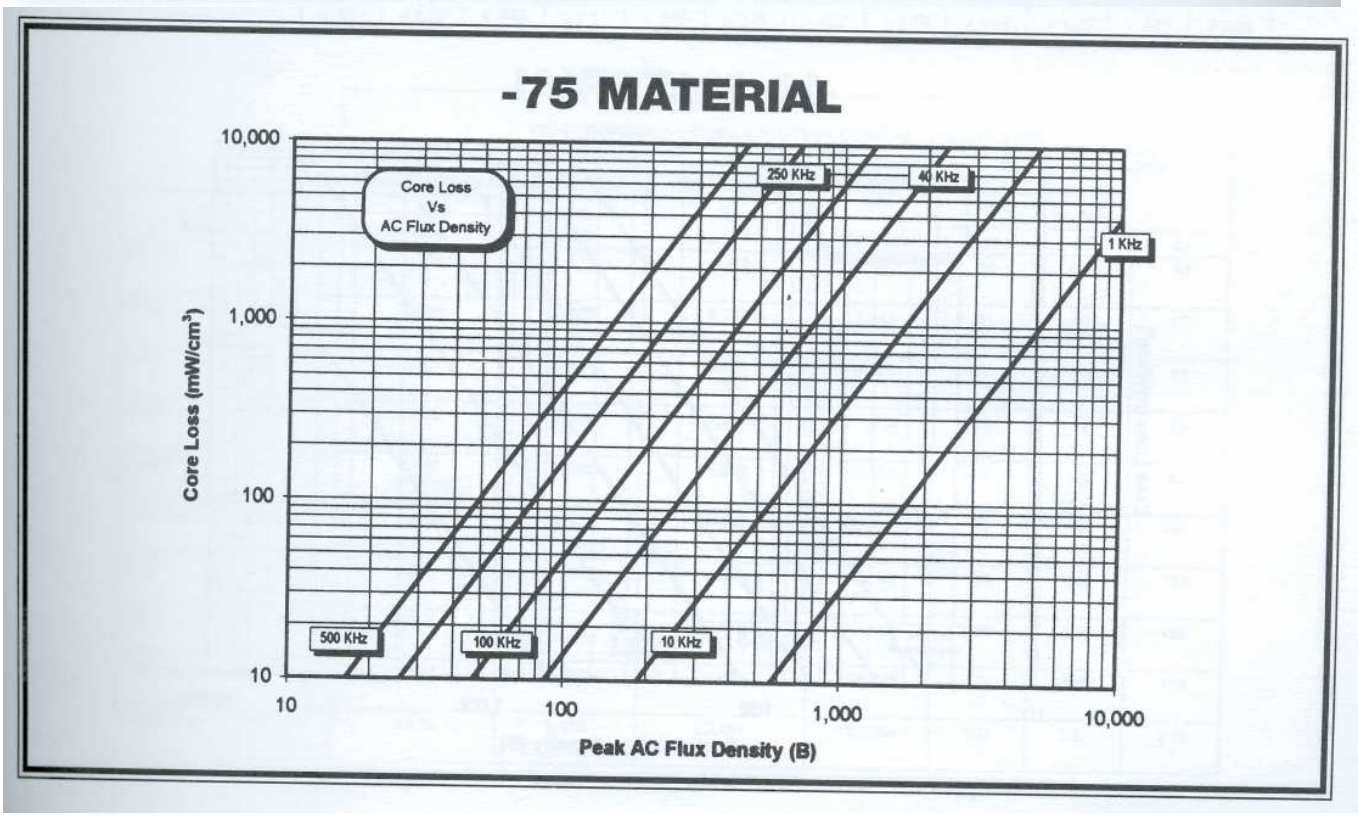




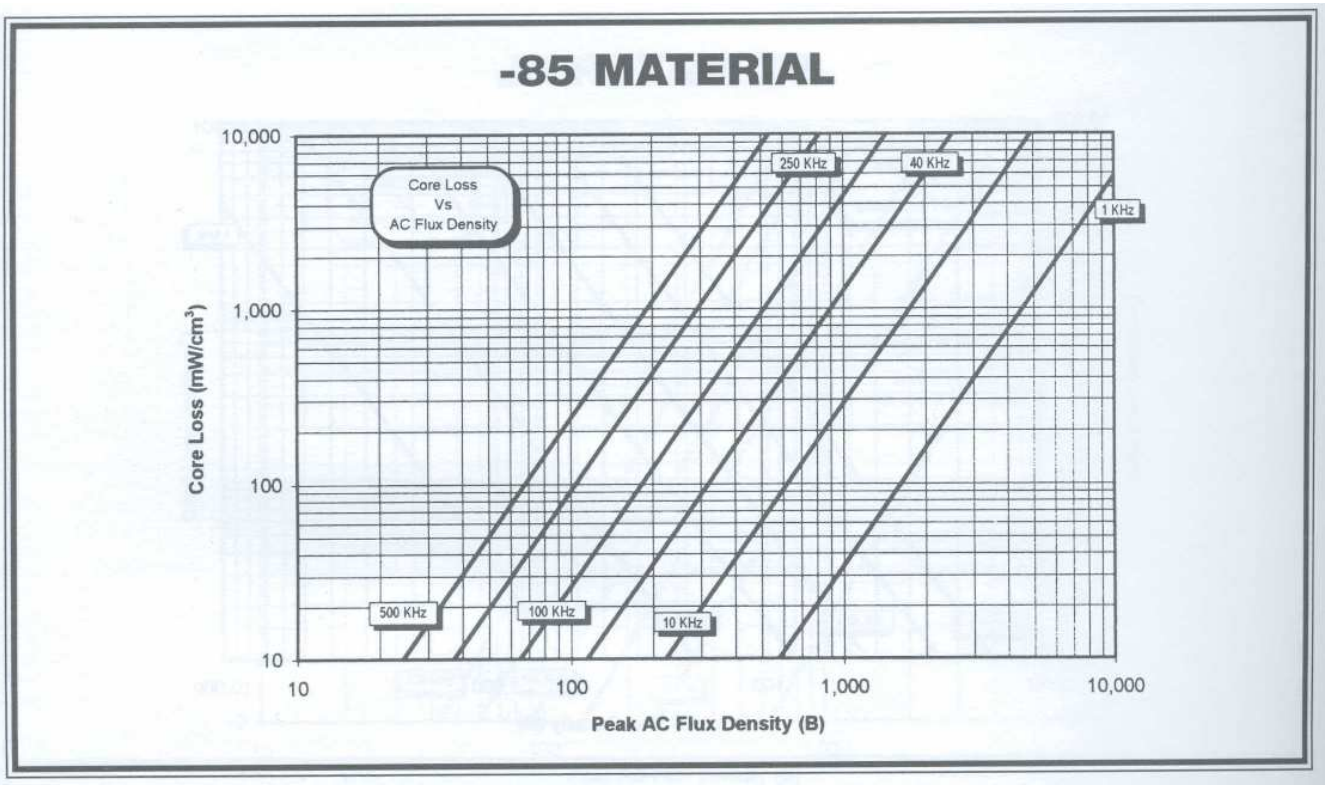
TSC Pyroferric

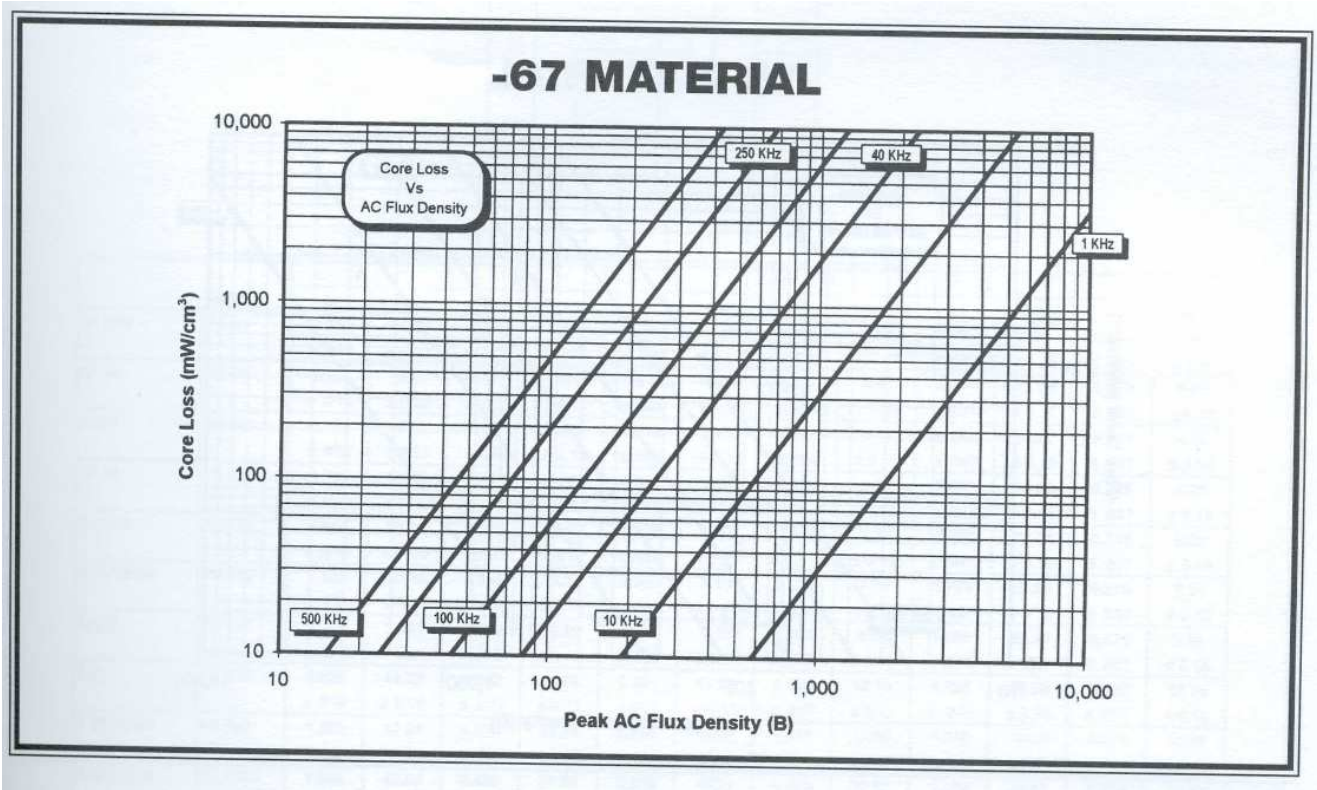
Iron Powder Magnetic Properties





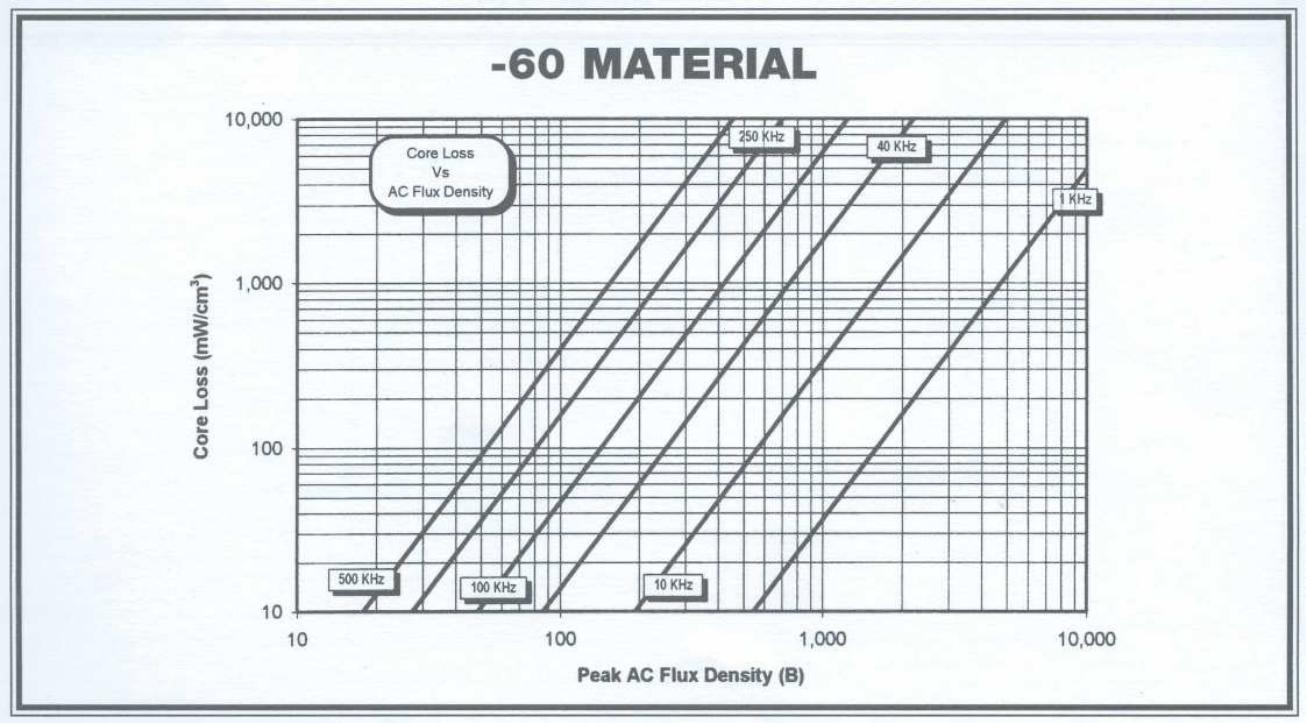
TSC Pyroferric

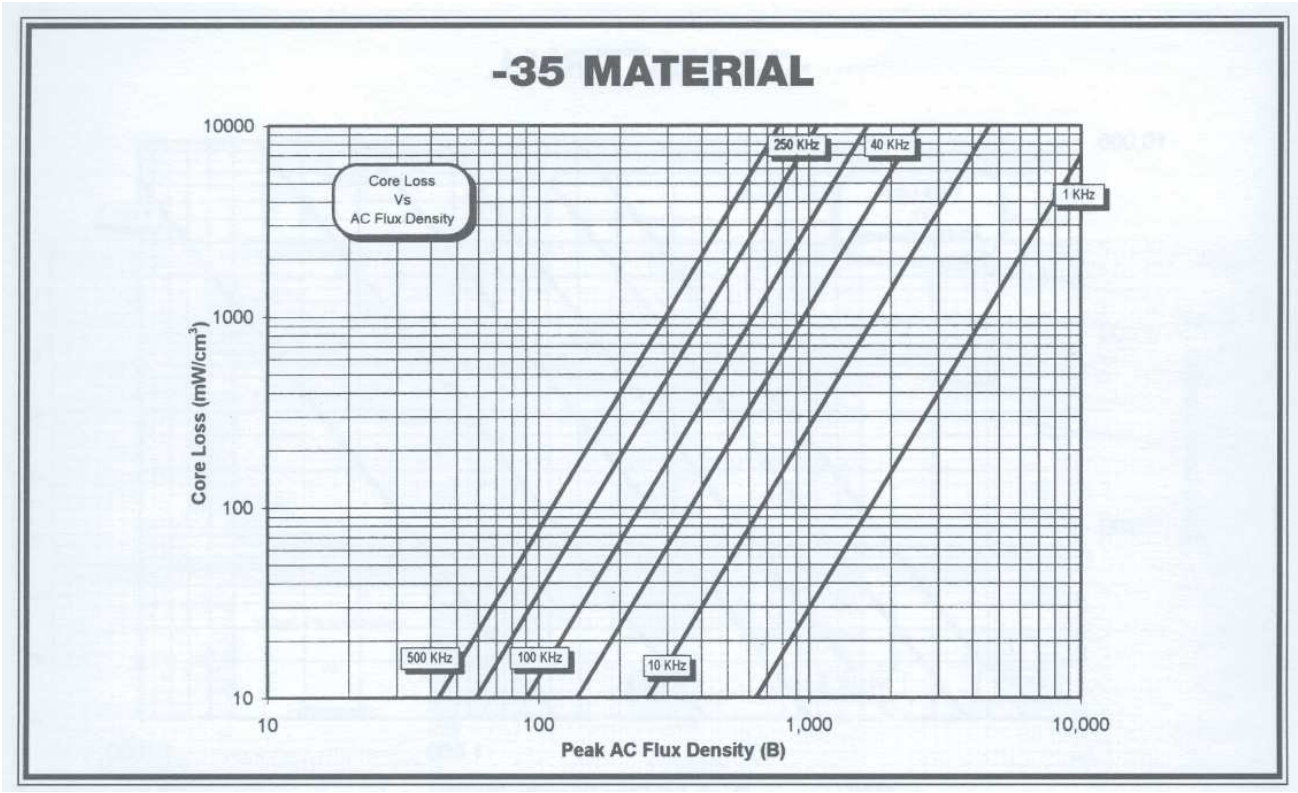




TSC Pyroferric

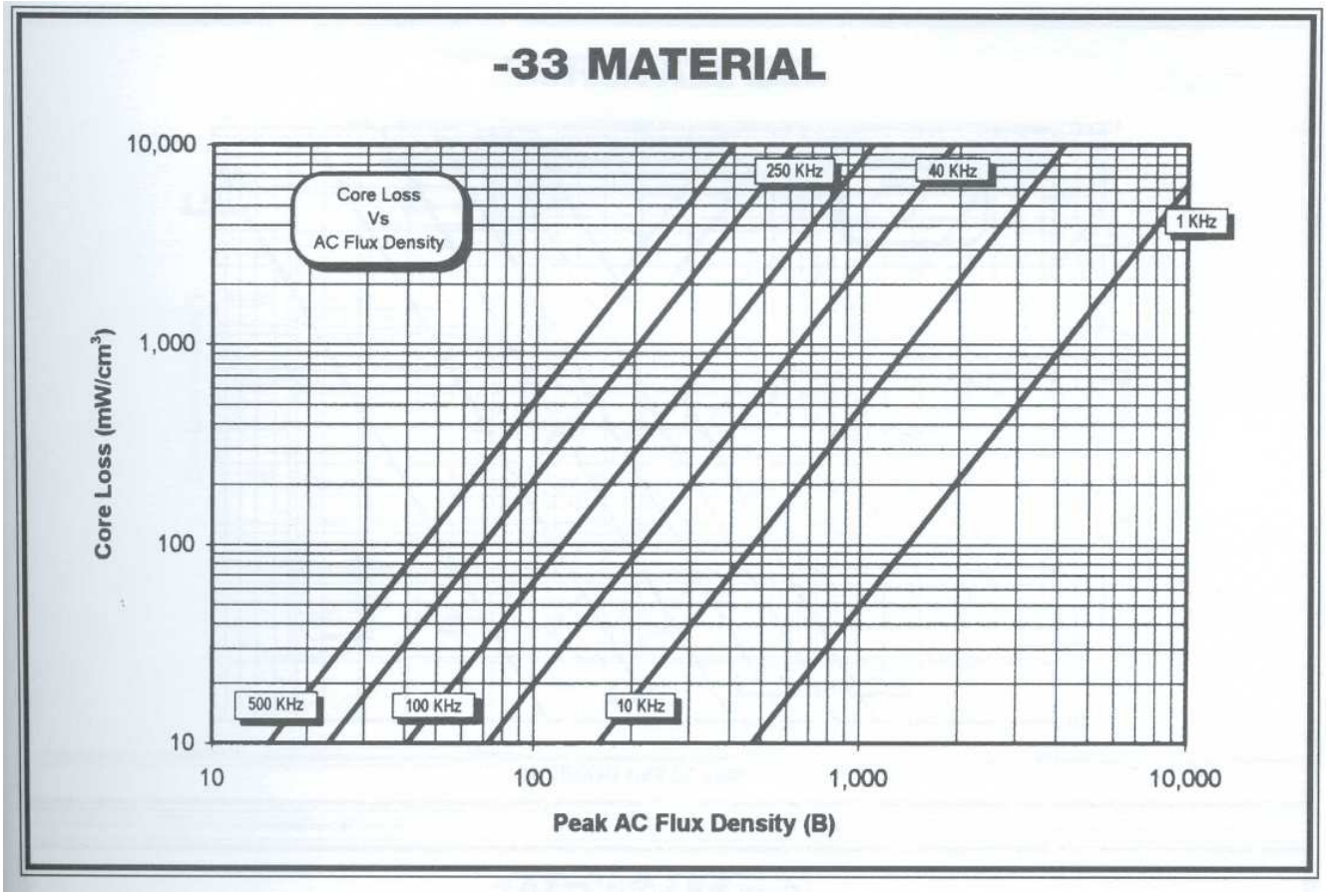
Iron Powder Magnetic Properties





TSC Pyroferric

Iron Powder Magnetic Properties



TSC Pyroferric

Cross reference of TSC-Pyroferric part number to competitor part number

TSC-PYROFERRIC PART NUMBER	MICROMETALS PART NUMBER
PT 200	T20
PT 250	-
PT 250A	T25
PT 260	T26
PT 280	T27
PT 310	T30
PT 380	T37
PT 381	T38
PT 437	-
PT 440	T44
PT 500	T50
PT 500A	T50-nnB
PT 500D	T50-nnD
PT 501	T51
PT 600	T60
PT 680	T68
PT 680A	T68-nnA

TSC-PYROFERRIC PART NUMBER	MICROMETALS PART NUMBER
PT 680D	T68-nnD
PT 720	T72
PT 800	T80
PT 800A	T80-nnB
PT 800D	T80-nnD
PT 900	T90
PT 940	T94
PT 941	-
PT 1060	T106
PT 1060A	T106-nnB
PT 1060B	T106-nnA
PT 1300	T130
PT 1301	T131
PT 1302	T132
PT 1302A	-
PT 1510	T151
PT 1570	T157

TSC-PYROFERRIC PART NUMBER	MICROMETALS PART NUMBER
PT 1750	T175
PT 1840	T184
PT 2000	T200
PT 2000B	T200-nnB
PT 2250	T225
PT 3000	T300
PT 3000D	T300-nnD
PE 51	-
PE 63	-
PE 75	E75
PE 76	-
PE 80	E80
PE 99	E99
PE 100	E100
PE 118	E118
PE 137	E137
PE 162	E162
PE 168	E168
PE 168A	E168-nnA

nn = Micrometals Material #

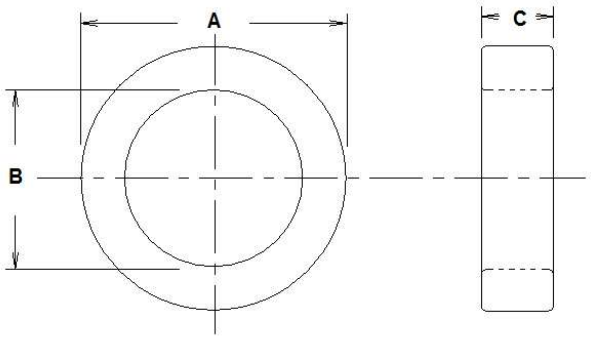
Pyroferric Material	Micrometals Material
-33	-33
-35	- 8
-60	--
-67	-40
-75	-26
-85	-38
-LL	-52

TSC-PYROFERRIC PART NUMBER	MICROMETALS PART NUMBER
13-07-07-3367	ST50-267
13-07-09-2575	ST50-275B
21-13-10-33-67	ST83-267
21-13-13-25-75	ST83-275B

TSC-PYROFERRIC PART NUMBER	MICROMETALS PART NUMBER
26-15-12-3367	ST102-267
26-15-16-2575	ST102-275B
39-21-16-3367	ST150-267
39-21-21-2575	ST150-275B

TSC-PYROFERRIC PART NUMBER	MICROMETALS PART NUMBER
51-31-20-3367	ST200-267
51-31-26-2575	ST200-275B

TSC Pyroferric



TSC PYROFERRIC TOROID DIMENSIONS

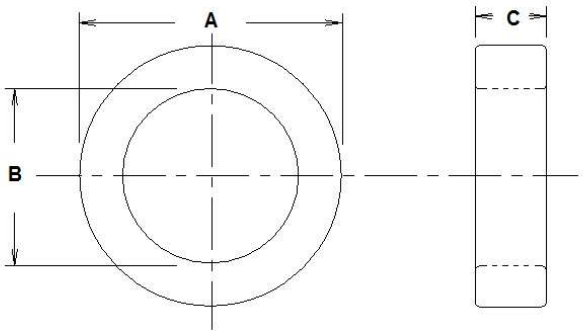
PART #	A		B		C	
	inches	mm	inches	mm	inches	mm
PT 200	0.200 + - 0.005	5.08 + - 0.13	0.088 + - 0.005	2.24 + - 0.13	0.067 + - 0.005	1.70 + - 0.13
PT 250	0.200 + - 0.005	5.08 + - 0.13	0.125 + - 0.005	3.18 + - 0.13	0.063 + - 0.005	1.60 + - 0.13
PT 250A	0.250 + - 0.005	6.35 + - 0.13	0.125 + - 0.005	3.18 + - 0.13	0.096 + - 0.005	2.44 + - 0.13
PT 260	0.260 + - 0.010	6.60 + - 0.25	0.105 + - 0.010	2.67 + - 0.25	0.187 + - 0.010	4.75 + - 0.25
PT 280	0.280 + - 0.010	7.11 + - 0.25	0.150 + - 0.010	3.81 + - 0.25	0.128 + - 0.010	3.25 + - 0.25
PT 310	0.310 + - 0.010	7.87 + - 0.25	0.156 + - 0.010	3.96 + - 0.25	0.125 + - 0.010	3.18 + - 0.25
PT 380	0.380 + - 0.010	9.65 + - 0.25	0.210 + - 0.010	5.33 + - 0.25	0.125 + - 0.010	3.18 + - 0.25
PT 381	0.380 + - 0.010	9.65 + - 0.25	0.175 + - 0.010	4.45 + - 0.25	0.190 + - 0.010	4.83 + - 0.25
PT 437	0.437 + - 0.010	11.10 + - 0.25	0.250 + - 0.010	6.35 + - 0.25	0.125 + - 0.010	3.18 + - 0.25
PT 440	0.440 + - 0.010	11.18 + - 0.25	0.230 + - 0.010	5.84 + - 0.25	0.160 + - 0.010	4.06 + - 0.25
PT 500	0.500 + - 0.010	12.70 + - 0.25	0.300 + - 0.010	7.62 + - 0.25	0.187 + - 0.010	4.75 + - 0.25
PT 500A	0.500 + - 0.010	12.70 + - 0.25	0.300 + - 0.010	7.62 + - 0.25	0.250 + - 0.010	6.35 + - 0.25
PT 500D	0.500 + - 0.010	12.70 + - 0.25	0.300 + - 0.010	7.62 + - 0.25	0.375 + - 0.010	9.53 + - 0.25
PT 501	0.500 + - 0.010	12.70 + - 0.25	0.200 + - 0.010	5.08 + - 0.25	0.250 + - 0.010	6.35 + - 0.25
PT 600	0.600 + - 0.010	15.24 + - 0.25	0.336 + - 0.010	8.53 + - 0.25	0.234 + - 0.010	5.94 + - 0.25
PT 680	0.680 + - 0.010	17.27 + - 0.25	0.380 + - 0.010	9.65 + - 0.25	0.187 + - 0.010	4.75 + - 0.25
PT 680A	0.680 + - 0.010	17.27 + - 0.25	0.380 + - 0.010	9.65 + - 0.25	0.250 + - 0.010	6.35 + - 0.25
PT 680D	0.680 + - 0.010	17.27 + - 0.25	0.380 + - 0.010	9.65 + - 0.25	0.375 + - 0.010	9.53 + - 0.25
PT 720	0.720 + - 0.010	18.29 + - 0.25	0.280 + - 0.010	7.11 + - 0.25	0.260 + - 0.010	6.60 + - 0.25
PT 800	0.800 + - 0.010	20.32 + - 0.25	0.500 + - 0.010	12.70 + - 0.25	0.250 + - 0.010	6.35 + - 0.25

Tolerances are for unpainted cores

TSC Pyroferric

	TSC PYROFERRIC TOROIDAL CORE EFFECTIVE PARAMETER				INDUCTANCE INDEX AL ± 10% nH/N^2						
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	CORE WEIGHT							
PART #	Le cm	Ae cm^2	Ve cm^3	GRAMS	-33	-35	-60	-67	-75	-85	-LL
PT 200	1.030	0.023	0.024	0.19		7.8	14.5	16.5	18.5	20.0	17.5
PT 250	1.380	0.024	0.034	0.26		6.5	13.0	14.5	16.5	17.5	15.0
PT 250A	1.380	0.037	0.051	0.39		10.0	20.5	22.0	24.5	26.5	23.0
PT 260	1.280	0.090	0.116	0.97		24.0	45.5	51.0	57.0	63.0	56.0
PT 280	1.610	0.052	0.084	0.63		11.5	20.0	22.0	25.0	26.5	24.0
PT 310	1.720	0.060	0.103	0.79		14.0	26.0	29.0	32.5	34.5	30.5
PT 380	2.220	0.067	1.480	1.10		12.0	22.0	24.5	27.5	29.5	26.0
PT 381	2.010	0.120	0.240	1.89		20.0	42.0	47.0	53.0	60.0	49.0
PT 437	2.600	0.073	0.191	1.41		11.5	21.0	23.0	26.0	28.0	24.5
PT 440	2.490	0.105	0.263	1.98		18.0	31.0	33.5	37.5	41.5	35.0
PT 500	3.060	0.118	0.361	2.62		17.5	29.5	30.0	34.0	38.5	33.0
PT 500A	3.060	0.158	0.483	3.50		23.0	39.0	43.5	46.5	52.5	43.5
PT 500D	3.060	0.237	0.724	5.25			57.5	64.0	72.0	77.0	66.0
PT 501	2.440	0.266	0.550	4.59			67.0	73.5	83.0	88.5	75.0
PT 600	3.530	0.194	0.685	5.06			41.5	45.0	51.0	55.0	47.0
PT 680	4.000	0.176	0.704	5.20	18.0		34.5	39.0	43.5	45.0	40.0
PT 680A	4.000	0.235	0.941	6.96	23.5		46.5	52.0	58.0	61.0	54.0
PT 680D	4.000	0.363	1.410	10.44	36.0		68.5	76.5	86.0	92.0	80.0
PT 720	3.450	0.343	1.180	10.01	36.0		72.5	81.0	90.5	97.5	82.0
PT 800	5.000	0.238	1.188	8.53	18.0		36.5	41.0	46.0	48.5	42.0

TSC Pyroferric



TSC PYROFERRIC TOROID DIMENSIONS

	A		B		C	
PART #	inches	mm	inches	mm	inches	mm
PT 800A	0.800 + - 0.010	20.32 + - 0.25	0.500 + - 0.010	12.70 + - 0.25	0.375 + - 0.010	9.53 + - 0.25
PT 800D	0.800 + - 0.010	20.32 + - 0.25	0.500 + - 0.010	12.70 + - 0.25	0.500 + - 0.010	12.70 + - 0.25
PT 900	0.900 + - 0.010	22.86 + - 0.25	0.550 + - 0.010	13.97 + - 0.25	0.375 + - 0.010	9.53 + - 0.25
PT 940	0.940 + - 0.010	23.88 + - 0.25	0.560 + - 0.010	14.22 + - 0.25	0.312 + - 0.010	7.92 + - 0.25
PT 941	0.940 + - 0.010	23.88 + - 0.25	0.630 + - 0.010	16.00 + - 0.25	0.250 + - 0.010	6.35 + - 0.25
PT 1060	1.060 + - 0.015	26.92 + - 0.38	0.580 + - 0.015	14.73 + - 0.38	0.440 + - 0.015	11.18 + - 0.38
PT 1060A	1.060 + - 0.015	26.92 + - 0.38	0.580 + - 0.015	14.73 + - 0.38	0.575 + - 0.015	14.61 + - 0.38
PT 1060B	1.060 + - 0.015	26.92 + - 0.38	0.580 + - 0.015	14.73 + - 0.38	0.312 + - 0.015	7.92 + - 0.38
PT 1300	1.300 + - 0.015	33.02 + - 0.38	0.780 + - 0.015	19.81 + - 0.38	0.437 + - 0.015	11.10 + - 0.38
PT 1301	1.300 + - 0.015	33.02 + - 0.38	0.640 + - 0.015	16.26 + - 0.38	0.437 + - 0.015	11.10 + - 0.38
PT 1302	1.300 + - 0.015	33.02 + - 0.38	0.700 + - 0.015	17.78 + - 0.38	0.437 + - 0.015	11.10 + - 0.38
PT 1302A	1.300 + - 0.015	33.02 + - 0.38	0.700 + - 0.015	17.78 + - 0.38	0.217 + - 0.015	5.51 + - 0.38
PT 1510	1.510 + - 0.015	38.35 + - 0.38	0.845 + - 0.015	21.46 + - 0.38	0.437 + - 0.015	11.10 + - 0.38
PT 1570	1.570 + - 0.015	39.88 + - 0.38	0.955 + - 0.015	24.26 + - 0.38	0.570 + - 0.015	14.48 + - 0.38
PT 1750	1.750 + - 0.015	44.45 + - 0.38	1.070 + - 0.015	27.18 + - 0.38	0.650 + - 0.015	16.51 + - 0.38
PT 1840	1.840 + - 0.015	46.74 + - 0.38	0.950 + - 0.015	24.13 + - 0.38	0.710 + - 0.015	18.03 + - 0.38
PT 2000	2.000 + - 0.015	50.80 + - 0.38	1.250 + - 0.015	31.75 + - 0.38	0.550 + - 0.015	13.97 + - 0.38
PT 2000B	2.000 + - 0.015	50.80 + - 0.38	1.250 + - 0.015	31.75 + - 0.38	1.000 + - 0.015	25.40 + - 0.38
PT 2250	2.250 + - 0.015	57.15 + - 0.38	1.400 + - 0.015	35.56 + - 0.38	0.550 + - 0.015	13.97 + - 0.38
PT 3000	3.040 + - 0.015	77.22 + - 0.38	1.930 + - 0.015	49.02 + - 0.38	0.500 + - 0.015	12.70 + - 0.38
PT 3000D	3.040 + - 0.015	77.22 + - 0.38	1.930 + - 0.015	49.02 + - 0.38	1.000 + - 0.015	25.40 + - 0.38

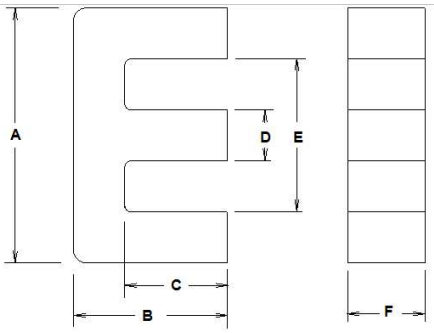
Tolerances are for unpainted cores

TSC Pyroferric

	TSC PYROFERRIC TOROIDAL CORE EFFECTIVE PARAMETER				INDUCTANCE INDEX AL ± 10% nH/N^2						
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	CORE WEIGHT							
PART #	Le cm	Ae cm^2	Ve cm^3	GRAMS	-33	-35	-60	-67	-75	-85	-LL
PT 800A	5.000	0.356	1.780	12.80	29.0		55.5	62.0	69.5	74.0	63.0
PT 800D	5.000	0.475	2.376	17.07	38.0		73.5	82.5	92.0	100.0	83.0
PT 900	5.560	0.415	2.306	16.66	30.0		56.5	63.0	70.5	77.5	64.0
PT 940	5.730	0.374	2.141	15.56	25.0		49.0	53.5	60.0	66.0	57.0
PT 941	5.980	0.215	1.228	9.04	16.0		30.5	34.0	38.0	41.0	35.0
PT 1060	6.160	0.661	4.074	30.31	40.0		81.0	86.0	96.0	110.0	95.0
PT 1060A	6.160	0.864	5.324	39.61	56.0		106.0	114.0	128.0	145.0	124.0
PT 1060B	6.160	0.469	2.889	21.50	30.0		53.5	60.0	67.0	78.0	67.0
PT 1300	7.950	0.717	5.702	41.37	34.0		66.0	73.0	82.0	93.0	79.0
PT 1301	7.130	0.892	6.360	48.97	46.5		94.0	105.0	118.0	130.0	108.0
PT 1302	7.490	0.819	6.138	45.89	43.5		83.0	92.0	103.0	112.0	95.0
PT 1302A	7.490	0.407	3.048	22.79	20.5		40.0	45.0	50.0	53.5	46.0
PT 1510	8.890	0.910	8.100	59.90	41.0		78.0	87.0	97.0	102.0	89.0
PT 1570	9.670	1.110	10.710	77.47	43.5		86.0	91.0	102.0	114.0	99.0
PT 1750	10.810	1.397	15.106	77.484	53.0		90.0	95.0	105.0	119.0	105.0
PT 1840	10.360	1.970	20.370	154.30	70.0		143.0	152.0	170.0	192.0	159.0
PT 2000	12.500	1.310	16.330	117.33	37.0		79.0	83.0	93.0	105.0	92.0
PT 2000B	12.500	2.380	29.690	213.33	70.0		128.0	143.0	160.0		155.0
PT 2250	14.030	1.480	20.770	149.34	37.0		78.0	88.0	98.0		92.0
PT 3000	19.163	1.760	33.724	241.41	38.0			71.0	80.0		80.0
PT 3000D	19.163	3.520	67.449	482.81	76.0			142.0	160.0		160.0

Magnetic parameters calculated per MMPA standard #UEI 310

TSC Pyroferric



TSC PYROFERRIC E CORE DIMENSIONS

		A		B		C		D		E		F	
	PART #	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
EF 12.6	PE 51	0.498 ± .010	12.65 ± 0.25	0.252 ± .005	6.40 ± 0.13	0.184 ± .005	4.66 ± 0.13	0.140 ± .007	3.54 ± 0.18	0.362 ± .007	9.19 ± 0.18	0.140 ± .007	3.54 ± 0.18
EF 16	PE 63	0.634 ± .010	16.10 ± 0.25	0.317 ± .005	8.04 ± 0.13	0.233 ± .005	5.91 ± 0.13	0.180 ± .007	4.56 ± 0.18	0.457 ± .007	11.60 ± 0.18	0.178 ± .007	4.51 ± 0.18
E 187	PE 75	0.750 ± .010	19.05 ± 0.25	0.318 ± .005	8.06 ± 0.13	0.223 ± .005	5.65 ± 0.13	0.187 ± .007	4.75 ± 0.18	0.562 ± .007	14.27 ± 0.18	0.187 ± .007	4.75 ± 0.18
EF 20	PE 80	0.795 ± .010	20.19 ± 0.25	0.392 ± .005	9.96 ± 0.13	0.275 ± .005	6.99 ± 0.13	0.230 ± .007	5.84 ± 0.18	0.575 ± .007	14.61 ± 0.18	0.228 ± .007	5.79 ± 0.18
EF 25	PE 99	1.000 ± .010	25.40 ± 0.25	0.500 ± .005	12.70 ± 0.13	0.345 ± .005	8.76 ± 0.13	0.287 ± .007	7.29 ± 0.18	0.695 ± .007	17.65 ± 0.18	0.287 ± .007	7.29 ± 0.18
E 24/25	PE 100	1.000 ± .010	25.40 ± 0.25	0.375 ± .005	9.53 ± 0.13	0.250 ± .005	6.35 ± 0.13	0.250 ± .007	6.35 ± 0.18	0.750 ± .007	19.05 ± 0.18	0.248 ± .007	6.30 ± 0.18
E 30/15mm	PE 118	1.185 ± .010	30.10 ± 0.25	0.593 ± .005	15.05 ± 0.13	0.391 ± .005	9.93 ± 0.13	0.278 ± .007	7.06 ± 0.18	0.782 ± .007	19.86 ± 0.18	0.276 ± .007	7.01 ± 0.18
E 375	PE 137	1.375 ± .010	34.93 ± 0.25	0.563 ± .005	14.29 ± 0.13	0.375 ± .005	9.53 ± 0.13	0.375 ± .007	9.53 ± 0.18	1.000 ± .010	25.40 ± 0.25	0.375 ± .007	9.53 ± 0.18
E 21	PE 162	1.625 ± .010	41.28 ± 0.25	1.342 ± .005	34.09 ± 0.13	0.421 ± .005	10.69 ± 0.13	0.500 ± .007	12.70 ± 0.18	1.125 ± .010	28.58 ± 0.25	0.500 ± .007	12.70 ± 0.18
E 42/15mm	PE 168	1.685 ± .010	42.80 ± 0.25	0.830 ± .005	21.08 ± 0.13	0.605 ± .005	15.37 ± 0.13	0.475 ± .007	12.07 ± 0.18	1.210 ± .010	30.73 ± 0.25	0.590 ± .010	14.99 ± 0.25
E 42/20mm	PE 168A	1.685 ± .010	42.80 ± 0.25	0.830 ± .005	21.08 ± 0.13	0.605 ± .005	15.37 ± 0.13	0.475 ± .007	12.07 ± 0.18	1.210 ± .010	30.73 ± 0.25	0.787 ± .010	19.99 ± 0.25
	PE 187	1.875 ± .010	47.63 ± 0.25	0.782 ± .005	19.86 ± 0.13	0.469 ± .005	11.91 ± 0.13	0.625 ± .005	15.88 ± 0.13	1.249 ± .010	31.72 ± 0.25	0.625 ± .010	15.88 ± 0.25

	TSF PYROFERRIC E CORE EFFECTIVE CORE SET PARAMETERS								
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	WINDOW AREA	POWER HANDLING CAPABILITY INDEX	CORE SET WEIGHT	INDUCTANCE INDEX AL ± 10% nH/N^2		
PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	WaAe cm^4	GRAMS	-67	-75	-LL
PE 51	2.979	0.124	0.370	0.263	0.033	2.641	40	45.5	44
PE 63	3.760	0.201	0.757	0.415	0.084	5.412	51	60	56
PE 75	3.971	0.227	0.908	0.538	0.122	6.455	57	64	59
PE 80	4.583	0.334	1.533	0.612	0.204	11.015	65	73	70
PE 99	5.745	0.554	3.185	0.908	0.504	22.978	81	96	96
PE 100	4.807	0.400	1.923	0.806	0.323	13.818	82	92	85
PE 118	6.539	0.605	3.958	1.271	0.769	31.103	80	90	90
PE 137	6.896	0.908	6.262	1.512	1.373	45.109	120	134	131
PE 162	7.860	1.613	12.677	1.698	2.738	92.182	188	210	199
PE 168	9.854	1.780	17.536	2.869	5.107	125.426	174	195	179
PE 168A	9.854	2.374	23.391	2.869	6.811	167.304	207	232	230
PE 187	8.847	2.523	22.318	1.888	4.763	168.28	240	268	260

Magnetic parameters calculated per MMPA standard #UEI 310

RF Applications

RF MATERIAL CHART

Core Material	Permeability	Toroidal Color Code	Recommended Frequency Range
Carbonyl W	6	Gray	40 MHz-250 MHz
Carbonyl J	7	Gray	35 MHz-135 MHz
Carbonyl SF	8	Yellow/ Gray	10 MHz-100 MHz
Carbonyl TH	8.5	Gray	1 MHz-60 MHz
Carbonyl E	10	Red/ Gray	100 KHz-25 MHz
Carbonyl C	20	Gray	50 KHz-5 MHz
Carbonyl GQ4 *	35	White/ Green	50 KHz-2 MHz

* For Carbonyl GQ4 (-35) toroidal cores please refer to the Power Conversion Applications section.

FINISH

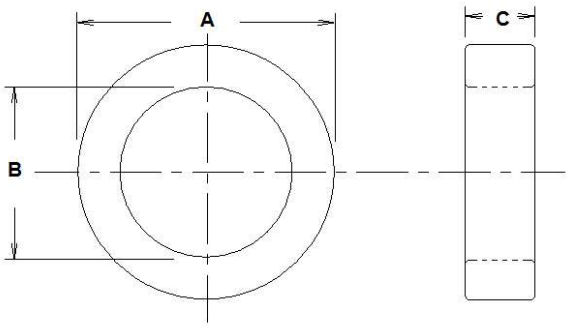
Toroidal core sizes PT 125 and PT 250A listed in this catalog are coated with Parylene C. The minimum dielectric strength is 250 volts.

Toroidal core sizes PT 280 and larger are coated with a polyurethane enamel. The cores are color-coded in accordance to material. The minimum dielectric strength is 500 volts. The typical dry film thickness is 4-7 mil, 10 mil maximum.

Q & μ COMPARISON CHART

Core Material	Comments
Carbonyl W	Highest “Q” at recommended frequency range.
Carbonyl J	Higher “Q” than SF at recommended frequency range.
Carbonyl SF	Higher “Q” than TH at higher frequencies.
Carbonyl TH	Higher “Q” than E at higher frequencies.
Carbonyl E	High “Q”, medium μ, high resistance, most common RF material.
Carbonyl C	Medium μ with high “Q”.
Carbonyl GQ4	Medium μ with high “Q” for special applications.

TSC Pyroferric



TSC PYROFERRIC RF TOROID DIMENSIONS

	A		B		C	
PART #	inches	mm	inches	mm	inches	mm
PT 125	0.125 + - 0.005	3.18 + - 0.13	0.062 + - 0.005	1.57 + - 0.13	0.050 + - 0.005	1.27 + - 0.13
PT 160	0.160 + - 0.005	4.06 + - 0.13	0.078 + - 0.005	1.98 + - 0.13	0.060 + - 0.005	1.52 + - 0.13
PT 200	0.200 + - 0.005	5.08 + - 0.13	0.088 + - 0.005	2.24 + - 0.13	0.067 + - 0.005	1.70 + - 0.13
PT 250	0.250 + - 0.005	6.35 + - 0.13	0.125 + - 0.005	3.18 + - 0.13	0.063 + - 0.005	1.60 + - 0.13
PT 250A	0.250 + - 0.005	6.35 + - 0.13	0.125 + - 0.005	3.18 + - 0.13	0.096 + - 0.005	2.44 + - 0.13
PT 280	0.280 + - 0.010	7.11 + - 0.25	0.150 + - 0.010	3.81 + - 0.25	0.128 + - 0.010	3.25 + - 0.25
PT 310	0.310 + - 0.010	7.87 + - 0.25	0.156 + - 0.010	3.96 + - 0.25	0.126 + - 0.010	3.20 + - 0.25
PT 380	0.380 + - 0.010	9.65 + - 0.25	0.210 + - 0.010	5.33 + - 0.25	0.125 + - 0.010	3.18 + - 0.25
PT 437	0.437 + - 0.010	11.10 + - 0.25	0.250 + - 0.010	6.35 + - 0.25	0.125 + - 0.010	3.18 + - 0.25
PT 440	0.440 + - 0.010	11.18 + - 0.25	0.230 + - 0.010	5.84 + - 0.25	0.160 + - 0.010	4.06 + - 0.25
PT 500	0.500 + - 0.010	12.70 + - 0.25	0.300 + - 0.010	7.62 + - 0.25	0.187 + - 0.010	4.75 + - 0.25
PT 680	0.680 + - 0.010	17.27 + - 0.25	0.380 + - 0.010	9.65 + - 0.25	0.187 + - 0.010	4.75 + - 0.25
PT 680A	0.680 + - 0.010	17.27 + - 0.25	0.380 + - 0.010	9.65 + - 0.25	0.250 + - 0.010	6.35 + - 0.25
PT 800	0.800 + - 0.010	20.32 + - 0.25	0.500 + - 0.010	12.70 + - 0.25	0.250 + - 0.010	6.35 + - 0.25
PT 940	0.940 + - 0.010	23.88 + - 0.25	0.560 + - 0.010	14.22 + - 0.25	0.312 + - 0.010	7.92 + - 0.25
PT 941	0.940 + - 0.010	23.88 + - 0.25	0.630 + - 0.010	16.00 + - 0.25	0.250 + - 0.010	6.35 + - 0.25
PT 1060	1.060 + - 0.015	26.92 + - 0.38	0.580 + - 0.015	14.73 + - 0.38	0.440 + - 0.015	11.18 + - 0.38
PT 1300	1.300 + - 0.015	33.02 + - 0.38	0.780 + - 0.015	19.81 + - 0.38	0.437 + - 0.015	11.10 + - 0.38
PT 1570	1.570 + - 0.015	39.88 + - 0.38	0.955 + - 0.015	24.26 + - 0.38	0.570 + - 0.015	14.48 + - 0.38
PT 1750	1.750 + - 0.015	44.45 + - 0.38	1.070 + - 0.015	27.18 + - 0.38	0.650 + - 0.015	16.51 + - 0.38
PT 1840	1.840 + - 0.015	46.74 + - 0.38	0.950 + - 0.015	24.13 + - 0.38	0.710 + - 0.015	18.03 + - 0.38
PT 2000	2.000 + - 0.015	50.80 + - 0.38	1.250 + - 0.015	31.75 + - 0.38	0.550 + - 0.015	13.97 + - 0.38

Tolerances are for unpainted cores

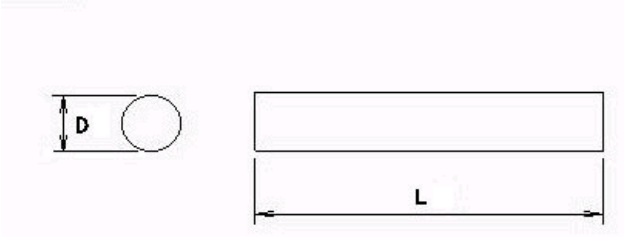
TSC Pyroferric

	TSC PYROFERRIC TOROIDAL CORE EFFECTIVE PARAMETER				INDUCTANCE INDEX AL ± 10% nH/N^2					
	MAGNETIC PATH LENGTH	EFFECTIVE CORE AREA	EFFECTIVE CORE VOLUME	CORE WEIGHT						
PART #	Le cm	Ae cm^2	Ve cm^3	GRAMS	-0	-W	-SF	-TH	-E	-C
PT 125	0.688	0.010	0.007	0.037	0.33	1.10	1.30	1.55	1.70	3.65
PT 160	0.873	0.015	0.013	0.074	0.38	1.30	1.60	1.65	2.00	4.20
PT 200	1.029	0.023	0.024	0.136	0.44	1.60	2.10	2.20	2.50	5.20
PT 250	1.382	0.024	0.034	0.186	0.38	1.50	1.75	1.85	2.20	4.20
PT 250A	1.382	0.037	0.051	0.284	0.52	2.10	2.50	2.60	3.10	7.50
PT 280	1.609	0.052	0.084	0.451	0.50	2.10	2.60	2.70	3.20	6.30
PT 310	1.720	0.060	0.103	0.566	0.73	2.55	3.25	3.30	4.00	7.10
PT 380	2.222	0.067	0.148	0.791	0.55	2.30	2.80	3.00	3.40	7.00
PT 437	2.603	0.074	0.191	1.013	0.50	2.00	2.65	2.85	3.20	6.30
PT 440	2.494	0.105	0.261	1.420	0.70	2.95	4.00	4.60	5.00	10.50
PT 500	3.057	0.118	0.361	1.887	0.64	3.10	3.30	3.70	4.30	8.20
PT 680	3.999	0.176	0.704	3.750	0.62	3.20	4.10	4.55	4.90	10.40
PT 680A	3.996	0.235	0.941	5.014	0.80	4.30	5.70	6.00	6.85	13.00
PT 800	5.000	0.238	1.188	6.149	0.68	3.30	4.15	4.70	5.40	10.80
PT 940	5.725	0.374	2.141	11.215	0.98	4.60	6.10	6.50	7.70	15.00
PT 941	6.099	0.247	1.505	7.673	0.60	3.00	3.80	3.90	4.80	9.60
PT 1060	6.163	0.661	4.074	21.844	1.60	7.80	10.00	10.50	12.50	28.00
PT 1300	7.949	0.717	5.702	29.808			8.80	9.40	11.00	20.00
PT 1570	9.671	1.108	10.714	55.821			10.50	11.50	13.00	28.00
PT 1750	10.810	1.397	15.106	56.973			12.50	13.00	15.00	30.00
PT 1840	10.360	1.966	20.365	111.183			17.50	20.00	23.50	50.00
PT 2000	12.501	1.306	16.332	84.546			9.50	10.50	12.00	24.00

Magnetic parameters calculated per MMPA standard #UEI 310

TSC Pyroferric

ROD CORES



D in.	L in.	L/D ratio	Materials and Part Numbers E	TH	SF	J	W	C	-60
0.060	0.328	5.5	P3-1866						
0.062	0.035	0.6			P3-2743				
0.062	0.175	2.8			P3-2606				
0.062	0.187	3.0				P5-3972			
0.062	0.187	3.0	P3-4565						
0.080	0.200	2.5			P3-3643				
0.080	0.230	2.9			P3-3655				
0.080	0.275	3.4	P3-4647						
0.100	0.250	2.5				P3-1536			
0.100	0.312	3.1			P3-1809				
0.100	0.500	5.0				P3-2152			
0.105	0.170	1.6					P32497		
0.105	0.200	1.9					P3-2146		
0.105	0.230	2.2					P3-1058		
0.105	0.250	2.4	P3-2258					P3-2324	
0.105	0.315	3.0	P3-4657						
0.105	0.360	3.4	P3-1931					P3-1661	
0.120	0.270	2.3					P3-2740		
0.120	0.300	2.5					P3-2662		
0.120	0.345	2.9					P3-2135		
0.120	0.500	4.2	P3-2929	P3-1426					
0.125	0.170	1.4					P3-2277		
0.125	0.230	1.8					P31058		
0.125	0.375	3.0	P3-3696					P3-3169	
0.145	0.375	2.6	P3-1523						
0.145	0.445	3.1	P3-1878						
0.145	0.455	3.1	P3-4836						
0.145	0.625	4.3	P3-2690						
0.170	0.375	2.2	P3-1940						
0.170	0.500	2.9	P3-1978						
0.187	0.255	1.4				P3-3575			
0.187	0.312	1.7		P3-2583					
0.187	0.500	2.7				P3-3580		P3-3566	
0.187	0.750	4.0							P3-2693
0.195	0.625	3.2	P3-1830						
0.195	0.750	3.8	P3-1771						
0.245	0.750	3.1			P3-2595				P3-2697
0.245	1.000	4.1		P3-2057					P3-2060
0.245	1.250	5.1	P3-1091						P3-4300
0.250	0.500	2.0	P3-1859						
Test Frequency			10 MHz	40 MHz	40 MHz	40 MHz	100 MHz	10 MHz	

Electrical values based upon *TSC-PYROFERRIC's* standard core at the specified test frequency.
Q tolerance ± 7½ % Permeability Tolerance ± 4 %

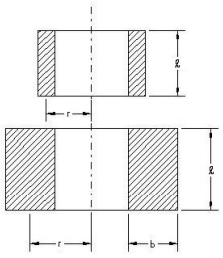
TSC Pyroferric

ROD CORES

D in.	L in.	L/D ratio	Materials and Part Numbers								
			E	TH	SF	J	W	C	-60	-67	-75
0.250	0.750	3.0			P3-2595				P3-4689	P3-4880	
0.250	0.875	3.5						P3-3794			
0.250	1.000	4.0	P3-2057	P3-1133						P3-4456	
0.250	1.125	4.5									P3-4768
0.250	1.250	5.0	P3-1091						P3-4859	P3-4318	
0.365	0.375	1.0	P3-1466								
0.365	0.500	1.4	P3-2270								
0.365	0.750	2.1		P3-1002		P3-1547					
0.365	0.875	2.4		P3-2229							
0.365	1.000	2.7		P3-1398	P3-2163						
0.375	0.750	2.0		P3-3664							
0.375	1.000	2.7	P3-3607							P3-4777	
0.375	1.190	3.2	P3-4901								
0.375	1.250	3.3								P3-4892	
0.375	1.500	4.0	P3-4841			P3-1547					
0.433	0.625	1.4						P3-1507			
0.500	0.440	0.9	P3-4145								
0.500	0.750	1.5	P3-4702								
0.500	1.000	2.0	P3-3606							P3-4842	
0.500	1.125	2.3						P3-1571			
0.500	1.375	2.8	P3-4656							P3-4819	
0.500	1.500	3.0	P3-4194								
0.500	2.000	4.0									P3-3680
0.630	0.380	0.6	P3-4906								
0.750	0.437	0.6	P3-2443								
0.750	1.000	1.3	P3-2594							P3-4867	
0.750	1.250	1.7	P3-4808								
0.750	1.500	2.0							P3-4752		
1.000	1.000	1.0	P3-4747						P4-4879		
1.000	1.250	1.3	P3-4807								
1.000	1.500	1.5		P3-4887	P3-4888				P3-4831		
1.500	1.250	0.8	P3-4926								
1.500	1.500	1.0	93-2970								
Test Frequency			10 MHz	40 MHz	40 MHz	40 MHz	100 MHz	10 MHz			

Electrical values based upon *TSC-PYROFERRIC's* standard core at the specified test frequency.
Q tolerance ± 7½ % Permeability Tolerance ± 4 %

Insert Coils

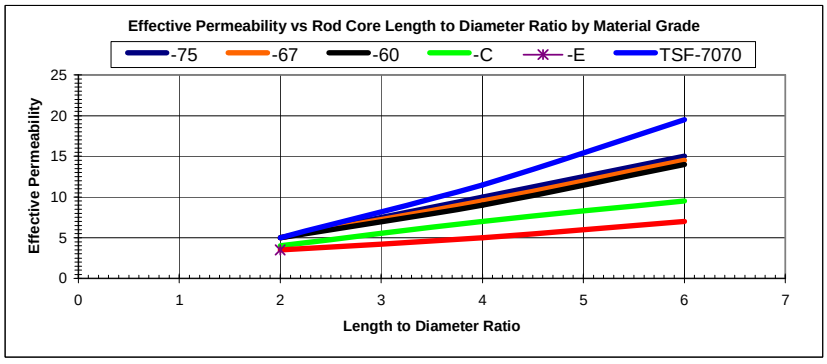


Approximate Inductance

Single layer winding
L = effective core perm * (r * N)^2 / (9 * r + 10 * l)

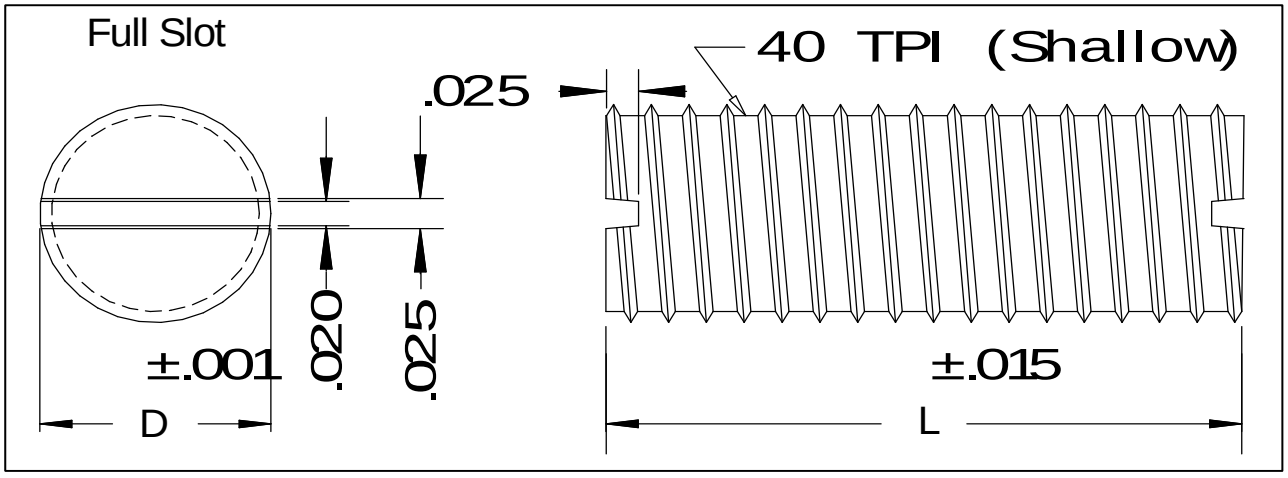
miltti-layer winding
L = effective core perm * 0.8 * (r * N)^2 / (6 * r + 9 * l + 10 * b)

L = Inductance in micro-henries
r = mean radius to center of winding in inches
N = Turn count
l = length of coil in inches



TSC Pyroferric

THREADED CORES
4-40 series



D in.	L in.	Materials and Part Numbers E	TH	SF	J	W	C
0.109	0.187	P1-3401	P1-3405	P1-3409	P1-3413	P1-3417	P1-3424
	0.25	P1-3402	P1-3406	P1-3410	P1-3414	P1-3418	P1-3425
	0.312	P1-3403	P1-3407	P1-3411	P1-3415	P1-3419	P1-3426
	0.375	P1-3404	P1-3408	P1-3412	P1-3416	P1-3420	P1-3427
Test Frequency		10 MHz	40 MHz	40 MHz	40 MHz	100 MHz	10 MHz

Any length available in range 0.125 to 0.375 inches.
Teflon Coating Available

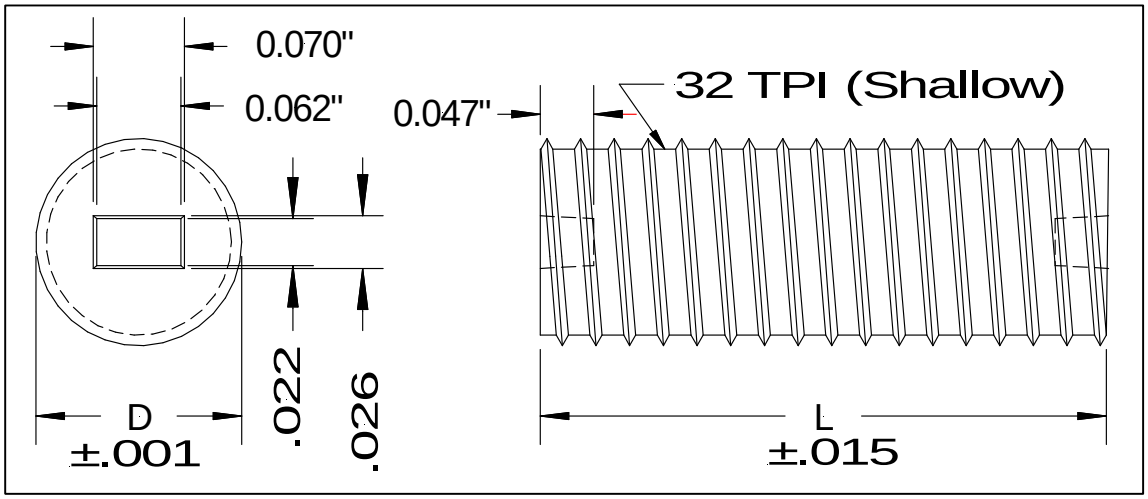
SPECIFICATIONS

Electrical values based upon *TSC-PYROFERRIC's* standard core at the specified test frequency.
Q tolerance ± 7½ % Permeability Tolerance ± 4 %

All other specifications are in accordance with MPIF Standards for iron powder cores.

TSC Pyroferric

THREADED CORES
6-32 series



D in.	L in.	Materials and Part Numbers					
		E	**TH**	**SF**	**J**	**W**	**C**
0.129	**0.187**	P1-2343	P1-2392	P1-2391	P1-2386	P1-2828	P1-3444
	0.250	P1-2334	P1-2640	P1-2393	P1-1943	P1-2802	P1-2808
	0.312	P1-2297	P1-3433	P1-3436	P1-2298	P1-2389	P1-2296
	0.375	P1-2294	P1-3434	P1-2339	P1-2295	P1-2384	P1-2293
	0.500	P1-3432	P1-3435	P1-3437	P1-2373	P1-3438	P1-3445
Test Frequency		10 MHz	40 MHz	40 MHz	40 MHz	100 MHz	10 MHz

Any length available in range 0.125 to 0.500 inches.
Teflon Coating Available

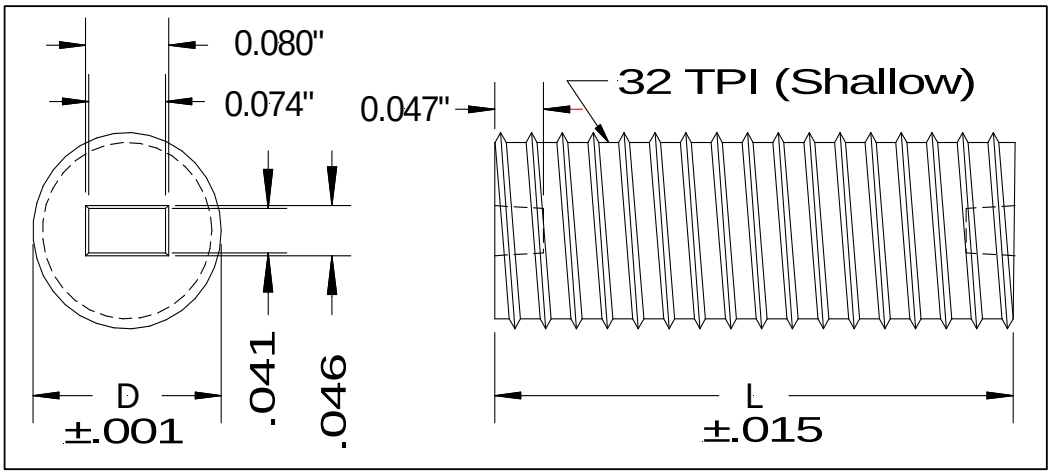
SPECIFICATIONS

Electrical values based upon *TSC-PYROFERRIC's* standard core at the specified test frequency.
Q tolerance ± 7½ % Permeability Tolerance ± 4 %

All other specifications are in accordance with MPIF Standards for iron powder cores.

TSC Pyroferric

THREADED CORES
8-32 series



D in.	L in.	Materials and Part Numbers					
		E	**TH**	**SF**	**J**	**W**	**C**
0.160	**0.187**	P1-2658	P1-2337	P1-2647	P1-2589	P1-3457	P1-3466
	0.250	P1-2261	P1-3451	P1-1988	P1-2422	P1-3458	P1-3467
	0.312	P1-3449	P1-2872	P1-2873	P1-3454	P1-3459	P1-3468
	0.375	P1-2262	P1-2874	P1-1116	P1-3455	P1-3460	P1-3469
	0.500	P1-3450	P1-3452	P1-3453	P1-3456	P1-3461	P1-3470
Test Frequency		10 MHz	40 MHz	40 MHz	40 MHz	100 MHz	10 MHz

Any length available in range 0.125 to 0.500 inches.
Teflon Coating Available

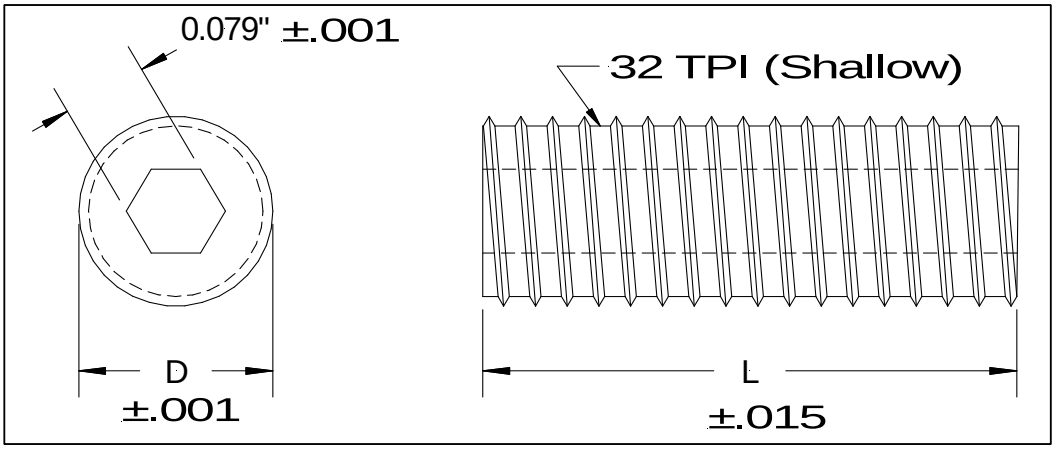
SPECIFICATIONS

Electrical values based upon *TSC-PYROFERRIC's* standard core at the specified test frequency.
Q tolerance ± 7½ % Permeability Tolerance ± 4 %

All other specifications are in accordance with MPIF Standards for iron powder cores.

TSC Pyroferric

THREADED CORES
10-32 series



D in.	L in.	Materials and Part Numbers					
		E	**TH**	**SF**	**J**	**W**	**C**
0.181	**0.187**	P1-1925	P1-3481	P1-3484	P1-3487	P1-3488	P1-3498
	0.25	P1-1934	P1-2858	P1-2362	P1-2139	P1-3489	P1-1948
	0.312	P1-2037	P1-1929	P1-2179	P1-1921	P1-3490	P1-1947
	0.375	P1-2051	P1-2860	P1-2361	P1-2070	P1-2856	P1-2309
	0.437	P1-1944	P1-2824	P1-3485	P1-2810	P1-3491	P1-2882
	0.5	P1-2323	P1-3482	P1-2375	P1-1937	P1-3492	P1-2329
	0.625	P1-2317	P1-3483	P1-3486	P1-2332	P1-3493	P1-2850
Test Frequency		10 MHz	40 MHz	40 MHz	40 MHz	100 MHz	10 MHz

Any length available in range 0.125 to 0.625 inches.
Teflon Coating Available

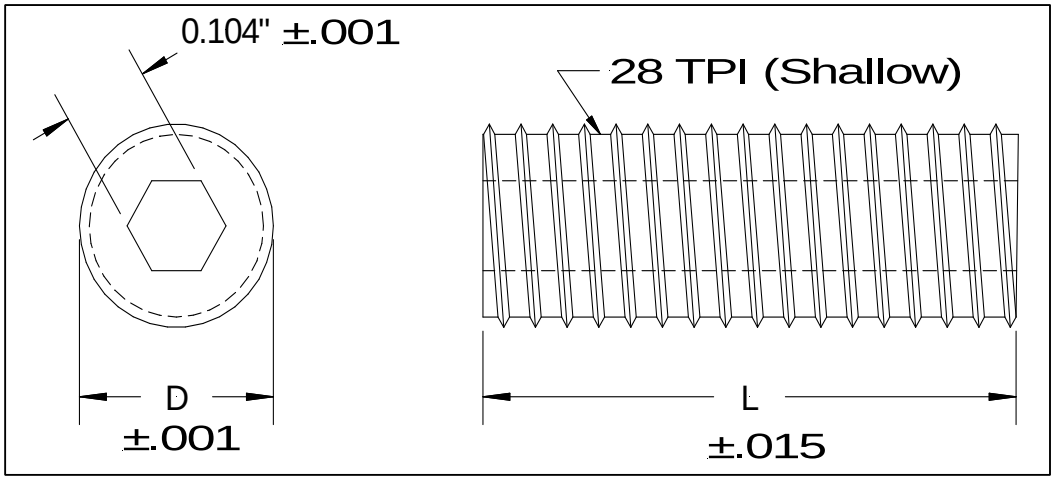
SPECIFICATIONS

Electrical values based upon *TSC-PYROFERRIC's* standard core at the specified test frequency.
Q tolerance ± 7½ % Permeability Tolerance ± 4 %

All other specifications are in accordance with MPIF Standards for iron powder cores.

TSC Pyroferric

THREADED CORES
1/4-28 series



D in.	L in.	Materials and Part Numbers					
		E	**TH**	**SF**	**J**	**W**	**C**
0.249	**0.250**	P1-5111	P1-5112	P1-1942	P1-1938	P1-2350	P1-3535
	0.312	P1-1912	P1-3518	P1-3520	P1-2335	P1-3525	P1-3536
	0.375	P1-5101	P1-5110	P1-2360	P1-5113	P1-2385	P1-2071
	0.437	P1-2379	P1-3519	P1-3521	P1-3523	P1-1401	P1-3537
0.248	**0.500**	P1-5109	P1-2344	P1-2341	P1-5115	P1-3526	P1-2848
	0.625	P1-5106	P1-2883	P1-2803	P1-1919	P1-3527	P1-2849
0.249	**0.750**	P1-1776	P1-1238	P1-3522	P1-3524	P1-3528	P1-3538
Test Frequency		10 MHz	40 MHz	40 MHz	40 MHz	100 MHz	10 MHz

Any length available in range 0.125 to 0.750 inches.
Teflon Coating Available

SPECIFICATIONS

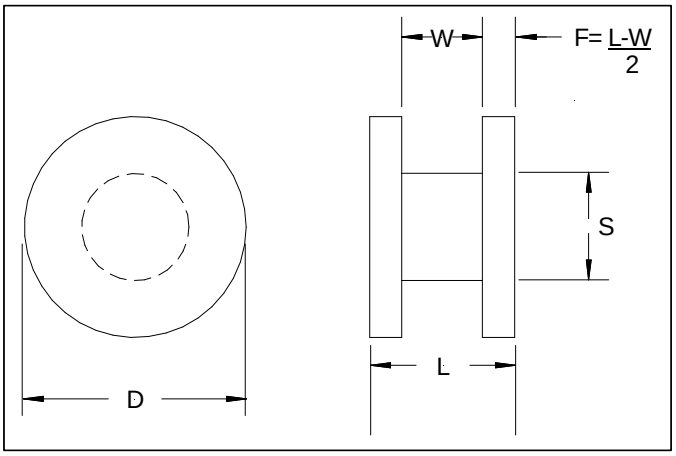
Electrical values based upon *TSC-PYROFERRIC's* standard core at the specified test frequency
Q tolerance ± 7½ % Permeability Tolerance ± 4 %

All other specifications are in accordance with MPIF Standards for iron powder cores.

TSC Pyroferric

PLAIN BOBBIN CORES

TSC-PYROFERRIC manufactures more than 200 various bobbin cores, both of its own design and to customer's specifications. All bobbin cores are electrically controlled to a wound bobbin inductance value, within narrow tolerance limits. This type of control insures uniformity, which reduces the customer's winding cost.

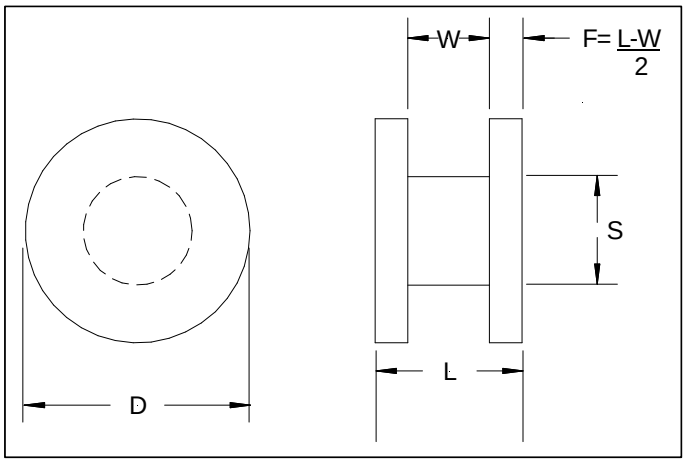


Part Number	Material	L/ 100 turns mH	D in. *mm*	L in. *mm*	W in. *mm*	S in. *mm*	Nominal Winding Area in.2 *mm2*	Average Turn Length ft. *cm*
P2-4212	**SF**	20.8	0.047	0.075	0.035	0.028	0.00038	0.0094
P2-4211	**E**	21.6	*1.19*	*1.9*	*0.89*	*0.71*	*0.2492*	*0.2859*
P2-4512	**35**	28.4						
P2-2513	**SF**	29.6	0.063	0.105	0.045	0.033	0.00067	0.0126
P2-2512	**E**	32	*1.6*	*2.67*	*1.14*	*0.84*	*0.4332*	*0.3833*
P2-4866	**35**	41.6						
P2-2942	**SF**	38	0.08	0.1	0.045	0.045	0.00079	0.0164
P2-2943	**E**	39.6	*2.03*	*2.54*	*1.14*	*1.14*	*0.5073*	*0.4979*
P2-3062	**35**	54						
P2-3063	**SF**	51.2	0.093	0.09	0.04	0.05	0.00086	0.0187
P2-2610	**E**	54	*2..36*	*2.29*	*1.02*	*1.27*	*0.5559*	*0.5702*
P2-3064	**35**	66						
P2-2983	**SF**	40.8	0.1	0.11	0.055	0.05	0.00137	0.0196
P2-2480	**E**	47.6	*2.54*	*2.79*	*1.4*	*1.27*	*0.889*	*0.5985*
P2-3065	**35**	64						
P2-3203	**SF**	66	0.125	0.125	0.051	0.063	0.00158	0.0246
P2-3202	**E**	69.2	*3.18*	*3.18*	*1.3*	*1.6*	*1.103*	*0.7493*
P2-4718	**35**	90.7						
P2-1152	**SF**	61.9	0.147	0.147	0.068	0.07	0.00262	0.0284
P2-1767	**E**	69.9	*3.73*	*3.73*	*1.73*	*1.78*	*1.687*	*0.8655*
P2-4665	**35**	84.5						
P2-3068	**SF**	66	0.187	0.16	0.08	0.076	0.00444	0.0344
P2-3206	**E**	68	*4.75*	*4.06*	*2.03*	*1.93*	*2.862*	*1.049*
P2-3069	**35**	86.3						

TSC Pyroferric

PLAIN BOBBIN CORES

TSC-PYROFERRIC manufactures more than 200 various bobbin cores, both of its own design and to customer's specifications. All bobbin cores are electrically controlled to a wound bobbin inductance value, within narrow tolerance limits. This type of control insures uniformity, which reduces the customer's winding cost.

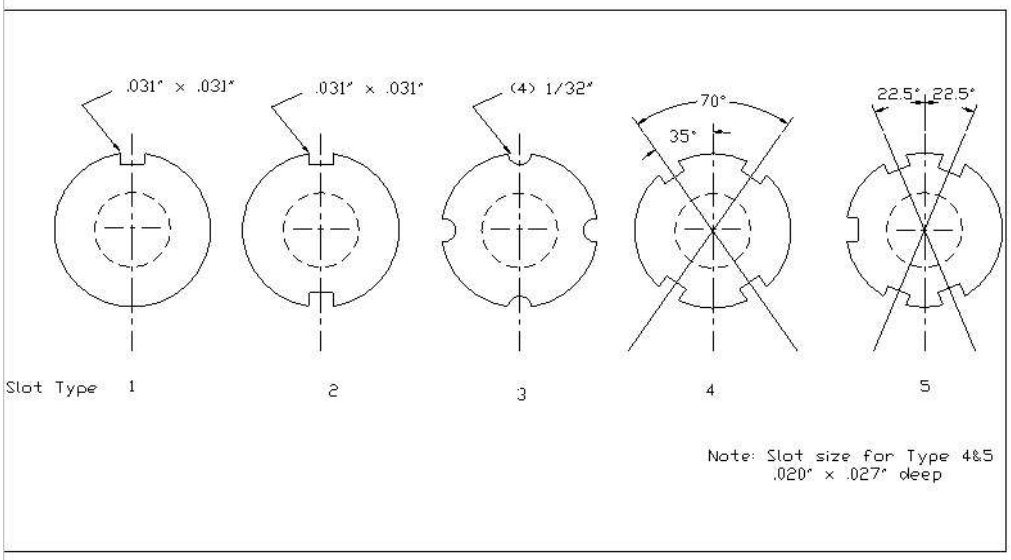


Part Number	Material	L/ 100 turns mH	D in. *mm*	L in. *mm*	W in. *mm*	S in. *mm*	Nominal Winding Area in.2 *mm2*	Average Turn Length ft. *cm*
P2-2691	**SF**	100	0.2	0.25	0.127	0.128	0.00457	0.0429
P2-3205	**E**	105	*5.08*	*6.35*	*3.23*	*3.25*	*2.955*	*1.308*
P2-4937	**35**	135						
P2-1972	**SF**	105.3	0.25	0.187	0.063	0.093	0.00494	0.0449
P2-1598	**E**	129.4	*6.35*	*4.75*	*1.6*	*2.36*	*3.192*	*1.368*
P2-4094	**35**	165.2						
P2-3072	**SF**	77.5	0.25	0.225	0.125	0.098	0.0095	0.0455
P2-1063	**E**	92.4	*6.35*	*5.72*	*3.18*	*2.49*	*6.118*	*1.388*
P2-3073	**35**	117						
P2-2799	**SF**	115.8	0.31	0.25	0.125	0.14	0.01062	0.0589
P2-1459	**E**	145.5	*7.87*	*6.35*	*3.18*	*3.56*	*6.831*	*1.795*
P2-3074	**35**	180.8						
P2-2798	**SF**	159.2	0.35	0.25	0.14	0.167	0.01281	0.0677
P2-1029	**E**	167.6	*8.89*	*6.35*	*3.56*	*4.24*	*8.277*	*2.062*
P2-3075	**35**	210						
P2-3076	**SF**	194.2	0.375	0.445	0.25	0.25	0.01562	0.0818
P2-2673	**E**	205	*9.52*	*11.3*	*6.35*	*6.35*	*10.06*	*2.493*
P2-3077	**35**	280.1						
P2-3078	**SF**	192	0.437	0.281	0.157	0.219	0.01711	0.0858
P2-3204	**E**	200	*11.1*	*7.14*	*3.99*	*5.56*	*11.05*	*2.617*
P2-3079	**35**	252						
P2-3080	**SF**	246.9	0.5	0.25	0.125	0.25	0.01562	0.0982
P2-1313	**E**	314	*12.7*	*6.35*	*3.18*	*6.35*	*10.06*	*2.992*
P2-3081	**35**	393.7						

TSC Pyroferric

SLOTTED BOBBIN CORES

TSC-PYROFERRIC manufactures more than 200 various bobbin cores, both of its own design and to customer's specifications. All bobbin cores are electrically controlled to a wound bobbin inductance value, within narrow tolerance limits. This type of control insures uniformity, which reduces the customer's winding cost.



Part Number	Material	L/ 100 turns mH	D in. *mm*	L in. *mm*	W in. *mm*	S in. *mm*	Nominal Winding Area in.2 *mm2*	Average Turn Length ft. *cm*
P2-1491	**E**	1	0.312 *7.92*	0.25 *6.35*	0.125 *3.18*	0.14 *3.56*	0.01075 *6.911*	0.0592 *1.803*
P2-1031 **P2-2783**	**E** **C**	1	0.375 *9.52*	0.281 *7.14*	0.157 *3.99*	0.187 *4.75*	0.01476 *9.516*	0.0736 *2.241*
P2-2197	**35**	2	0.16 *4.06*	0.16 *4.06*	0.09 *2.29*	0.076 *1.93*	0.00378 *2.439*	0.0309 *0.941*
P2-1092 **P2-1160**	**E** **SF**	2	0.25 *6.35*	0.187 *4.75*	0.062. *1.57*	0.093. *2.36*	0.00487 *3.132*	0.0449 *1.368*
P2-1714	**E**	2	0.5 *12.7*	0.343 *8.71*	0.187 *4.75*	0.285 *7.24*	0.0201 *12.967*	0.1027 *3.132*
P2-2607	**E**	3	0.25 *6.35*	0.187 *4.75*	0.093 *2.36*	0.093 *2.36*	0.0073 *4.708*	0.0449 *1.368*
P2-1022 **P2-2694** **P2-1173**	**E** **TH** **SF**	4	0.25 *6.35*	0.187 *4.75*	0.062 *1.57*	0.093 *2.36*	0.00487 *3.132*	0.0449 *1.368*
P2-2695 **P2-2696**	**TH** **PY11B**	4	0.25 *6.35*	0.187 *4.75*	0.062 *1.57*	0.155 *3.94*	0.00294 *1.892*	0.053 *1.616*
P2-2278	**TH**	5	0.25 *6.35*	0.187 *4.75*	0.062 *1.57*	0.093 *2.36*	0.00487 *3.132*	0.0449 *1.368*
P2-2102	**TH**	5	0.25 *6.35*	0.187 *4.75*	0.062 *1.57*	0.12 *3.05*	0.00403 *2.59*	0.0484 *1.476*
P2-1791	**E**	5	0.25 *6.35*	0.187 *4.75*	0.094 *2.39*	0.093 *2.36*	0.00738 *4.768*	0.0449 *1.368*
P2-1667	**SF**	5	0.25 *6.35*	0.187 *4.75*	0.094 *2.39*	0.095 *2.41*	0.00728 *4.708*	0.0452 *1.376*
P2-1668	**SF**	5	0.25 *6.35*	0.187 *4.75*	0.094 *2.39*	0.099 *2.51*	0.0071 *4.589*	0.0457 *1.392*
P2-1669	**SF**	5	0.25 *6.35*	0.187 *4.75*	0.094 *2.39*	0.104 *2.64*	0.00686 *4.433*	0.0463 *1.412*
P2-1670	**SF**	5	0.25 *6.35*	0.187 *4.75*	0.094 *2.39*	0.109 *2.77*	0.00663 *4.278*	0.047 *1.432*
P2-2217 **P2-2218** **P2-2216**	**E** **TH** **C**	5	0.25 *6.35*	0.187 *4.75*	0.09 *2.29*	0.145 *3.68*	0.00472 *3.057*	0.0517 *1.575*

GENERAL DATA ON LAMINATIONS

For standard type laminations, the following pages contain information on the types of materials available, their mechanical and physical characteristics, and their electrical and magnetic properties.

Types of Material

TSC-Arnold Technologies' laminations are made from various grades of electrical steels, silicon steels, nickel-iron alloys, and cold rolled motor lamination steel.

Electrical & Silicon Steels

Laminations made from various grades of electrical silicon steels are the most economical for use in small transformers and reactors. These steels are classified according to ASTM A664.

Grain Oriented

TSC-Arnold Technologies provides grain-oriented laminations in thickness of .006 and .014 (29 gauge) inches. This material shows very low core losses and high permeability in the rolling direction. Laminations made from this material are supplied in a fully stress relief annealed condition with high interlaminar resistance and a high stacking factor.

Non-Oriented

TSC-Arnold Technologies provides various grades of non-oriented silicon steels. The most common thicknesses are .0185 (26 gauge) and .025 (24 gauge) inches. Silicon content for these types of steels influences the core loss characteristics. Steels with higher silicon contents typically have lower core losses. Laminations made from these grades of steels are supplied in a fully stress relief annealed condition with high interlaminar resistance and high stacking factors.

Cold Rolled Motor Lamination Steel

TSC-Arnold Technologies provides cold rolled motor lamination steel in thickness of .018 (26 gauge) and .025 (24 gauge). Laminations produced from cold rolled motor lamination steel are used in fractional motors and transformers where low core losses are not critical and better permeability at a high KG is desired. Laminations made from this material are supplied in a fully stress relief annealed condition.

Nickel-Iron Alloys

Laminations produced from both low nickel iron alloys (50% nickel) and high nickel iron alloys (80% nickel) are used where both high performance and compactness are essential.

High Nickel-Iron Alloys (80% Nickel)

TSC-Arnold Technologies provides high nickel alloys in thickness of .006" and .014"
(29 gauge). This material has very high initial and maximum permeability for use in low density, high frequency applications, including telecommunications, ground fault interrupters and magnetic shielding. Laminations made from this material are supplied in a fully annealed condition, for highest permeability or lowest total harmonic distortion, with an inorganic coating for an optimum stacking factor. The thickness and the designation HN is used as a suffix after the lamination shape to form the catalog part number. *For example: EI375-0140-HN*.

Low Nickel-Iron Alloys (50% Nickel)

TSC-Arnold Technologies provides low nickel alloys in thickness of .006" and .014"
(29 gauge). This material shows high initial and maximum permeability for use in moderately low flux density applications, such as: servomotors, relay, armatures, and solenoids. Laminations made from this material are supplied in a fully annealed condition, assuring high permeability, with an inorganic coating for an optimum stacking factor. The thickness and the designation LN is used as a suffix after the lamination shape to form the catalog part number. *For example: EI375-0140-LN*.

TSC bourgeois

MECHANICAL AND PHYSICAL CHARACTERISTICS

TSC-Arnold Technologies' lamination standards for all applicable mechanical and physical characteristics meet or exceed the recognized industry standards. The most important of these are:

Tolerances

By maintaining the below listed tolerances, TSC-Arnold Technologies' laminations have a mechanical consistency that ensures good stacking characteristics and low gap losses.

Gauge No.	Gauge Thickness	Gauge Tolerance + or -	Burr Tolerance Max	Dimension Tolerances + or -	Flatness* Tolerances
29	.0140	.001	.0020**	.005	.022
26	.0185	.002	.0025	.005	.028
24	.0250	.003	.0030	.005	.035

* 1½" center leg and under measured with a bridge type gauge

** Nickel is .0010

Surface Insulation

The normal surface oxide on both silicon and nickel flat rolled steels provides some degree of interlamination resistance, which may be adequate for many applications. However, as additional interlamination resistance is generally desired, TSC-Arnold Technologies' laminations are coated with one of the following inorganic coatings:

Material	Coating Type	AISI Type
Grain Oriented	C-10	C-4
Non-Oriented	C-5	C-5
Nickel (High & Low)	Magnesium Oxide *or* Magnesium Methylate (Type 2)	- -

Packaging

Various methods of packaging, depending on the part number, are used for the maximum protection of the laminations in transit. Regardless of the method employed, all have the following standards:

- E and I laminations must be packed together as stamped to insure equal thickness and quantities.
- The thickness variation between E and I laminations in any one carton cannot exceed ± 2%.
- A layer of rust inhibiting paper (V.C.I. or equivalent) shall be packed between lamination layers.

TSC bourgeois

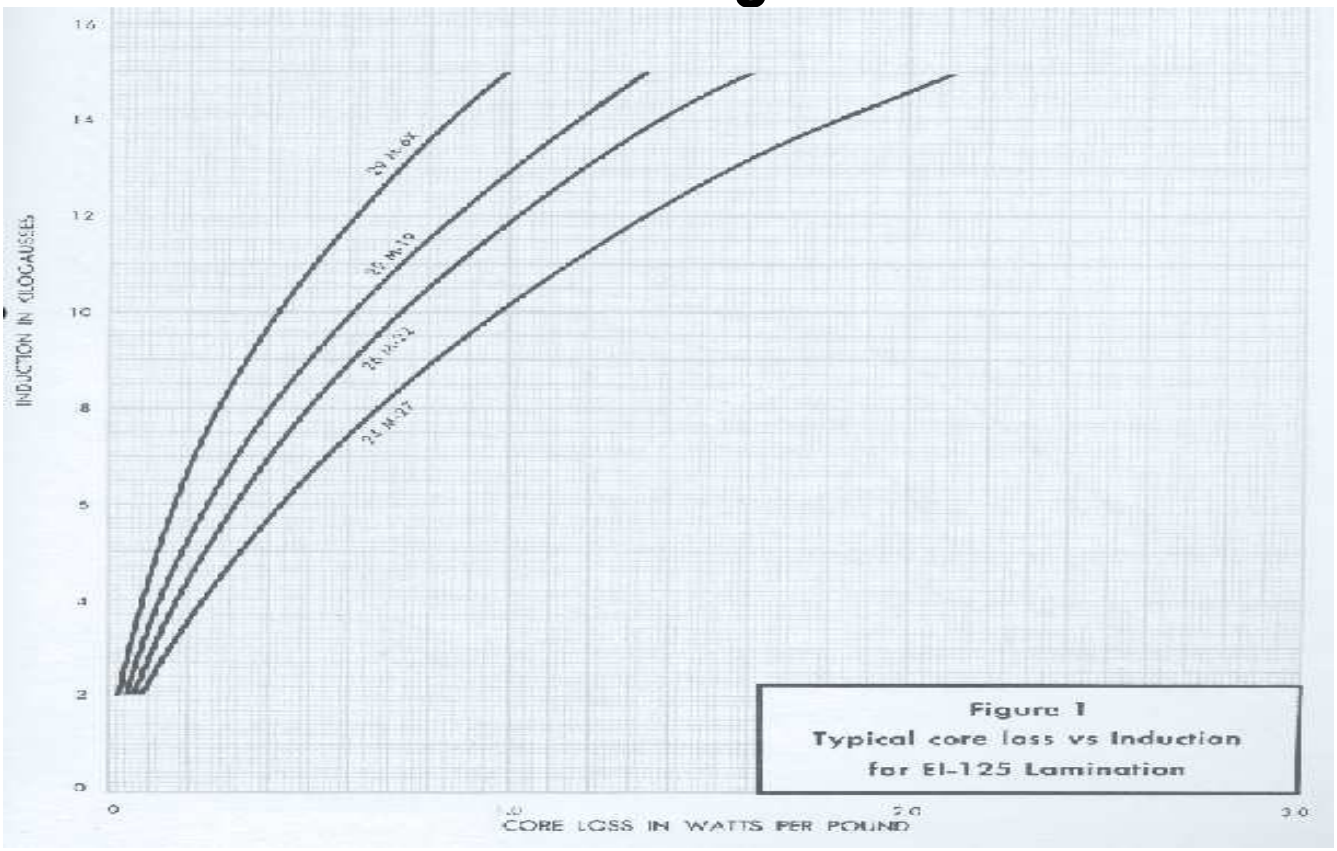


Figure 1
Typical core loss vs Induction
for EI-125 Lamination

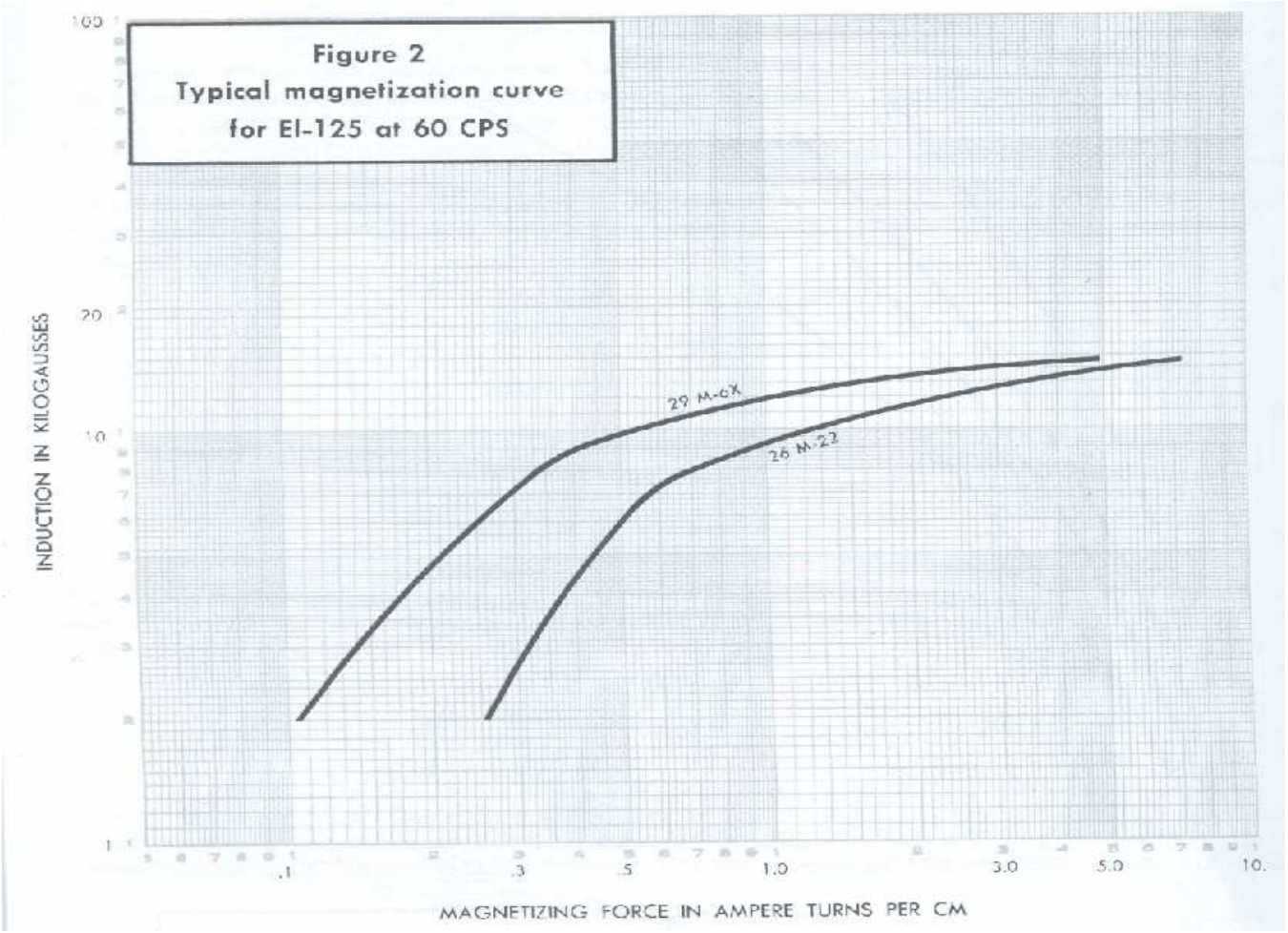
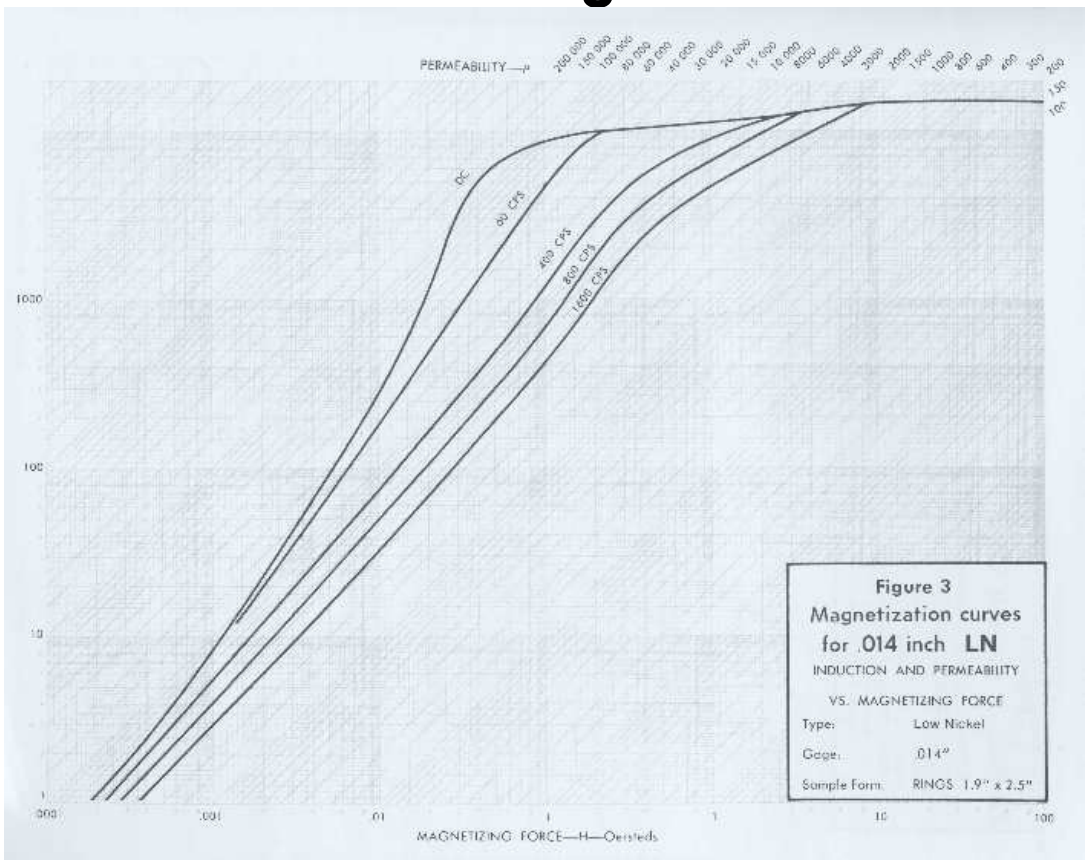
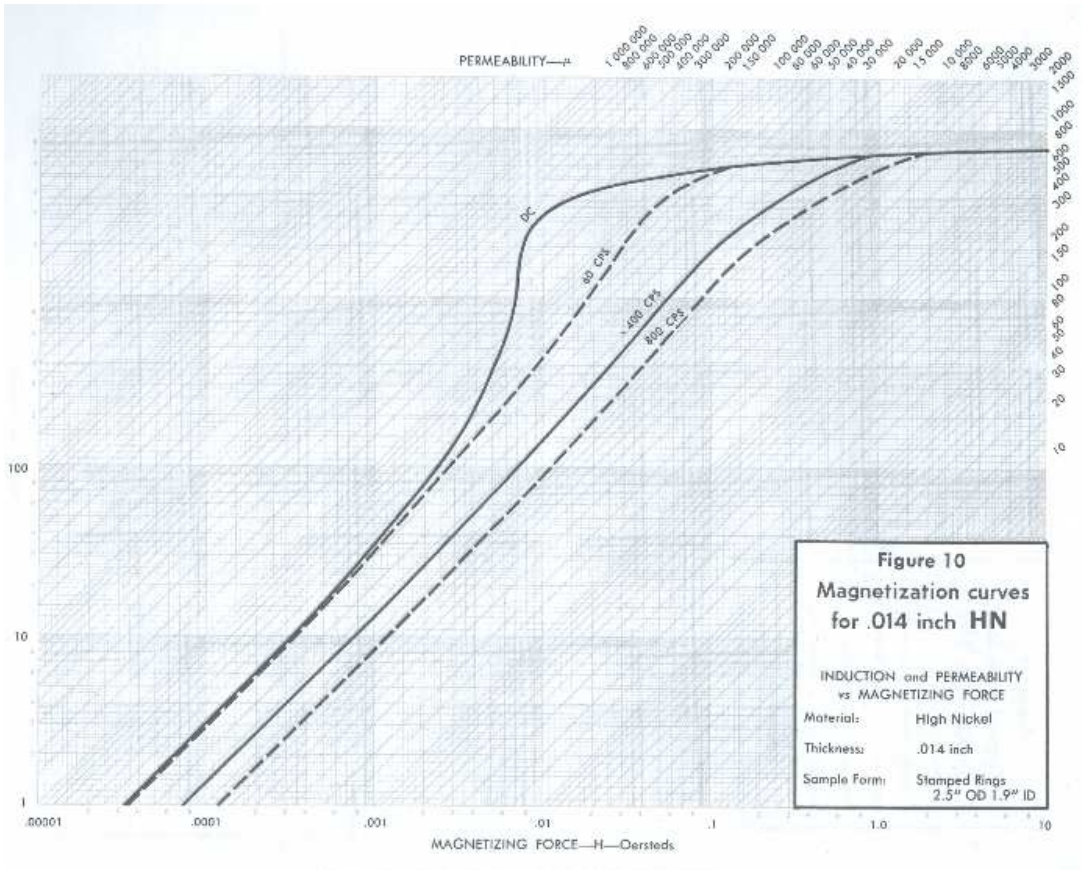


Figure 2
Typical magnetization curve
for EI-125 at 60 CPS

TSC bourgeois





TSC bourgeois

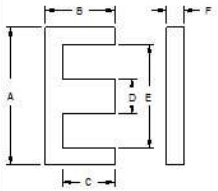


Figure 1

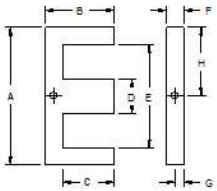


Figure 2

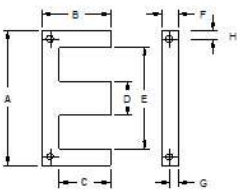


Figure 3

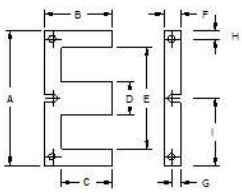


Figure 4

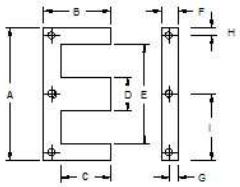


Figure 5

TSC-ARNOLD TECHNOLOGIES EI LAMINATION DIMENSIONS

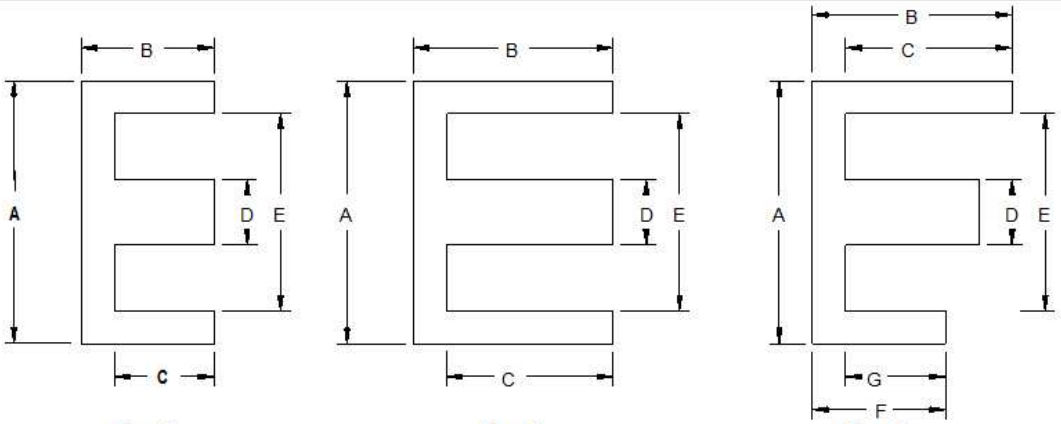
			A	B	C	D	E	F	G	H	Hole
	PART #	FIQURE	in	in	in	in	in	in	in	in	in
	EI094	1	0.375	0.203	0.156	0.094	0.281	0.047			
	EI186	1	0.750	0.344	0.250	0.188	0.563	0.094			
	EI187	1	0.750	0.531	0.438	0.188	0.563	0.094			
3/8	EI375	2	1.375	0.938	0.750	0.375	1.000	0.188	0.094	0.688	0.089
	EI21	2	1.625	1.063	0.813	0.500	1.125	0.250	0.125	0.750	0.125
1/2	EI50	2	1.500	1.000	0.750	0.500	1.000	0.250	0.125	0.750	0.125
5/8	EI625	2	1.875	1.250	0.938	0.625	1.250	0.313	0.156	0.938	0.125
3/4	EI75	2	2.250	1.500	1.125	0.750	1.500	0.375	0.188	1.125	0.125
7/8	EI87	3	2.625	1.750	1.313	0.875	1.750	0.438	0.219	0.219	0.187
1	EI100	3	3.000	2.000	1.500	1.000	2.000	0.500	0.250	0.250	0.218
1 1/8	EI112	3	3.375	2.250	1.688	1.125	2.250	0.563	0.281	0.281	0.218
1 1/4	EI125	3	3.750	2.500	1.875	1.250	2.500	0.625	0.313	0.313	0.218
	EI125R*	4	3.750	2.500	1.875	1.250	2.500	0.625	0.219	0.219	0.218
1 3/8	EI138	3	4.125	2.750	2.063	1.375	2.750	0.688	0.344	0.344	0.218
1 1/2	EI150*	4	4.500	3.000	2.250	1.500	3.000	0.750	0.375	0.375	0.218
1 3/4	EI175	3	5.250	3.500	2.625	1.750	3.500	0.875	0.438	0.438	0.281
2	EI200R	5	7.500	5.000	3.750	2.000	5.000	1.250	0.375	0.375	0.391
	EI200SR	3	6.000	4.000	3.000	2.000	4.000	1.000	0.313	0.313	0.313
2 1/8	EI212	3	6.375	4.250	3.188	2.125	4.250	1.063	0.531	0.531	0.328
2 1/4	EI225R	3	6.750	4.500	3.375	2.250	4.500	1.125	0.313	0.313	0.313
2 1/5	EI250R	5	7.500	5.000	3.750	2.500	5.000	1.250	0.375	0.375	0.391
	EI251R	5	9.000	6.750	5.500	2.500	6.500	1.250	0.500	0.500	0.375
3	EI300R	5	9.000	6.000	4.500	3.000	6.000	1.500	0.375	0.375	0.375
4	EI400R	5	12.000	8.000	6.000	4.000	8.000	2.000	0.438	0.438	0.406
1 1/4	EI1250FR	5	4.438	4.375	3.688	1.250	3.063	0.688	0.344	0.344	0.210
1 3/8	EI4731FR*	4	5.250	3.500	2.625	1.375	3.500	0.875	0.438	0.438	0.281
	EI5731FR*	4	5.250	4.875	4.000	1.375	3.500	0.875	0.438	0.438	0.281
1 5/8	EI1625FR	5	5.750	5.313	4.375	1.625	3.875	0.938	0.469	0.469	0.281
2 1/8	EI2125FR	5	7.125	6.750	5.563	2.125	4.750	1.188	0.594	0.594	0.281
2 5/8	EI2625FR	5	8.688	8.219	6.750	2.625	5.750	1.469	0.734	0.734	0.313
3 1/4	EI3250FR	5	10.625	9.938	8.125	3.250	7.000	1.813	0.906	0.906	0.438
1 1/2	EI3P150	5	7.500	5.250	3.750	1.500	4.500	1.500	0.750	0.750	0.344
	EI3P180	5	9.000	6.300	4.500	1.800	5.400	1.800	0.900	0.900	0.344
	EI3P240	5	12.000	8.400	6.000	2.400	7.200	2.400	1.200	1.200	0.406
	EI3P360	5	18.000	12.600	9.000	3.600	10.800	3.600	1.800	1.800	0.547

TSC bourgeois

		TSC-ARNOLD TECHNOLOGIES EI LAMINATION SQUARE STACK EFFECTIVE CORE SET PARAME										
		PATH	CORE	CORE	WINDOW	HN (80% Nickel		LN (49% Nickel		Silicon		
		LENGTH	AREA	VOLUME	AREA	0.006	0.014	0.006	0.014	0.014	0.0185	0.025
		Le	Ae	Ve	Wa	Lbs/	Lbs/	Lbs/	Lbs/	Lbs/	Lbs/	Lbs/
	PART #	cm	cm^2	cm^3	in^2	Mprs	Mprs	Mprs	Mprs	Mprs	Mprs	Mprs
	EI094	1.64	0.06	0.09	0.09	0.122	0.285	0.115	0.268	0.250	---	---
	EI186	2.97	0.23	0.68	0.30	0.441	1.030	0.419	0.978	0.903	---	---
	EI187	3.93	0.23	0.89	0.53	0.573	1.338	0.541	1.262	1.165	---	---
3/8	EI375	6.90	0.91	6.26	1.51	2.020	4.710	1.910	4.450	4.110	5.420	7.330
	EI21	7.71	1.61	12.44	1.64	3.020	7.060	2.860	6.670	6.170	8.150	10.580
1/2	EI50	7.08	1.61	11.41	1.21	2.810	6.550	2.650	6.170	5.720	7.560	9.800
5/8	EI625	8.85	2.52	22.29	1.89	4.410	10.270	4.160	9.700	8.970	11.850	16.020
3/4	EI75	10.61	3.63	38.51	2.72	6.340	14.800	5.980	13.970	13.000	17.200	23.200
7/8	EI87	12.38	4.94	61.17	3.71	---	19.850	---	18.750	17.350	22.900	31.000
1	EI100	14.15	6.45	91.29	4.84	---	25.800	---	24.400	22.600	29.900	40.300
1 1/8	EI112	15.92	8.17	130.00	6.12	---	32.800	---	31.000	28.700	37.900	51.200
1 1/4	EI125	17.69	10.08	178.30	7.56	---	40.800	---	38.400	35.600	47.100	63.600
	EI125R*	17.69	10.08	178.30	7.56	---	40.800	---	38.400	35.600	47.100	63.600
1 3/8	EI138	19.46	12.20	237.35	9.15	---	---	---	---	43.200	57.200	77.200
1 1/2	EI150*	21.23	14.52	308.10	10.89	---	---	---	---	51.600	68.200	92.200
1 3/4	EI175	24.76	19.76	489.25	14.82	---	---	---	---	69.300	91.500	123.800
2	EI200R	35.79	29.58	1,058.67	36.29	---	---	---	---	126.300	166.800	---
	EI200SR	28.30	25.81	730.31	19.36	---	---	---	---	88.500	118.800	---
2 1/8	EI212	27.80	32.48	902.98	11.57	---	---	---	---	96.900	130.600	---
2 1/4	EI225R	31.84	32.66	1,039.84	24.50	---	---	---	---	108.800	146.700	---
2 1/5	EI250R	35.38	40.32	1,426.39	30.24	---	---	---	---	133.100	179.500	---
	EI251R	48.08	40.32	1,938.49	70.97	---	---	---	---	178.600	240.600	---
3	EI300R	42.45	58.06	2,464.80	43.55	---	---	---	---	193.100	260.300	---
4	EI400R	56.60	103.23	5,842.50	77.42	---	---	---	---	344.700	455.200	---
1 1/4	EI1250FR	28.65	10.67	305.71	21.57	---	---	---	---	17.380	---	---
1 3/8	EI4731FR*	25.05	14.12	353.71	17.99	---	---	---	---	61.520	---	---
	EI5731FR*	31.92	13.97	445.93	27.42	---	---	---	---	77.090	---	---
1 5/8	EI1625FR	35.02	18.54	649.31	31.75	---	---	---	---	93.110	---	---
2 1/8	EI2125FR	44.04	31.13	1,370.78	47.11	---	---	---	---	163.000	---	---
2 5/8	EI2625FR	53.49	47.53	2,542.74	68.04	---	---	---	---	226.640	---	---
3 1/4	EI3250FR	64.73	72.73	4,707.80	98.29	---	---	---	---	338.370	---	---
1 1/2	EI3P150	33.52	20.20	677.22	36.29	---	---	---	---	140.520	---	---
	EI3P180	40.22	29.09	1,170.24	52.26	---	---	---	---	203.240	---	---
	EI3P240	53.63	51.72	2,773.90	92.90	---	---	---	---	362.080	488.110	---
	EI3P360	80.45	116.38	9,361.90	209.03	---	---	---	---	815.910	---	---

Other material thicknesses and ASTM grades available upon request

TSC bourgeois



TSC-ARNOLD TECHNOLOGIES E & LE LAMINATION DIMENSIOI

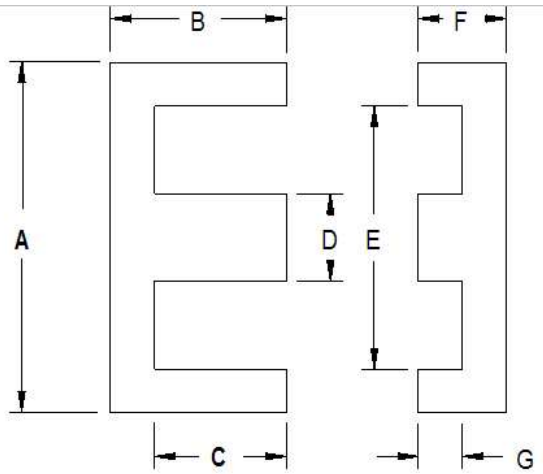
	PART #	FIQURE	A in	B in	C in	D in	E in	F in	G in	H in
	E250	1	0.840	0.445	0.320	0.250	0.590			
	E23	1	1.000	0.625	0.500	0.250	0.750			
	LE32	2	0.600	0.425	0.350	0.150	0.450			
16ELM	LE189	2	0.625	0.625	0.531	0.188	0.438			
186EL	EL186	1	0.750	0.438	0.344	0.188	0.563			
	LE186	2	0.780	1.078	0.883	0.195	0.585			
	LE187	3	0.750	0.625	0.531	0.188	0.563	0.438	0.344	0.438
2425EL	LE25	2	1.000	0.750	0.625	0.250	0.750			
	LE10	3	1.875	1.250	0.938	0.625	1.250	0.563	0.250	0.594
	LE625	1	2.500	1.563	1.250	0.625	1.875			

TSC-ARNOLD TECHNOLOGIES EE LAMINATION SQUARE STACK EFFECTIVE CORE SET PARAME

NS		PATH LENGTH	CORE AREA	CORE VOLUME	WINDOW AREA	HN (80% Nickel 0.006	0.014	LN (49% Nickel 0.006	0.014	Silicon 0.014	0.0185	0.025
	PART #	Le cm	Ae cm^2	Ve cm^3	Wa cm^2	Lbs/ Mprs	Lbs/ Mprs	Lbs/ Mprs	Lbs/ Mprs	Lbs/ Mprs	Lbs/ Mprs	Lbs/ Mprs
	E250	5.112	0.403	2.061	0.054	0.502	1.172	0.474	1.106	---	---	---
	E23	6.990	0.403	1.536	0.125	---	1.668	---	1.570	---	---	---
	LE32	2.920	0.145	0.452	0.041	0.284	0.663	0.625	0.268	---	---	---
16ELM	LE189	3.592	0.174	0.624	0.219	0.496	1.158	0.468	1.092	---	---	---
186EL	EL186	3.180	0.227	0.721	0.047	0.367	0.824	0.346	0.808	---	---	---
	LE186	5.960	0.246	1.835	0.865	---	2.190	---	2.070	---	---	---
	LE187	6.350	0.226	1.440	0.164	0.447	1.039	0.421	0.979	0.921	---	---
2425EL	LE25	5.080	0.403	2.050	0.125	0.830	1.936	0.782	1.825	1.593	---	---
	LE10	10.800	2.520	27.000	0.371	---	5.840	---	5.530	5.100	---	---
	LE625	11.113	2.600	24.000	0.524	---	10.450	---	9.860	---	---	---

Other material thicknesses and ASTM grades available upon request

TSC bourgeois



TSC-ARNOLD TECHNOLOGIES EE LAMINATION DIMENSIONS

		A	B	C	D	E	F	G
	PART #	in	in	in	in	in	in	in
3/32	EE3031	0.375	0.219	0.172	0.093	0.281	0.156	0.109
1/8	EE2829	0.500	0.313	0.250	0.125	0.375	0.125	0.063
	EE3233	0.580	0.270	0.200	0.140	0.440	0.145	0.075
3/16	EE186187	0.750	0.531	0.438	0.188	0.563	0.344	0.250
1/4	EE2425	1.000	0.500	0.375	0.250	0.750	0.250	0.125
3/8	EE2627	1.250	0.688	0.500	0.375	0.875	0.375	0.188
	EE2638	1.250	0.520	0.333	0.375	0.875	0.375	0.188
	EE2738	1.250	0.688	0.500	0.375	0.875	0.520	0.333

TSC-ARNOLD TECHNOLOGIES EE LAMINATION SQUARE STACK EFFECTIVE CORE SET PARAMET

	PATH	CORE	CORE	WINDOW	N (80% Nickel		LN (49% Nickel		Silicon		
	LENGTH	AREA	VOLUME	AREA	0.006	0.014	0.006	0.014	0.014	0.0185	0.025
PART #	Le cm	Ae cm^2	Ve cm^3	Wa in^2	Lbs/ Mprs	Lbs/ Mprs	Lbs/ Mprs	Lbs/ Mprs	Lbs/ Mprs	Lbs/ Mprs	Lbs/ Mprs
EE3031	2.28	0.06	0.13	0.17	0.166	0.387	0.157	0.366	0.339	---	---
EE2829	2.72	0.10	0.28	0.25	0.267	0.624	0.251	0.585	0.546	---	---
EE3233	2.72	0.13	0.34	0.27	0.298	0.699	0.281	0.660	0.603	---	---
EE186187	5.20	0.23	1.18	0.83	0.756	1.765	0.713	1.665	1.546	---	---
EE2425	4.92	0.52	2.54	0.81	0.415	2.210	0.894	2.090	1.940	---	---
EE2627	6.26	0.91	5.68	1.11	1.860	4.350	1.760	4.110	3.810	---	---
EE2638	5.41	0.91	4.90	0.84	1.620	---	1.530	---	---	---	---
EE2738	7.00	0.91	6.35	1.34	2.450	---	2.310	---	---	---	---

Other material thicknesses and ASTM grades available upon request

TSC International

CORE SIZE SELECTION FOR POWER TRANSFORMERS

A Power Transformers Core selection is dependent on the amount of power the core will need to handle. A relationship between apparent Power (Pt) and Area Product (WaAe) can be derived from Faraday's Law as follows:

Faraday's Law $Np = \frac{Vp \times 10^4}{Kf\ Bm\ Ae\ f}$ $Ns = \frac{Vs \times 10^4}{Kf\ Bm\ Ae\ f}$

Winding Area Utilization $KuWa = Np\ Awp + NsAws$ (by definition $Aw = \frac{I}{J}$)

Substituting $\frac{I}{J}$ for Aw $KuWa = Np\ \frac{Ip}{J} + Ns\ \frac{Is}{J}$

Substituting $\frac{V \times 10^4}{Kf\ Bm\ Ae\ f}$ for Np and Ns

$$KuWa = \left(\frac{Vp \times 10^4}{Kf\ Bm\ Ae\ f}\right)\left(\frac{Ip}{J}\right) + \left(\frac{Vs \times 10^4}{Kf\ Bm\ Ae\ f}\right)\left(\frac{Is}{J}\right)$$

Rearranging $WaAe = \frac{\left[(Vp\ Ip) + (VsIs)\right]10^4}{Ku\ Kf\ Bm\ f\ J}$

Input Power $Pin = VP\ Ip = \frac{Vs\ Is}{\eta} = \frac{Po}{\eta}$

Output Power = Po = VsIs

Apparent Power $= Pt = Pin + Po = \frac{Po}{\eta} + Po = Po\left(\frac{I}{\eta} + 1\right) = (Vp\,Ip + Vs\,Is)$

Substituting $Ap = WaAe = \frac{Pt \times 10^4}{Ku\ Ke\ B\ f\ J}$

J	=	Current density (A/cm^2)
Ke	=	Wave Form Coefficient (typically 4 for square wave)
Ku	=	Window Utilization Factor (typically 0.4)
Wa	=	Window Area (winding area cm^2)
Np	=	Primary Turns
Ns	=	Secondary Turns
Ip	=	Primary Current in amperes
Is	=	Secondary Current in amperes
Vp	=	Primary Voltage
Vs	=	Secondary Voltage
Pt	=	Apparent Power (watts)
Po	=	Output Power (watts)
Pin	=	Input Power (watts)
η	=	Efficiency
Ae	=	Effective core cross sectional area in cm^2
B	=	Maximum Operating Flux density in tesla
f	=	Frequency in Hz

WaAe is published for each of our cores in cm^4

TSC International

$B = \frac{Erms \times 10^8}{4.44FNAe}$ IN GAUSS (FOR A SINE WAVE CONDITION)	$\mu = \frac{B}{H}$
$B = \frac{Eavg \times 10^8}{4FNAe}$ IN GAUSS (FOR A SQUARE WAVE CONDITION)	$L = \frac{.004\ \pi\ N^2Ae \times 10^{-8}\ \mu}{Le}$ IN HENRIES
$B = \frac{E\ PEAK \times 10^8 t}{NAe}$ IN GAUSS (FOR A PULSED WAVE CONDITION)	$Lair = \frac{.004\ \pi\ Ae \times 10^{-8}}{Le}$ IN HENRIES/N²
$Hac = \frac{0.4\ \pi\ N\sqrt{2}\ Irms}{Le}$ IN OERSTEDS	$A_L = \mu_e\ Lair \times 10^9$ IN NANO HENRIES/N²
$Hdc = \frac{0.4\ \pi\ NIdc}{Le}$ IN OERSTEDS	$Q = \frac{XLs}{Rs}$ or $\frac{2\ \pi\ FLs}{Rs}$

Determine approximate A_L from known gap:

$$A_L = \frac{4\ \pi\ \mu\ A_E A_G}{\mu\ A_E L_G + A_G(L_E - L_G)}$$

OR

determine approximate gap from known A_L:

$$L_G = \left(\frac{4\ \pi\ \mu\ A_E A_G}{A_L} - A_G L_E\right) \div (\mu\ A_E - A_G)$$

A_L = Inductance index in nH/N² or mH/1000 turns
μ = Material permeability
A_E = Effective cross sectional area in CM²
A_G = Area of gap in CM²
L_E = Effective magnetic path length in CM
L_G = Gap length in CM
G = Winding length in CM

Formulas neglect fringing flux. Multiply the equation for A_L value by $(1 + L_G/\sqrt{A_e}\ \ln(2G/L_g))$ to account for fringing flux.

REFERENCES

Annual book for ASTM Standards Volume 03.04
Metals Test Methods and Analytical Procedures for Magnetic Properties…

Available from: American Society for Testing and Materials
100 Barr Harbor Drive
West Conshohocken, PA 194288-2959
Phone: (610) 832-9500

IMA Publications on Soft Ferrites
Soft Ferrites A User's Guide
Standard No. UEI 310 Standard Specifications for Ferrite U,E&I cores
Standard No. PC 110 Standard Specifications for Ferrite Pot Cores
Standard No. FTC 410 Standard Specifications for Ferrite Toroid Cores
Permanent Magnet Guidelines
Standard No. 0100-90 Standard Specifications for Permanent Magnet Materials

Available from: International Magnetics Association
8 South Michigan Avenue, Suite 1000
Chicago, IL 60603
Phone: (312) 456-5590
FAX: (312) 580-0165

GLOSSARY OF TERMS

SYMBOL	UNIT	DEFINITION
H	OERSTED	**MAGNETIC FIELD STRENGTH (MAGNETIZING FORCE)** The externally applied magnetizing force that induces magnetic flux in a magnetic material.
Hs	OERSTED	**SATURATION MAGNETIZATION FORCE** The value of magnetizing force (H) required to achieve saturation.
Hc	OERSTED	**COERCIVE FORCE** The magnetizing force required to reduce the magnetic induction in a magnetic structure from Br to zero.
B	GAUSS	**MAGNETIC FLUX DENSITY (MAGNETIC INDUCTION)** The flux per unit area induced by a field strength (H).
Bs	GAUSS	**SATURATION FLUX DENSITY** The value of magnetic flux density at saturation. It is material's maximum magnetic induction possible.
Br	GAUSS	**RESIDUAL INDUCTION (REMANENECE)** The magnetic induction (B) remaining in a magnetized material after the magnetizing force (H) has been reduced to zero.
μ	—	**PERMEABILITY** The measure of a materials ability to conduct magnetic flux relative to air (where air is assumed to have a permeability of one (1). The ratio of the flux (B) in a material that results from a known magnetizing force (H) divided by that same known magnetizing force (H) (μ = B/H).
μ_i	—	**INITIAL PERMEABILITY** The relative permeability at very low magnetic field strenghts (H).
μ_e	—	**EFFECTIVE PERMEABILITY** The relative permeability of a magnetic structure including the effect of air gaps in the magnetic path length.
μ_m	—	**MAXIMUM PERMEABILITY** The maximum value of permeability observed on a magnetic material as its normal magetization curve is traversed.
L	HENRY	**INDUCTANCE (INDUCTOR)** Electrical circuit property that opposes any change in current because of a magnetic field.
AL	nH/N2 or mH/1000 TURNS	**INDUCTANCE INDEX** Inductance per unit turn.
Q	—	**Q FACTOR** A measure of the losses in a material at very low levels of magnetizing force. High Q means low losses; low Q means high losses.
TAN $\delta/\mu i$	—	**LOSS FACTOR** Figure of merrit of a material. Eddy current and residual losses per unit of permeability (1/UO).
T.C.	%/°C or PPM/°C	**TEMPERATURE COEFFICIENT** The effect of temperature on magnetic characteristics, such as μ, B, H, etc. always expressed over a specified temperature range.
Tc	°C	**CURIE TEMPERATURE** The temperature at which a ferromagnetic material becomes paramagnetic. The temperature at which a material's initial permeability becomes equal to the permeability of air which is assumed to be one (1).
Le	cm	**EFFECTIVE MAGNETIC PATH LENGTH** Normalized distance of the path that the magnetic flux takes through the core.
Ae	cm^2	**EFFECTIVE CROSS SECTIONAL AREA** Normalized core area perpendicular to the magnetic line of flux.

GLOSSARY OF TERMS (continued)

SYMBOL	UNIT	DEFINITION
Ve	cm^3	**EFFECTIVE CORE VOLUME** Effective volume of the magnetic core material (may be less than the physical volume of the core).
Wa	cm^2	**CORE WINDOW AREA** Area available for windings.
WaAe	cm^4	**POWER HANDLING CAPABILITY INDEX** The product of a core's effective cross sectional area and its window area. Also known as area product (Ap).
—	—	**SATURATION** A magnetic material is saturated when increases in magnetizing force (H) no longer appreciably increase the magnetic induction (B).
—	mw/cm^3	**CORE LOSS** A measure of the efficiency of a material at relatively high levels of magnetizing force (H). Power dissipated in the material (analagous to I^2R loss in a resistor).
—	—	**HYSTERESIS CURVE** A curve showing the relationship between a magnetizing force (H) and the resultant magnetic induction (B).
—	—	**TRANSFORMER** A device that transforms electric energy from one circuit to another circuit by electromagnetic induction. The transformed electric energy is at the same frequency but often at different voltage and current values. Transformers are often used to step up or down voltage or current, match impedances or isolate one circuit from another.
—	—	**CHOKE COIL (FILTER)** Inductor placed in a circuit to "choke out" unwanted frequencies. Often used to allow direct current to pass while opposing pulsating or alternating current.
thd	decibels	**TOTAL HARMONIC DISTORTION** The ratio of output power at the fundamental frequency to the output power of all harmonics

Prefix	Symbol	Factor
yocto	y	10^{-24}
zepto	z	10^{-21}
atto	a	10^{-18}
femto	f	10^{-15}
pico	p	10^{-12}
nono	n	10^{-9}
micro	μ	10^{-6}
milll	m	10^{-3}
centi	c	10^{-2}
deci	d	10^{-1}
deca	da	10^{1}
hecto	h	10^{2}
kilo	k	10^{3}
mega	M	10^{6}
giga	G	10^{9}
tera	T	10^{12}
peta	P	10^{15}
exa	E	10^{18}
zetta	Z	10^{21}
yotta	Y	10^{24}

TSC International

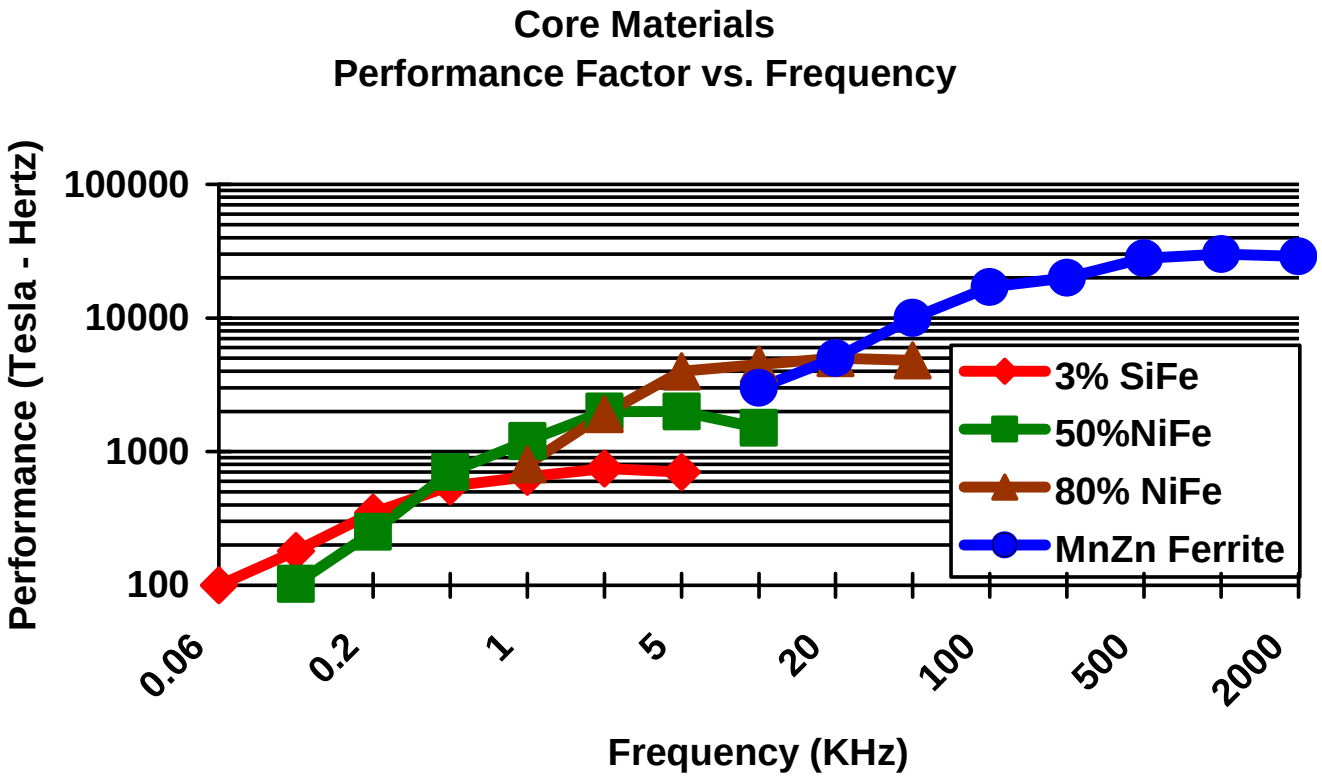
Metric System SI Units

Quantity	Metric Symbol	Metric SI Units	Customary Symbol	Customary Units	Multiplication Factor to Convert from Customary Units to SI Units
Area	m^2	Square meter	cm^2	Square centimeter	$1x10^{-4}$
Celsius Temperature	^{O}C	Degree Celsius	^{O}F	Degree Fahrenheit	(F-32)*5/9
Density	kg/m^3	Kilogram per cubic meter	g/cm^3	Gram per cubic centimeter	$1x10^3$
Electric resistance	Ω	Ohm	Ω	Ohm	1
Electrical charge	C	Coulomb	E.M.	Electric charge per mass	10
Electric current	A	Ampere	I	Ampere	1
Electrical potential, electromotive force	V	Volt	E	Volt	1
Energy, work	J	Joule	ERG	Centimeter-gram-second	$1x10^{-7}$
Force	N	Newton	#	Pounds	4.44822
Frequency	Hz	Hertz	kHz	Kilohertz	$1x10^3$
Inductance, Inductor	H	Henry	L	Henry	1
Length	m	Meter	cm	Centimeter	$1x10^{-2}$
Magnetic field strength	A/m	Ampere per meter	Oe	Oersteds	79.58
Magnetic flux	Wb	Weber	Mx	Maxwell	$1x10^{-8}$
Magnetic flux density, Magnetic Induction	T	Tesla	g	Gausses	$1x10^{-4}$
Mass	kg	Kilogram	g	Gram	$1x10^{-3}$
Permeability	H/m	Henry per meter	μ	(Unit less)	$4x10^{-7}$
Power	W	Watt	W	Mw	$1x10^{-3}$
Power Loss Density	kW/m^3	Kilowatt per cubic meter	Pc	mW/cm^3	1
Pressure, stress	Pa	Pascal	PSI	Lbs/in^2	6896.5
Thermal conductivity	W/(m*K)	Watt per meter Kelvin			
Time	S	Second	S	Second	1
Volume	m^3	Cubic meter	cm^3	Cubic centimeter	$1x10^{-6}$

TSC International

CROSS REFERENCE OF TSC INTERNATIONAL PART NUMBERS

Part Type	Description	TSC FERRITE Int'l. PART # Soft Ferrite	TSC Pyroferric PART # Iron Powder	TSC Arnold Technologies PART # Lamination
E Core	EE2829	13-06-03		EE2829
E Core	EF12.6	13-06-04	PE51	
E Core	EF16	16-08-05	PE63	
E Core	E3233	17-07-03		EE3233
E Core	E187	19-08-05	PE75	EI186
E Core	EF 20	20-10-06	PE80	
E Core	E2425	25-10-06	PE100	EE2425
E Core		25-16-06		LE25
E Core	E30/7	30-15-07	PE118	
E Core	E375	34-14-09	PE137	EI375
E Core	E21	41-16-12	PE162	EI21
E Core	E42/15	42-21-15	PE168	
E Core	E42/20	42-21-20	PE168A	
E Core	E625	47-21-16		EI625
E Core	E75	56-24-19		EI75
E Core	EE65	70-54-32		EI87



39105 North Magnetics Blvd. Wadsworth, IL 60083 TEL (847) 249-4900 • FAX (847) 249-4988 www.tscinternational.com

TSC International

FORMULAS FOR CALCULATING QUALITY METRICS

VARIABLE DATA

METRIC	*Double Sided*	*Single Sided with Upper Limit*	*Single Sided with Lower Limit*
Cp	**(USL-LSL)/6s**	**(USL-m)/3s**	**(m-LSL)/3s**
K	**|T-m|/(USL-LSL)(0.5)**	**|T-M|/(T-USL)**	**|T-m|/(LSL-T)**
Cpk	**Cp(1-k)**	**Cp(1-k)**	**Cp(1-k)**
Sigma	**3 Cpk**	**3Cpk**	**3Cpk**

Where:

Cp = Centered process capability
k = Process mean offset
Cpk = Process capability
m = sample mean
s = sample standard deviation
USL = Upper spec limit
LSL = Lower spec limit
T = Target value

TSC INTERNATIONAL
WARRANTIES AND DISCLAIMERS

"TSC International" expressly warrants to the "Buyer" for whom it manufactures, sells and delivers product made of magnetic materials will conform to specifications and drawings as published within the product catalog. Buyer specifications that have not been approved by the International Electronic Commission shall be considered as a custom product, and will be warranted by TSC International for the buyer in a separate written agreement.

There are no other express or implied warranties which extend beyond the above-referenced warranty of conformity to the specifications and specifically, TSC International does not warrant that any product will be merchantable or fit for the particular purpose for which the purchaser, it successors, agents, assigns or affiliates, intends to use such product.

Buyer shall notify TSC International in writing (and reasonable detail) of any defect in any product within thirty (30) days after the delivery date thereof. If products do not conform to the specification, buyer's remedy shall be limited, at TSC International's sole discretion, to either (1) The return of such product in exchange for the return of or credit for any payment received by TSC International relating thereto; (2) The replacement of such product; or (3) The repair of such product. TSC International shall pay for all reasonable shipping costs incurred in connection with the return, replacement or repair of any defective product. Solution to resolve defective product shall be within (60) days after receipt of written notice from buyer of such defect.

TSC International shall not be liable for any incidental or consequential loss, damage or expense (including without limitation, economic loss or lost profits) or buyer for any defective product sold and delivered to buyer regardless or whether such loss, damage or expense results from a breach of contract or warranty or commission of a tort (including, without limitation, strict liability or negligence).

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CONVERSION FOR QUALITY METRICS

Z	CPK	SIGMA	PROBABILITY OF GOOD	PROBABILITY OF DEFECT	PPM
1.5	0.50	3.0	93.3200%	6.6800%	66800
1.6	0.53	3.1	94.5200%	5.4800%	54800
1.7	0.57	3.2	95.5400%	4.4600%	44600
1.8	0.60	3.3	96.4100%	3.5900%	35900
1.9	0.63	3.4	97.1300%	2.8700%	28700
2.0	0.67	3.5	97.7200%	2.2800%	22800
2.1	0.70	3.6	98.2100%	1.7900%	17900
2.2	0.73	3.7	98.6100%	1.3900%	13900
2.3	0.77	3.8	98.9300%	1.0700%	10700
2.4	0.80	3.9	99.1800%	0.8200%	8200
2.5	0.83	4.0	99.3800%	0.6200%	6200
2.6	0.87	4.1	99.5300%	0.4700%	4700
2.7	0.90	4.2	99.6500%	0.3500%	3500
2.8	0.93	4.3	99.7400%	0.2600%	2600
2.9	0.97	4.4	99.8100%	0.1900%	1900
3.0	1.00	4.5	99.8700%	0.1300%	1300
3.1	1.03	4.6	99.9000%	0.1000%	1000
3.2	1.07	4.7	99.9300%	0.0700%	700
3.3	1.10	4.8	99.9500%	0.0500%	500
3.4	1.13	4.9	99.9700%	0.0300%	300
3.5	1.17	5.0	99.9767%	0.0233%	233
3.6	1.20	5.1	99.9841%	0.0159%	159
3.7	1.23	5.2	99.9892%	0.0108%	108
3.8	1.27	5.3	99.9928%	0.0072%	72
3.9	1.30	5.4	99.9952%	0.0048%	48
4.0	1.33	5.5	99.9968%	0.0032%	32
4.1	1.37	5.6	99.9979%	0.0021%	21
4.2	1.40	5.7	99.9987%	0.0013%	13
4.3	1.43	5.8	99.9992%	0.0009%	9
4.4	1.47	5.9	99.9995%	0.0005%	5
4.5	1.50	6.0	99.9997%	0.0003%	3

PROBABILITIES ASSUME LARGE SAMPLE SIZE, NORMAL DISTRIBUTION AND A HIGH CONFIDENCE LEVEL

INCH - TO - METRIC CONVERSIONS

INCHES FRACTIONS	INCHES DECIMALS	MILLIMETERS
1/64	0.016	0.397
1/32	0.031	0.794
3/64	0.047	1.191
1/16	0.062	1.588
5/64	0.078	1.984
3/32	0.094	2.381
7/64	0.109	2.778
1/8	0.125	3.175
9/64	0.141	3.572
5/32	0.156	3.969
11/64	0.172	4.366
3/16	0.188	4.763
13/64	0.203	5.159
7/32	0.219	5.556
15/64	0.234	5.953
1/4	0.250	6.350
17/64	0.266	6.747
9/32	0.281	7.144
19/64	0.297	7.541
5/16	0.312	7.938
21/64	0.328	8.334
11/32	0.344	8.731
23/64	0.359	9.128
3/8	0.375	9.525
25/64	0.391	9.922
13/32	0.406	10.319
27/64	0.422	10.716
7/16	0.438	11.113
29/64	0.453	11.509
15/32	0.469	11.906
31/64	0.484	12.303
1/2	0.500	12.700
33/64	0.515	13.097
17/32	0.531	13.494
35/64	0.547	13.891
9/16	0.562	14.288
37/64	0.578	14.684
19/32	0.594	15.081
39/64	0.609	15.478
5/8	0.625	15.875
41/64	0.641	16.272
21/32	0.656	16.669
43/64	0.672	17.066
11/16	0.688	17.463
45/64	0.703	17.859
23/32	0.719	18.256
47/64	0.734	18.653
3/4	0.750	19.050
49/64	0.766	19.447
25/32	0.781	19.844
51/64	0.797	20.241
13/16	0.812	20.638
53/64	0.828	21.034
27/32	0.844	21.431
55/64	0.859	21.828
7/8	0.875	22.225
57/64	0.891	22.622
29/32	0.906	23.019
59/64	0.922	23.416
15/16	0.938	23.813
61/64	0.953	24.209
31/32	0.969	24.606
63/64	0.984	25.003
1	1.000	25.400

INTERNATIONAL

Ferrite International . Pyroferric . TSC Bourgeois

Top 10 Reasons to Source Ferrites & Iron Powder Cores from TSC Ferrite International

10. **Knowledgeable and dependable.** >72 years experience manufacturing iron powder cores. >20 years experience manufacturing ferrite cores. >14 year experience stamping laminations.
9. **Short supply chain and close proximity.** Buy direct from centrally located NAFTA manufacturer.
8. **One stop shopping.** Full product lines including all industry standard material grades, shapes & sizes for all your ferrite, iron powder core and lamination requirements.
7. **Innovative, revolutionary material grades** (Low loss, temperature stable "TSF-50ALL Flat Line" for transformers & high saturation "TSF-Boost" for inductors).
6. **Custom material, shape and size development capability.**
5. **TSC Ferrite cores are certified to ASTM A1009-05.** Statistical test data of the critical magnetic characteristics measured on each manufacturing order are supplied with each shipment.
4. **Informative website www.tscinternational.com** Company and product information and engineering tools including calculators for core parameters, core loss density, dc bias and inductance index (A_L values).
3. **Fast, flexible process and company culture** enables us to make and supply customers what they need on short (lead time) notice.
2. **Purchase cores 24/7, 365 days/year** through our Internet direct sales channel **with no minimums. www.tscinternational.net**
1. **TSC Ferrite International is your only source for NAFTA made low loss ferrites.**

39105 North Magnetics Boulevard Wadsworth Illinois 60083

Phone 847-249-4900, Fax 847-249-4988,

www.tscinternational.com

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