Ferrite Cores

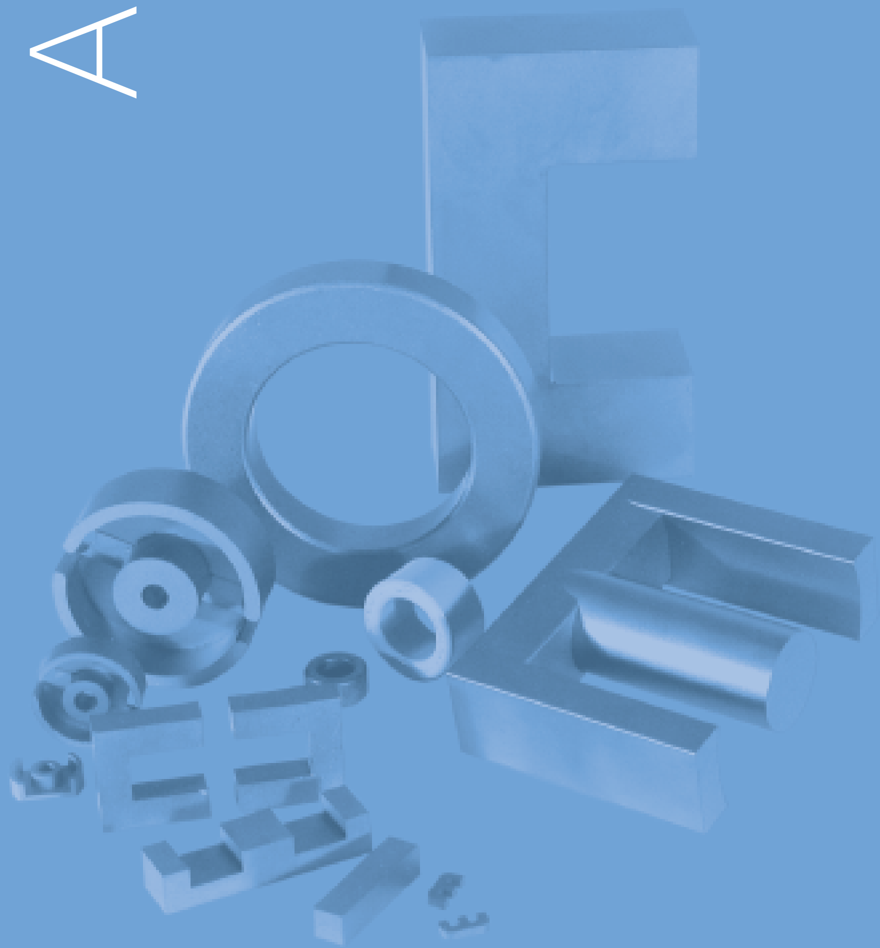
MAGNETICS®

About Magnetics

Magnetics® offers the confidence of over fifty years of expertise in the research, design, manufacture and support of high quality magnetic materials and components.

A major supplier of the highest performance materials in the industry including; MPP, High Flux, Kool Mμ®, power ferrites, high permeability ferrites and strip wound cores, Magnetics products set the standard for providing consistent and reliable electrical properties for a comprehensive range of core materials and geometries. Magnetics is the best choice for a variety of applications ranging from simple chokes and transformers used in telephone equipment to sophisticated devices for aerospace electronics.

Magnetics backs its products with unsurpassed technical expertise and customer service. Magnetics' Application Engineering staff offers the experience necessary to assist the designer from the initial design phase through prototype approval. The knowledgable Sales staff is available to help with all of your customer service needs. This support, combined with a global presence via a worldwide distribution network, including a Hong Kong distribution center, makes Magnetics a premier supplier to the international electronics industry.



CONTACT MAGNETICS

P.O. Box 11422
Pittsburgh, PA 15238-0422

Phone: 412-696-1300 or 1-800-245-3984
Fax: 412-696-0333

email: magnetics@spang.com
web: www.mag-inc.com

Part Number Index

ARRANGED BY PART NUMBER

PLANAR CORES are available in a number of parts as indicated with an * in the index. Note that most cores can be pressed as planar types upon request. Check with the factory for cores that may already have an assigned planar part number or for any other parts for which you may have an interest.

Part Number Index

ARRANGED BY PART TYPE

***PLANAR CORES**

Contact Sales Department for newest parts. For sizes not listed here, contact the Magnetics Sales Department.

WARRANTY

All standard parts are guaranteed to be free from defects in material and workmanship, and are warranted to meet the Magnetics published specification. No other warranty, expressed or implied, is made by Magnetics. All special parts manufactured to a customer's specification are guaranteed only to the extent agreed upon, in writing, between Magnetics and the user.

Magnetics will repair or replace units under the following conditions:

1. The buyer must notify Magnetics, Pittsburgh, PA 15238 in writing, within 30 days of the receipt of material, that he requests authorization to return the parts. A description of the complaint must be included.

2. Transportation charges must be prepaid.

3. Magnetics determines to its satisfaction that the parts are defective, and the defect is not due to misuse, accident or improper application.

Magnetics liability shall in no event exceed the cost of repair or replacement of its parts, if, within 90 days from date of shipment, they have been proven to be defective in workmanship or material at the time of shipment. No allowance will be made for repairs or replacements made by others without written authorization from Magnetics.

Under no conditions shall Magnetics have any liability whatever for the loss of anticipated profits, interruption of operations, or for special, incidental or consequential damages.

ORDERING

When ordering, please use Magnetics part numbers, or specify material, size, and A_L value. Magnetics customer service representatives and applications engineers are available to help you.

PACKING UNIT

A packing unit is the quantity in a standard full package for a particular part. Special consideration, such as expedited deliveries, is given when ordering stocked standard sized packing units. Contact the factory for details.

UL RECOGNITION

Magnetics is a UL-recognized molder in the QMMY2 fabricated parts program. Many bobbins shown in this catalog are covered. Contact Magnetics for details on specific parts.

Introduction

WHAT ARE FERRITES?

Ferrites are dense, homogeneous ceramic structures made by mixing iron oxide (Fe_2O_3) with oxides or carbonates of one or more metals such as manganese, zinc, nickel, or magnesium. They are pressed, then fired in a kiln up to 2000° F, and machined as needed to meet various operational requirements.

ADVANTAGES OF FERRITES

Ferrites have a paramount advantage over other types of magnetic materials: high electrical resistivity and resultant low eddy current losses over a wide frequency range. Additional characteristics such as high permeability and time/temperature stability have expanded ferrite uses into quality filter circuits, high frequency transformers, wide band transformers, adjustable inductors, delay lines, and other high frequency electronic circuitry. As the high frequency performance of other circuit components continues to be improved, ferrites are routinely designed into magnetic circuits for both low level and power applications. For the most favorable combination of low cost, high Q, high stability, and lowest volume, ferrites are the best core material choice for frequencies from 10 KHz to 50 MHz. Ferrites offer an unmatched flexibility in magnetic and mechanical parameters.

FERRITE ADVANTAGES

- LOW COST
- LARGE SELECTION OF MATERIALS
- SHAPE VERSATILITY
- ECONOMICAL ASSEMBLY
- TEMPERATURE AND TIME STABILITY
- HIGH RESISTIVITY
- WIDE FREQUENCY RANGE (10KHz TO 50 MHz)
- HIGH Q/SMALL PACKAGE

MAGNETICS® FERRITES

Magnetics' ferrite cores are manufactured for a wide variety of applications. Magnetics has developed and produces the leading MnZn ferrite materials for power transformers, power inductors, wideband transformers, common mode chokes, and many other applications. In addition to offering the leading materials, other advantages of ferrites from Magnetics include: the full range of standard planar E and I cores; rapid prototyping capability for new development; the widest range of toroid sizes in power and high permeability materials; standard gapping to precise inductance or mechanical dimension; wide range of coil former and assembly hardware available; and superior toroid coatings available in several options.

Properties

TYPICAL MECHANICAL AND THERMAL PROPERTIES OF FERRITE MATERIALS

MECHANICAL DATA		UNITS	THERMAL DATA		UNITS
Bulk Density	4.85	gm/cm^3	Coefficient of Linear Expansion	$10.5X10^{-6}$	$°C^{-1}$
Tensile Strength	$5.0, 7.0X10^3$	$kgf.mm^{-2}$, $lbs.in^{-2}$	Specific Heat (25°)	1100, .26	$J.kg^{-1}°C^{-1}$, $cal.g^{-1}.°C^{-1}$
Compressive Strength	$45, 63X10^3$	$kgf.mm^{-2}$, $lbs.in^{-2}$	Thermal Conductivity (25-85°C)	3500-4300	$\mu W.mm^{-1}.°C^{-1}$
Youngs Modulus	$12.4X10^3, 1.8X10^7$	$kgf.mm^{-2}$, $lbs.in^{-2}$		35-43	$mW.cm^{-1}.°C^{-1}$
Hardness (Knoop)	650 Typical			.0083-.010	$cal.s^{-1}.cm^{-1}.°C^{-1}$
Resistivity	10^2-10^3	ohm-cm			

Above properties are averages measured on a range of commercially available MnZn ferrite materials.

Applications

FERRITE APPLICATION AREAS

APPLICATIONS	DESIRED PROPERTIES	PREFERRED MATERIALS	AVAILABLE SHAPES
Common Mode Chokes	Very high μ.	J, W, H	Toroids
Differential Inductors	Low losses and high temperature stability.	F, P, R	Pot cores, EP cores, E-cores, RM cores, Planar cores
Power Transformers	High μ and low losses at high flux densities and temperatures. High saturation.	F, P, R	Ungapped pot cores, E, U & I cores, toroids, EP cores, RS cores, PQ cores, Planar cores
Power Inductors	Low losses at high flux densities and temperatures. High saturation.	F, P, R	Pot cores, E cores, PQ cores, RM cores, Planar cores
Converter and Inverter Transformers	Low losses, high saturation.	F, P, R	Toroids, E, U, & I cores, pot cores, RS cores, Planar cores
Pulse Transformers	High μ, low loss, high Vt product.	J, W, H	Toroids
Broadband Transformers	Low loss, high μ.	J, W, H	Pot cores, toroids, E, U & I cores, RM, EP cores
Narrow Band Transformers	Moderate Q, high μ, high stability.	F	Pot cores, toroids
Telecom Inductors	Low losses and high temperature stability.	F, P, R	Pot cores, EP cores, E cores, RM cores, Planar cores
Noise Filters	Very high μ.	J, W, H	Toroids
Machining and Prototyping	High μ, low losses, high saturation.	J, R	Ferrite blocks for machined parts

Ungapped Cores and Toroids

1. TYPICAL PART NUMBER

S P 4 30 19 UG XX

- S — COATING/SHAPE CODE (SEE NOTE 2)
- P — FERRITE CORE MATERIAL
- 4 — USED FOR ALL FERRITE TYPES
- 30 — APPROXIMATE DIAMETER IN MM
- 19 — APPROXIMATE HEIGHT IN MM
- UG — GEOMETRY CODE (SEE NOTE 3)
- XX — SPECIAL SPECIFICATION CODE (SEE NOTE 4)

2. COATING/SHAPE CODE

For some cores, a designation letter precedes the material code.

COATING/SHAPE CODE

CODE	MEANING	EXAMPLE
C	Planar E-core with clip recesses	CR45810EC
D	DS core with solid centerpost	DF42311UG
F	Planar E-core option: no clip recesses	FR45810EC
H	DS core with a center hole	HP41408UG
N	RM core with solid centerpost	NP41510UG
P	EP core	PJ41313UG
R	RM core with a center hole	RG41510UG
S	RS core	SD41408UG
V	Nylon toroid coating	VJ42206TC
X	Black coating (contact factory)	XW41003TC
Y	Parylene toroid coating	YA40603TC
Z	Polyester/Epoxy toroid coating	ZJ42915TC
O	No meaning (e.g.OP-41808-EC is the same as P-41808-EC)	

Ungapped Cores and Toroids

3. GEOMETRY CODE

For standard ungapped cores, a two letter code indicates the geometry.

GEOMETRY CODE

CODE	GEOMETRY	EXAMPLE	UNIT OF MEASURE
EC	All E-cores, including ETD, EC, EER, EEM, EFD, planar and lamination size.	OP44317EC	Piece
IC	I-Core	OJ42516IC	Piece
TC	Toroid	ZJ42915TC	Piece
UC	U-Core	OJ41106UC	Piece
UG	POT, RS, DS, RM, PQ, EP	DF42311UG	Set

4. SPECIAL SPECIFICATION CODE

A variety of features over and above the standard specifications are available. For details, see the section on page 1.6, "Special Specification Codes."

5. UNIT OF MEASURE

POT, RS, DS, RM, PQ, and EP cores are ordered in sets. One set is a pair of two pieces. One set usually is ordered for each transformer, inductor, or device to be built.

E-, U-, and I-Cores are ordered in individual pieces. Two pieces usually are ordered for each transformer, inductor, or device to be built.

Toroids are ordered in individual pieces.

HARDWARE

Accessory hardware is offered for nearly all of the cores shown in this catalog. Available items are shown together with the appropriate cores.

Magnetics is a UL-recognized molder in the QMMY2 fabricated parts program. Many bobbins shown in this catalog are covered. Contact the factory for details on specific parts.

The part number and material are shown with the drawing for each bobbin. Every bobbin is provided in the material defined by the part number, whether the bobbin is covered in the UL QMMY2 program or not.

Gapped Cores

1. TYPICAL PART NUMBER

OP44317 A450 XX

SAME AS FOR UNGAPPED CORES AND TOROIDS(PAGE 1.3) → OP44317

GAP CODE (SEE NOTE 2) → A450

SPECIAL SPECIFICATION CODE → XX

2. GAP CODE

The letter indicates the type of gap and a three-digit number defines the value.

GAP CODE

CODE	MEANING	EXAMPLE
A_ _ _	A_L (if < 1000)	DF42311A275 (A_L = 275)
X_ _ _	A_L if 1000 or greater (add 1000 to code)	OP44721X250 (A_L = 1250)
F_ _ _	A_L if < 100, non-integer (divide code by10)	OR42510F807 (A_L = 80.7)
G_ _ _	Depth of grind in mils (1000^{ths} of an inch)	OF44317G079 (Gap = 0.079”)
M_ _ _	Depth of grind, mm (divide code by 10)	OF43019M015 (Gap = 1.5mm)

A_L is inductance factor, mH/1000 Turns, or nH/T^2 (see page 14.2 for definitions, page 2.1 for measurement setup.) See the chart on pages 1.8-1.11 for tolerances. The standard gap codes do not apply to U-Cores, toroids, I-Cores, or some E-I combinations.

3. UNIT OF MEASURE

See Note 5 on page 1.5. For parts ordered in pieces (E-Cores), the depth of grind is given for each piece. For parts ordered in sets, the depth of grind is given as a total for the set, and may be UG/G or G/G (see the chart on page 1.8 to determine which is standard.)

When ordering E-cores gapped to an A_L value it is critical to understand whether the standard is UG/G or G/G. See Note 1 on page 1.9.

4. SPECIAL REQUIREMENTS

Many non-standard features are available, including gap values and tolerances that are different from those shown on the tables in this catalog. The next section on this page, “Special Specification Codes” explains how part numbers are defined for non-standard requirements.

For assistance with any special requirements, Magnetics customer service representatives and applications engineers are available to help you.

Special Specification Codes

SPECIAL SPECIFICATION CODES

For special customer requirements, a detailed product specification is written. This special specification is referenced to a unique two-character part number suffix. The resulting part number is reserved for the exclusive use of the originating customer and any sub-contractors that the originating customer designates.

Special specifications can be written to meet a wide variety of requirements, including:

- CUSTOM PACKAGING
- CUSTOM MARKING
- NON-STANDARD TOLERANCES
- NON-STANDARD UNITS OF MEASURE
- CUSTOM ELECTRICAL PERFORMANCE
- MODIFIED HEIGHTS
- SPECIAL TESTING
- MANY OTHER NEEDS

For five common requirements, a standard letter code is used in the suffix location:

SPECIAL SPECIFICATION CODE

CODE	MEANING	EXAMPLE
NS	Not stamped; the standard part marking is omitted.	DF42311UGNS
CC	Color coded; see page 13.1 for the color index.	ZP42915TCCC
EI	E-core gapped to an A_L value when mated with the standard I-core.	CR42216A160EI *A_L = 160±3% with CR42216IC*

Depth of Grind Tolerance Ranges

Either the A_L or the depth of grind (not both) is controlled during production of gapped cores. Part numbering for gapped cores is explained on page 1.6. Codes A, X and F define A_L values. Codes G and M define depths of grind.

In most applications, defining the gap with the A_L results in inductors with the least variation. Electrical measurement is inherently more precise, and compensation is made for variability in material permeability and core geometry. For deep gaps, however, better consistency often results when the depth of grind is specified. In such cases, variation in the finished inductor is dominated by the variation in the windings, especially if the number of turns is low.

"Ungapped to gap combination" means an asymmetrical gap; the entire gap is taken from one piece, and the other piece is ungapped. "Gap to gap combination" means the gap is symmetrical; half of the total gap is ground into each piece.

INCHES			MILLIMETERS	
GAP	**TOLERANCE**	For shapes: POT, RS, DS, RM, PQ, and EP Cores.	**GAP**	**TOLERANCE**
0.001"–0.038"	±0.0005"	Ungapped to gap combination.	0.1mm–0.9mm	±0.03mm
0.039"–0.076"	±0.001"	Ungapped to gap combination *(Except if the gap is more than 10% of the minimum bobbin depth for the set*. Then gap-to-gap combination.)*	1.0mm–1.9mm	±0.04mm
0.077"–0.114"	±0.002"	Gap to gap combination *(Except if the gap is less than 10% of the minimum bobbin depth for the set*. Then ungapped-to-gap combination.)*	2.0mm–2.9mm	±0.07mm
0.115"–0.152"	±0.002"	Gap to gap combination.	3.0mm–3.8mm	±0.07mm
0.153"–0.228"	±0.004"	Gap to gap combination.	3.9mm–5.0mm	±0.12mm

**The bobbin depth for the set is the 2D dimension, or 2 times the D dimension.*

INCHES		MILLIMETERS	
GAP	**TOLERANCE**	**GAP**	**TOLERANCE**
0.001"–0.038"	±0.0005"	0.1mm–0.9mm	±0.03mm
0.039"–0.076"	±0.001"	1.0mm–1.9mm	±0.04mm
0.077"–0.152"	±0.002"	2.0mm–3.8mm	±0.07mm
0.153"–0.228"	±0.004"	3.9mm–5.0mm	±0.12mm

For E-Cores: Lamination Size, EFD, EEM, EC, ETD, ER, EER, Planar E, and other E-Cores.

E-cores are sold as pieces, not sets. To make an ungapped/gapped set, use one piece of each. For example, use OR41808G050 with OR41808EC for an asymmetrical gap of 0.050" ± 001". For the same gap, but symmetric, use two pieces of OR41808G025.

For more information about gapped cores and using them, please see pages 4.13-4.19. For tolerance requirements other than those shown below, please contact the factory.

Gapping for A_L

Gapped Cores

1. UNIT OF MEASURE

When specifying and ordering E-Cores gapped to an A_L, it is important to note which cores are produced in gap-to-gap combination, because two gapped pieces are assembled to achieve the A_L. Alternatively, for E-Cores provided ungapped-to-gap, an ungapped piece must be used with the gapped part to achieve the A_L. POT, RS, DS, RM, PQ, and EP cores are sold as sets whether the combination is G/G or UG/G.

2. SIGNIFICANT FIGURES

A_L testing and limits are calculated to three significant digits, based on the nominal value. For example, A_L = 99±3% is interpreted as 96.0 Minimum, 99.0 Nominal, and 102.0 Maximum.

3. CORRELATION

Magnetics tests gapped A_L values with full bobbins, usually 100 turns, or 250 turns for deep gaps. The drive level is low (5 Gauss) and the frequency is set low enough to avoid resonance effects. Measured inductance in an application may vary significantly from the theoretical value due to low turns, low bobbin fill, leakage effects, resonance effects, or elevated drive levels.

It is important for the user to verify the correlation between the test of the core and the specific test being applied to the inductor or transformer. Planar E Cores, planar RM, and planar PQ cores are especially susceptible to correlation discrepancies.

PC (POT) CORES

FOUND IN SECTION 6

	GAP TO GAP	UNGAPPED TO GAP COMBINATION			
	±3%	±3%	±5%	±7%	±10%
40704	25-35	36-62	63-95	96-125	126-175
40905	25-48	49-87	88-135	136-180	181-240
41107	25-75	76-135	136-220	221-285	286-399
41408	71-113	114-210	211-307	308-417	418-574
41811	96-174	175-326	≤ 523	≤ 712	≤ 988
42213	113-204	205-482	≤ 779	≤ 1060	≤ 1459
42616	139-249	250-695	≤ 1125	≤ 1543	≤ 1999
43019	170-304	305-1015	≤ 1642	≤ 1999	
43622	222-399	400-1494	≤ 1999		
44229	169-389	390-1965	≤ 1999		
44529	172-549	550-1999			

RS (ROUND-SLAB) CORES

FOUND IN SECTION 7

	GAP TO GAP	UNGAPPED TO GAP COMBINATION			
	±3%	±3%	±5%	±7%	±10%
41408		25-177	≤ 283	≤ 385	≤ 530
42311	25-39	40-347	≤ 708	≤ 963	≤ 1325
42318	25-39	40-452	≤ 731	≤ 994	≤ 1378
42616	25-39	40-622	≤ 998	≤ 1369	≤ 1884
43019	25-62	63-918	≤ 1485	≤ 1999	
43622	40-62	63-1286	≤ 1999		
44229	40-62	63-1732	≤ 1999		

Charts show type of combination and the guaranteed tolerance for corresponding A_L ranges. For special tolerances, or for A_L = 2000 or higher, contact the factory.

Ranges indicated are the tolerances for standard gapped cores.

For ± 5%, ± 7%, and ± 10%, the maximum A_L for each tolerance is shown. Standard cores are manufactured to the smallest allowed tolerance.

Gapping for A_L

DS (DOUBLE-SLAB) CORES
FOUND IN SECTION 7

	GAP TO GAP	UNGAPPED TO GAP COMBINATION			
	±3%	±3%	±5%	±7%	±10%
42311	109-195	196-386	≤ 625	≤ 850	≤ 1170
42318	78-135	136-441	≤ 706	≤ 961	≤ 1332
42616	117-205	206-580	≤ 930	≤ 1276	≤ 1756
43019	149-264	265-873	≤ 1412	≤ 1922	≤ 1999
43622	170-300	301-1111	≤ 1797	≤ 1999	
44229	179-315	316-1543	≤ 1999		

RM CORES
FOUND IN SECTION 8

	GAP TO GAP	UNGAPPED TO GAP COMBINATION			
	±3%	±3%	±5%	±7%	±10%
41110	25-50	51-55	≤ 75	≤ 170	≤ 250
41510	56-99	100-162	≤ 258	≤ 352	≤ 484
41812	69-120	121-238	≤ 381	≤ 519	≤ 714
41912	69-120	121-238	≤ 381	≤ 519	≤ 714
42316	84-150	151-395	≤ 633	≤ 862	≤ 1195
42819	126-200	201-625	≤ 1002	≤ 1374	≤ 1892
43723	145-250	251-977	≤ 1580	≤ 1999	

EP CORES
FOUND IN SECTION 9

	GAP TO GAP	UNGAPPED TO GAP COMBINATION			
	±3%	±3%	±5%	±7%	±10%
40707	25-63	64-75	≤ 125		≤ 160
41010	25-55	56-75	≤ 125		≤ 160
41313	25-75	76-110	≤ 175	≤ 275	≤ 315
41717	25-100	101-175	≤ 275	≤ 400	≤ 630
42120	25-180	181-450	≤ 630	≤ 850	≤ 1250

Charts show type of combination and the guaranteed tolerance for corresponding A_L ranges. For special tolerances, or for A_L = 2000 or higher, contact the factory.

Ranges indicated are the tolerances for standard gapped cores.

For ± 5%, ± 7%, and ± 10%, the maximum A_L for each tolerance is shown. Standard cores are manufactured to the smallest allowed tolerance.

PQ CORES
FOUND IN SECTION 10

	GAP TO GAP	UNGAPPED TO GAP COMBINATION			
	±3%	±3%	±5%	±7%	±10%
42016	60-184	185-467	≤ 755	≤ 1027	≤ 1425
42020	50-139	140-467	≤ 754	≤ 1026	≤ 1422
42610	200-396	397-777	≤ 1258	≤ 1728	≤ 1999
42614	103-334	335-645	≤ 1044	≤ 1421	≤ 1972
42620	95-296	297-888	≤ 1436	≤ 1955	≤ 1999
42625	77-234	235-880	≤ 1423	≤ 1936	≤ 1999
43214	127-416	417-548	≤ 885	≤ 1207	≤ 1661
43220	128-409	410-846	≤ 1369	≤ 1878	≤ 1999
43230	84-241	242-808	≤ 1305	≤ 1775	≤ 1999
43535	89-255	256-980	≤ 1575	≤ 1999	
44040	83-230	231-1006	≤ 1625	≤ 1999	

LAMINATION SIZE E-CORES
FOUND IN SECTION 11

	GAP TO GAP	UNGAPPED TO GAP COMBINATION			
	±3%	±3%	±5%	±7%	±10%
41203	16-27	28-55	≤ 86	≤ 117	≤ 160
41707	22-37	38-89	≤ 140	≤ 190	≤ 259
41808	27-42	43-121	≤ 192	≤ 258	≤ 355
42510	37-61	62-200	≤ 318	≤ 432	≤ 595
43009	55-91	92-222	≤ 353	≤ 475	≤ 653
43515	54-87	88-429	≤ 687	≤ 934	≤ 1284
44317	81-136	137-762	≤ 1222	≤ 1676	≤ 1999
44721	107-180	181-1188	≤ 1920	≤ 1999	
45724	129-218	219-1732	≤ 1999		

EFD, EEM CORES
FOUND IN SECTION 11

	GAP TO GAP	UNGAPPED TO GAP COMBINATION			
	±3%	±3%	±5%	±7%	±10%
41309	17-28	29-64	≤ 100	≤ 135	≤ 184
41515	19-30	31-81	≤ 127	≤ 172	≤ 236
41709	21-34	35-107	≤ 169	≤ 230	≤ 313
42110	15-25	26-92	≤ 145	≤ 195	≤ 268
42523	41-66	67-296	≤ 475	≤ 646	≤ 888

Gapping for A_L

PLANAR E-CORES*

FOUND IN SECTION 11

	GAP TO GAP ±3%	UNGAPPED TO GAP COMBINATION ±3%	±5%	±7%	±10%
41425	19-37	38-76	≤ 122	≤ 166	≤ 228
41434	17-31	32-77	≤ 123	≤ 167	≤ 230
41805	18-32	33-205	≤ 329	≤ 448	≤ 617
42107	35-66	67-188	≤ 304	≤ 414	≤ 569
42216	78-141	142-405	≤ 656	≤ 892	≤ 1239
43208	118-216	217-643	≤ 1040	≤ 1427	≤ 1964
43618	119-222	223-673	≤ 1088	≤ 1491	≤ 1999
43808	173-315	316-956	≤ 1547	≤ 1999	
44008	106-189	190-507	≤ 821	≤ 1116	≤ 1548
44308	201-367	368-1130	≤ 1828	≤ 1999	
44310	169-305	306-1130	≤ 1828	≤ 1999	
45810	266-481	482-1496	≤ 1999		
46409	413-768	769-1999			
46410	379-701	702-1999			
49938	336-594	595-1999			

** These tolerances also apply to Planar E-I combinations.*

OTHER E-CORES

FOUND IN SECTION 11

	GAP TO GAP ±3%	UNGAPPED TO GAP COMBINATION ±3%	±5%	±7%	±10%
41205	28-47	48-107	≤ 170	≤ 229	≤ 316
41208	19-30	31-78	≤ 123	≤ 166	≤ 228
41810	44-74	75-235	≤ 376	≤ 512	≤ 704
42211	26-42	43-148	≤ 236	≤ 320	≤ 440
42515	28-43	44-210	≤ 333	≤ 452	≤ 616
42520	107-190	191-397	≤ 643	≤ 874	≤ 1202
42530	45-72	73-409	≤ 655	≤ 891	≤ 1225
42810	84-146	147-490	≤ 786	≤ 1069	≤ 1483
43007	42-67	68-307	≤ 491	≤ 668	≤ 919
43013	71-121	122-552	≤ 885	≤ 1204	≤ 1669
43520	65-111	112-461	≤ 738	≤ 1003	≤ 1380
43524	41-62	63-439	≤ 698	≤ 949	≤ 1305
44011	59-95	96-642	≤ 1029	≤ 1400	≤ 1940
44016	52-83	84-545	≤ 872	≤ 1185	≤ 1629
44020	78-126	127-916	≤ 1480	≤ 1999	
44022	94-156	157-1187	≤ 1903	≤ 1999	
44924	100-165	166-1276	≤ 1999		
45021	99-167	168-1127	≤ 1807	≤ 1999	
45528	113-186	187-1736	≤ 1999		
45530	129-215	216-1999			
46016	102-129	130-1231	≤ 1989	≤ 1999	
47228	120-199	200-1823	≤ 1999		
48020	99-158	159-1922	≤ 1999		

EC CORES

FOUND IN SECTION 12

	GAP TO GAP ±3%	UNGAPPED TO GAP COMBINATION ±3%	±5%	±7%	±10%
43517	49-79	80-438	≤ 702	≤ 954	≤ 1312
44119	61-98	99-627	≤ 1004	≤ 1365	≤ 1891
45224	76-123	124-911	≤ 1471	≤ 1999	
47035	83-135	136-1403	≤ 1999		

ETD, EER CORES

FOUND IN SECTION 12

	GAP TO GAP ±3%	UNGAPPED TO GAP COMBINATION ±3%	±5%	±7%	±10%
40906	15-30	31-52	53-80	81-105	106-142
43434	55-88	89-500	≤ 806	≤ 1095	≤ 1507
43521	54-86	87-566	≤ 913	≤ 1241	≤ 1707
43939	95-156	157-641	≤ 1028	≤ 1398	≤ 1935
44216	71-117	118-876	≤ 1415	≤ 1925	≤ 1999
44444	73-117	118-881	≤ 1423	≤ 1935	≤ 1999
44949	81-130	131-1075	≤ 1736	≤ 1999	
45032	62-99	100-807	≤ 1304	≤ 1773	≤ 1999
45959	51-118	119-1822	≤ 1999		
47054	83-126	127-1681	≤ 1999		

Charts show type of combination and the guaranteed tolerance for corresponding A_L ranges. For special tolerances, or for A_L = 2000 or higher, contact the factory.

Ranges indicated are the tolerances for standard gapped cores.

For ± 5%, ± 7%, and ± 10%, the maximum A_L for each tolerance is shown. Standard cores are manufactured to the smallest allowed tolerance.

Notes

Section 2

Measurement Information

EQUIPMENT

The test data included in this catalog was primarily obtained using bridges such as a Hewlett-Packard 419A impedance analyzer. The HP 4192A was used for permeability and loss factor data from 10kHz to 1MHz. A Wayne-Kerr 3245 inductance analyzer was used for DC bias to 100kHz. Also, for Permeability vs. Temperature, Permeability vs. Frequency, and Disaccommodation, an HP 4192A was coupled with a computer controlled temperature cabinet and an HP 9836 computer.

Core loss up to and including 100kHz is measured using a 11401 Tektronix oscilloscope connected to an HP Vectra computer. This is a fully automated system. Other measurements include core loss using a Tektronix 7854 digital oscilloscope and an HP 9836 computer to measure losses at 500kHz to 1MHz. This test setup is also used to obtain B-H loops in the 1kHz to 100kHz ranges.

High level readings such as Permeability vs. Flux Density were measured on a General Radio 1632-A incremental bridge.

Q measurements were made on a Boonton 260A Q-meter.

MEASUREMENT

For initial permeability and inductance measurements, excitation levels are kept at values insuring flux densities below 10 gauss.

Temperature measurements normally are obtained between -30° and 70°C but additional temperatures to - 65° and 260°C are used to indicate trends and changes in materials properties outside the normal guaranteed range. Inductance measurements for disaccommodation are made at 10 and 100 minutes after the test core has been demagnetized. Disaccommodation Factor is calculated mathematically.

Test bobbins are carefully layer wound with magnet wire or litz wire whose size is chosen so that the calculated number of turns completely fills the bobbin.

Before core halves are assembled, the mating surfaces should be clean and free from dust. After aligning the two core halves, pressure indicated in the table below should be applied. Magnetics clamping hardware will handle these pressures.

STANDARD POT CORES				RM CORES	
40704	4 lbs.	42213	15 lbs.	41110	5 lbs.
40905	5 lbs.	42616	20 lbs.	41510, 41912	7 lbs.
41107	7 lbs.	43019	20 lbs.	41812	7 lbs.
41408	7 lbs.	43622	30 lbs.	42316	15 lbs.
41811	12 lbs.	44229	35 lbs.	42819	20 lbs.
RS CORES		**PQ CORES**		**EP CORES**	
41408	7 lbs.	42016, 42020	15 lbs.	40707	6 lbs.
42311, 42318	15 lbs.	42620, 42020	20 lbs.	41010	7 lbs.
42616	20 lbs.	43220, 42330	30 lbs.	41313	7 lbs.
43019	20 lbs.	43535	30 lbs.	41717	13 lbs.
43629	30 lbs.	44040	35 lbs.	42020	15 lbs.
44229	35 lbs.				

VOLTAGE BREAKDOWN MEASUREMENT

Core finishes (toroids) are tested for voltage breakdown by inserting the core between two weighted wire mesh pads. Force is adjusted to produce a uniform pressure of 10psi, simulating winding pressure. The test condition to guarantee minimum breakdown (see 13.2) is a 60 Hertz r.m.s. voltage equal to 1.25 times the minimum.

CONVERSION TABLE

MULTIPLY NUMBER OF	BY	TO OBTAIN NUMBER OF
oersteds	79.5	ampere-turns/m
oersteds	0.795	ampere-turns/cm
gausses	10^{-4}	teslas (webers/m^2)
gausses	0.10	milliTeslas
in^2	6.452	cm^2
circular mils	5.07×10^{-6}	cm^2
mWatts/cm^3	0.094	watts/lb.

CALIBRATION

All measurement equipment is periodically checked against our NSB traceable standards. These standards include an EDC 2902 DC voltage standard, an EDC 3200 AC/DC current calibrator, a Fluke 5200A AC calibrator, and various resistance, capacitive, and Q standards.

PHYSICAL MEASUREMENTS

Specific "+" or "-" tolerances on part dimensions indicated as "normal" in this catalog can be provided if needed. If a dimension is listed as "typical", it is the same as nominal except it covers a plurality.

RESEARCH AND DEVELOPMENT

Magnetics Technology has a continuing program aimed at improving existing products and introducing new materials and geometries. Technology efforts and concentrated programming have made Magnetics a leader in many other magnetic materials, in addition to having a steady growth in ferrites. Technology also provides technical data which may not be regularly available.

Section 3

Materials

MATERIALS

Magnetics has developed and produces leading MnZn ferrite materials for a variety of applications.

POWER MATERIALS

Three low loss materials are engineered for optimum frequency and temperature performance in power applications. Magnetics' R, P and F materials provide superior saturation, high temperature performance, low losses and product consistency.

SHAPES: E cores, Planar E cores, ETD, EC, U cores, I cores, PQ, Planar PQ, RM, Toroids (2mm to 86mm), Pot cores, RS (round-slab), DS (double slab), EP, Special Shapes.

APPLICATIONS: Telecomm Power Supplies, Computer Power Supplies, Commercial Power Supplies, Consumer Power Supplies, Automotive, DC-DC Converters, Telecomm Data Interfaces, Impedance Matching Transformers, Handheld Devices, High power control (gate drive), Computer Servers, Distributed Power (DC-DC), EMI Filters, Aerospace, Medical.

HIGH PERMEABILITY MATERIALS

Three high permeablility materials (5000µ J material, 10000µ W material and 15000µ H material) are engineered for optimum frequency and impedance performance in signal, choke and filter applications. These Magnetics' materials provide superior loss factor, frequency response, temperature performance, and product consistency.

SHAPES: Toroids (2 mm to 86 mm), E cores, U cores, RM, Pot cores, RS (round-slab), DS (double slab), EP, Special Shapes.

APPLICATIONS: Common Mode Chokes, EMI Filters, Other Filters, Current Sensors, Telecomm Data Interfaces, Impedance matching interfaces, Handheld devices, Spike Suppression, Gate Drive Transformers.

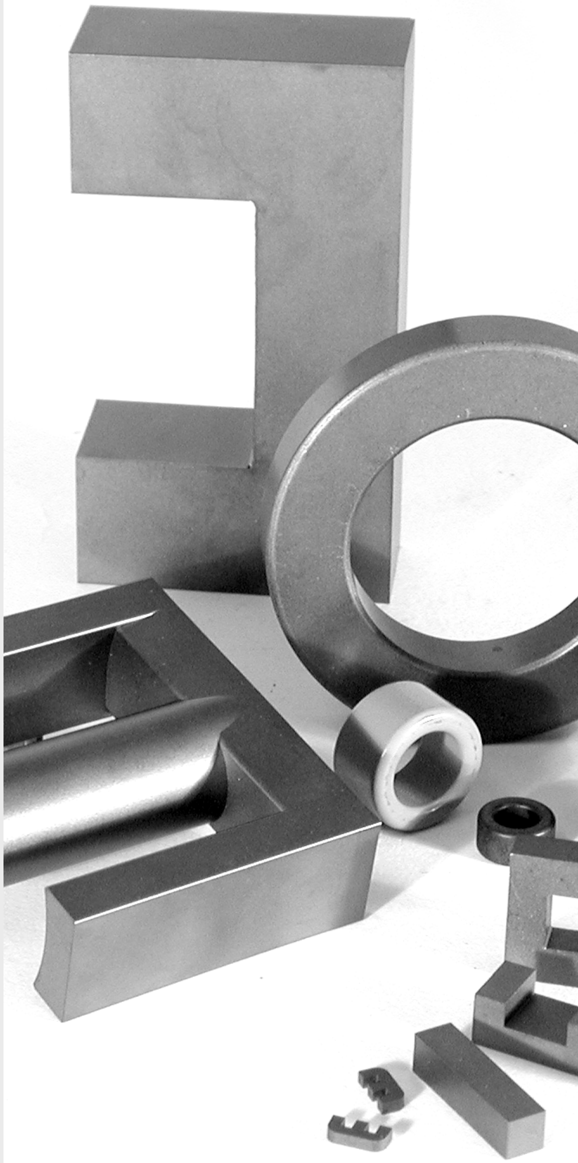
SPECIAL MATERIALS

A number of special materials are engineered for specific performance results, including frequency response, temperature factor, Curie temperature, permeability across temperature for GFCI and telecomm performance, and loss factor. Magnetics' special materials provide outstanding performance, customization options and superior product consistency.

SHAPES: E cores, Planar E cores, ETD, EC, U cores, I cores, PQ, Planar PQ, RM, Toroids (2mm to 86mm), Pot cores, RS (round-slab), DS (double slab), EP, Special Shapes.

APPLICATIONS: EMI Filters, Current sensors, Chokes, Tuned Filters, Data interfaces, Special temperature requirements, Other Special Requirements.

Contact Magnetics' Application Engineering for additional information.



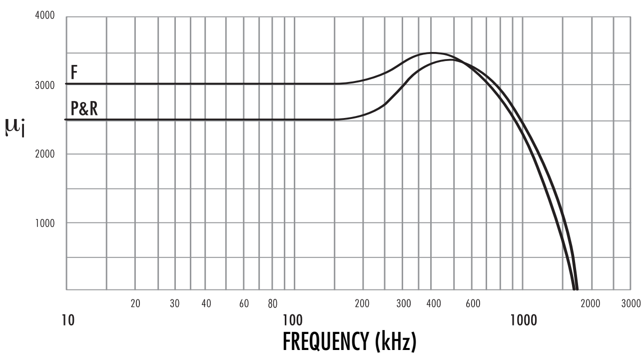
Characteristics

			INDUCTORS & POWER TRANSFORMERS			EMI/RFI FILTERS & BROADBAND TRANSFORMERS		
			R	P	F	J	W	H
Initial Permeability	μ_i	—	2,300 ± 25%	2,500 ± 25%	3,000 ± 20%	5,000 ± 20%	10,000 ± 30%	15,000 ± 30%
Maximum Usable Frequency (50% roll-off)	f	MHz	<1.5	<1.2	<1.3	<1	<0.25	<0.15
Relative Loss Factor	$\frac{\tan \delta}{\mu_{iac}}$	10^{-6}			<8 (100kHz)	<20 (100kHz)	<7 (10kHz)	<15 (10kHz)
*Curie Temperature	T_c	°C	>230	>230	>250	>140	>125	>120
* Relative Temp. Factor -30°C to +20°C +20°C to 70°C	/°C	10^{-6}/°C						
* Flux Density @ 1,194 A/m (15 Oe)	B_m	G mT	5,000 500	5,000 500	4,900 490	4,300 430	4,300 430	4,200 420
* Remanence	B_r	G mT	1,100 110	1,100 110	1,200 120	1,000 100	800 80	800 80
* Coercivity	Hc	Oe A/m	0.18 14	0.18 14	0.2 16	0.1 8	0.04 3	0.04 3
Disaccommodation Factor	D_F	10^{-6}				<3	<3	<2.5
* Resistivity	ρ	Ω-m	6	5	2	1	0.15	0.1
* Density	δ	g/cm^3	4.8	4.8	4.8	4.8	4.8	4.9
Power Loss (P_L) Sine Wave, in mW/cm^3 (typical)	25kHz 200mT (2,000G)	@25°C @60°C @100°C @120°C	130 85 70 85	120 90 95 130	90 160 240			
	100kHz 100mT (1,000G)	@25°C @60°C @100°C @120°C	140 100 70 90	125 90 125 165	100 180 225			
	500kHz 50mT (500G)	@25°C @60°C @100°C @120°C	375 300 250 300	300 250 275 350				
	700kHz 50mT (500G)	@25°C @60°C @100°C @120°C						
Available In:	Pot Cores		X	X	X	X	X	
	RS Cores		X	X	X	X	X	
	DS Cores		X	X	X	X	X	
	RM Cores		X	X	X	X	X	
	EP Cores		X	X	X	X	X	
	E, U Cores		X	X	X	X	X	
	EC, ETD Cores		X	X	X			
	PQ Cores		X	X	X			
	Toroids		X	X	X	X	X	X
	Blocks					X		

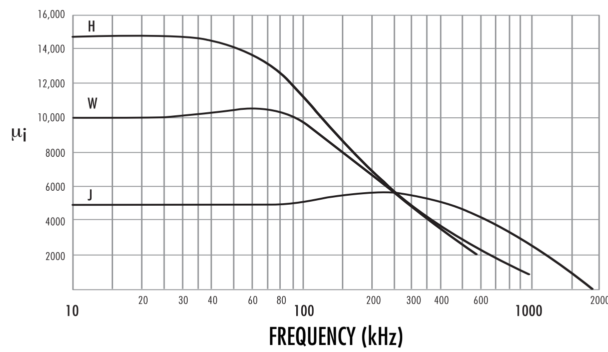
Note: These characteristics are typical for a 42206 size (0.870" O.D.) toroid. Specific core data will usually differ from these numbers due to the influence of geometry and size. Characteristics with a * are typical.

Material Curves

GRAPH 1 - FREQUENCY RESPONSE CURVES



GRAPH 2 - FREQUENCY RESPONSE CURVES



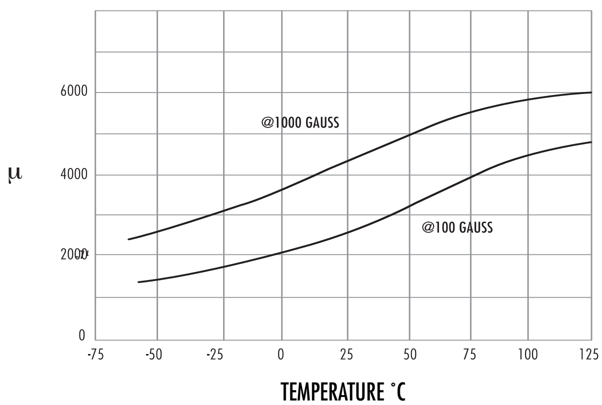
R Material

Saturation Flux Density - gausses 5,000 (at 15 oersted, 25˚C) (500 mT)
Coercive Force - oersted 0.18 (14A/m)
Curie Temperature . . . . 230˚C

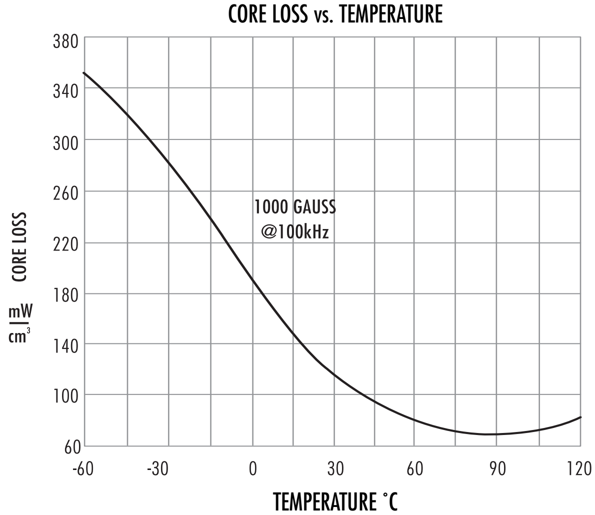
μ_i 2,300 ±25%

NOTE: The core loss curves are developed from empirical data. For best results and highest accuracy, use them. The formula on page 3.10 yields a fair approximation and can be useful in computer programs.

PERMEABILITY vs. TEMPERATURE

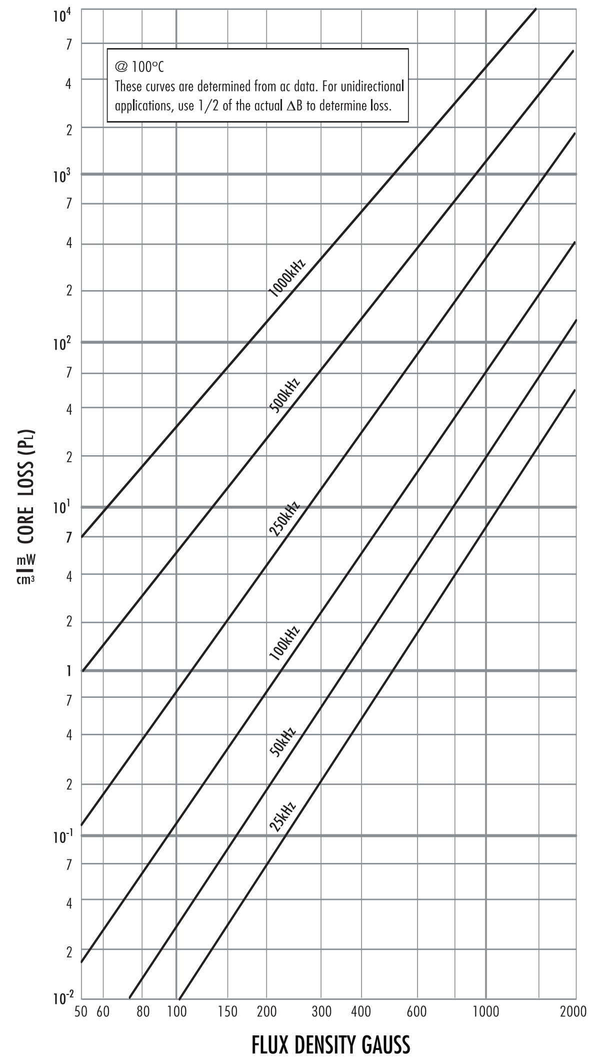


CORE LOSS vs. TEMPERATURE

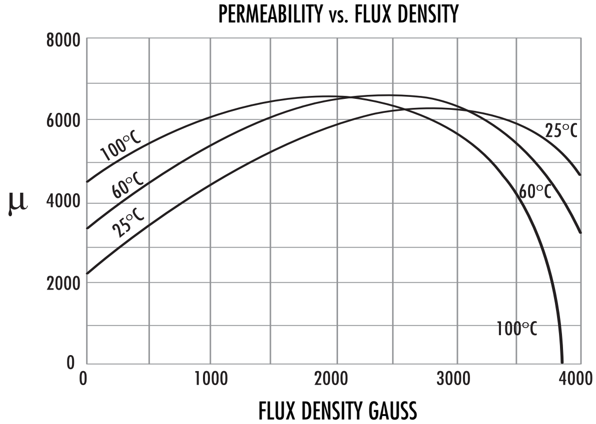


FLUX DENSITY GAUSS

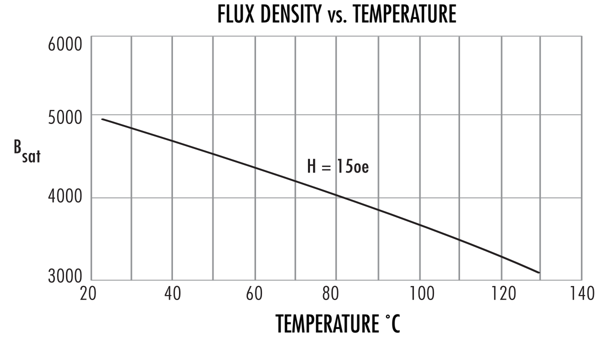
CORE LOSS vs. FLUX DENSITY



PERMEABILITY vs. FLUX DENSITY



FLUX DENSITY vs. TEMPERATURE



See Page 3.11 for B-H Data

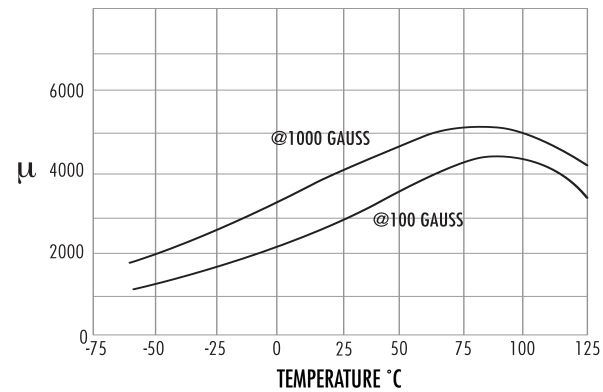
P Material

Saturation Flux Density - gausses 5,000 (at 15 oersted, 25°C) (500 mT)
Coercive Force - oersted 0.18 (14A/m)
Curie Temperature . . . . 230°C

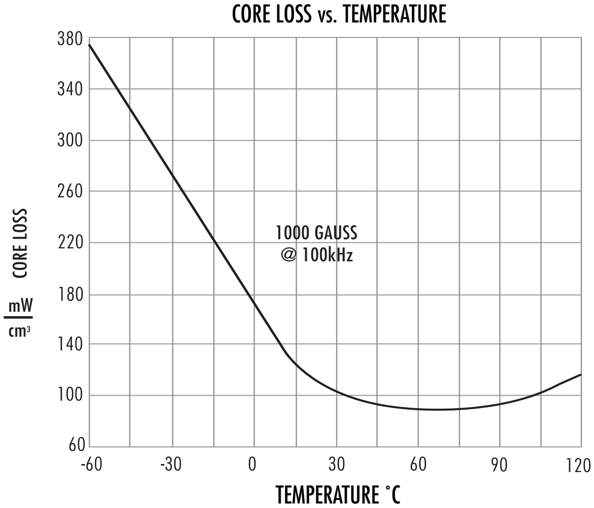
NOTE: The core loss curves are developed from empirical data.
For best results and highest accuracy, use them. The formula on page 3.10
yields a fair approximation and can be useful in computer programs.

μ_i 2,500 ±25%

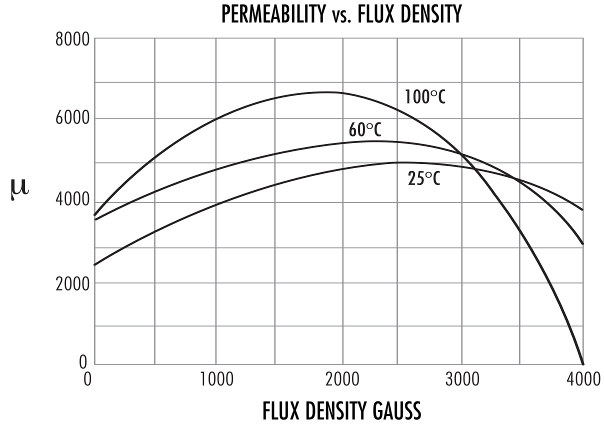
PERMEABILITY vs. TEMPERATURE



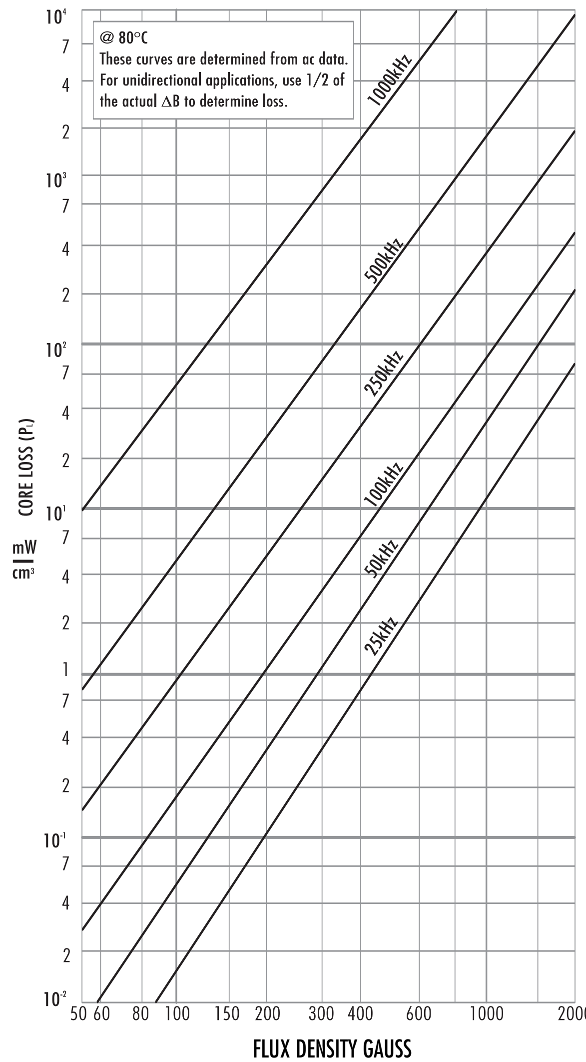
CORE LOSS vs. TEMPERATURE



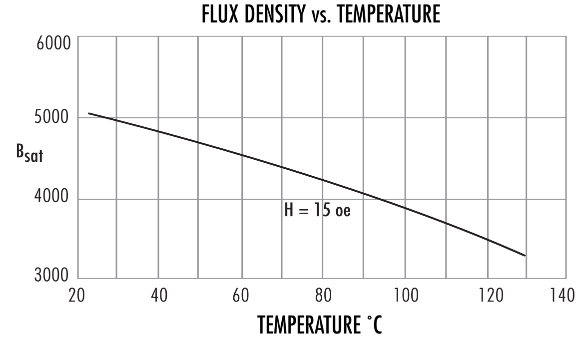
PERMEABILITY vs. FLUX DENSITY



CORE LOSS vs. FLUX DENSITY



FLUX DENSITY vs. TEMPERATURE



See Page 3.11 for B-H Data

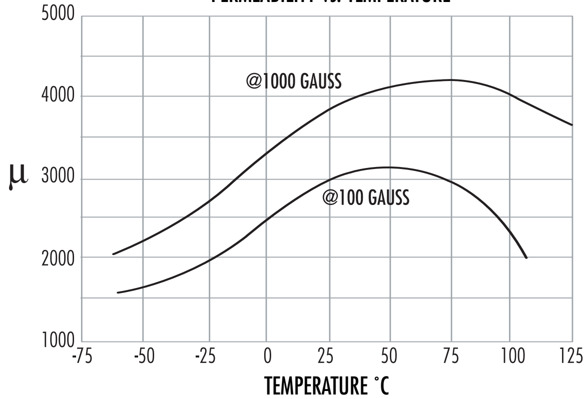
F Material

Saturation Flux Density - gausses 4,900 (at 15 oersted, 25˚C) (490 mT)
Coercive Force - oersted 0.20 (16A/m)
Curie Temperature. . . . . 250˚C

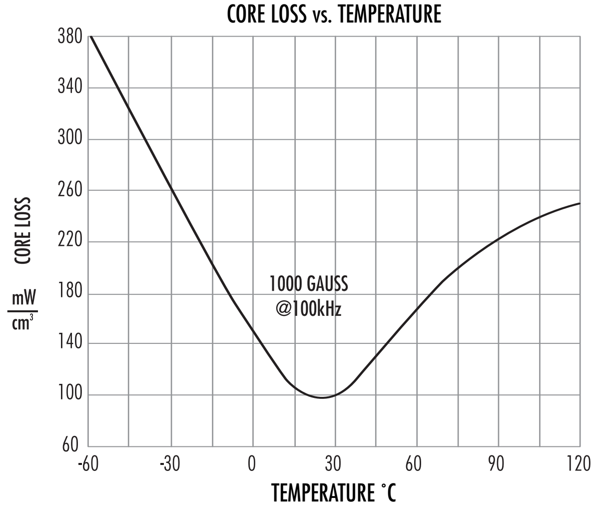
μ_i 3,000 ±20%

NOTE: The core loss curves are developed from empirical data. For best results and highest accuracy, use them. The formula on page 3.10 yields a fair approximation and can be useful in computer programs.

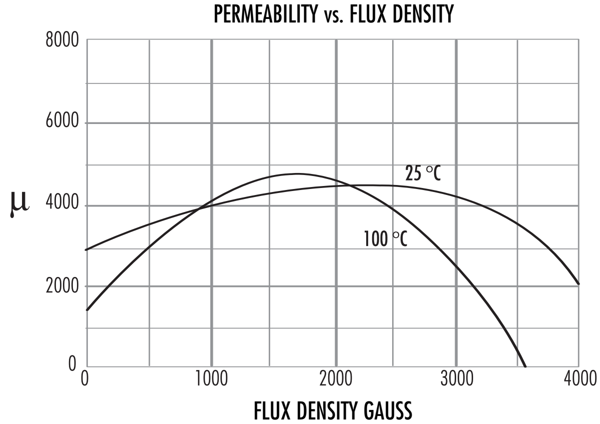
PERMEABILITY vs. TEMPERATURE



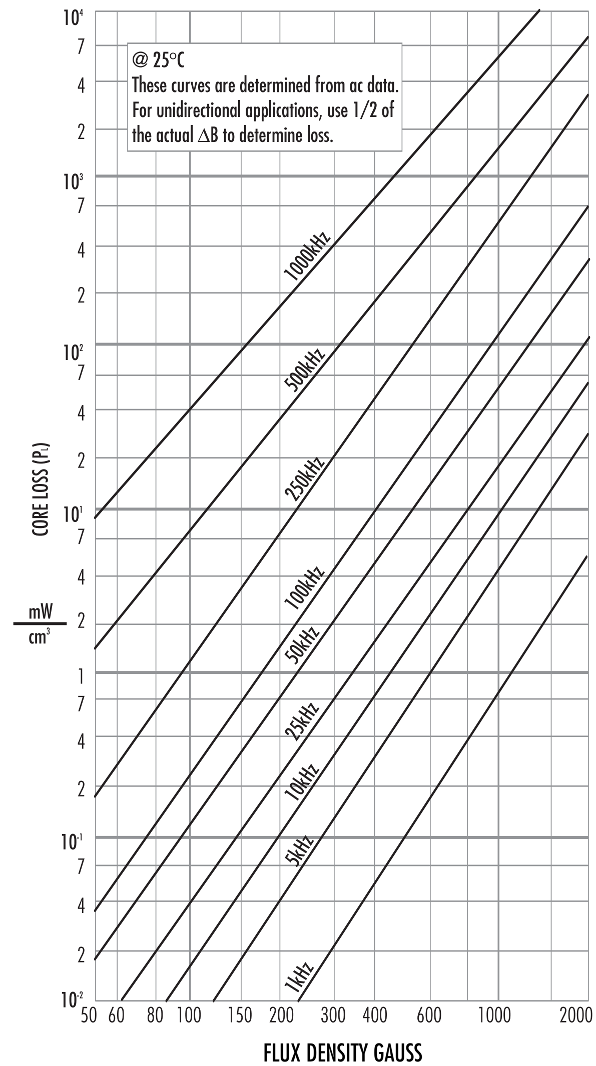
CORE LOSS vs. TEMPERATURE



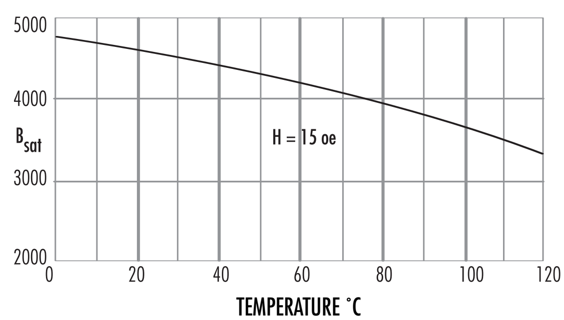
PERMEABILITY vs. FLUX DENSITY



CORE LOSS vs. FLUX DENSITY



FLUX DENSITY vs. TEMPERATURE



See Page 3.11 for B-H Data

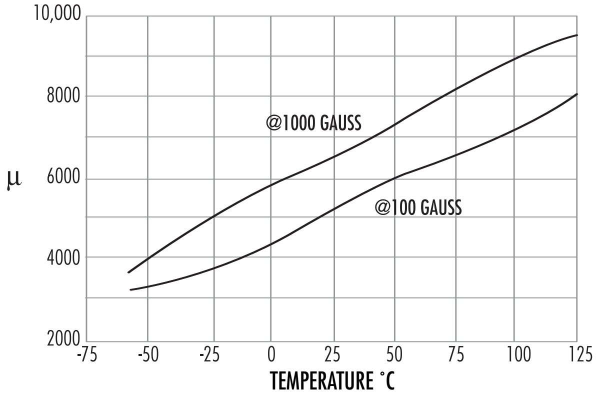
J Material

Saturation Flux Density - gausses 4,300 (at 15 oersted, 25°C) (430 mT)
Coercive Force - oersted 0.1 (8A/m)
Curie Temperature . . . . 140°C
Disaccomadation Factor . . . . <3.0 x 10^{-6}

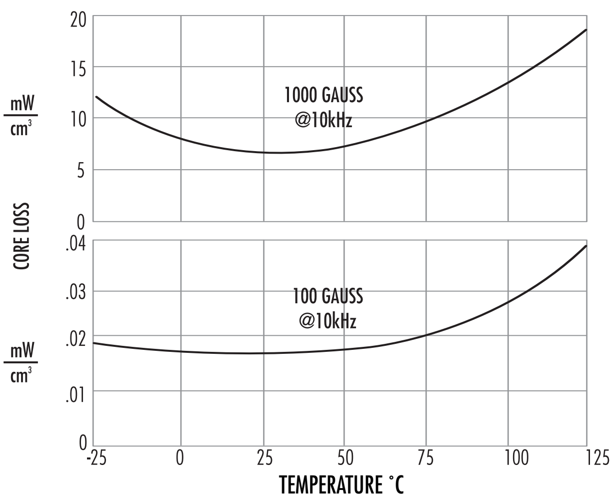
NOTE: The core loss curves are developed from empirical data.
For best results and highest accuracy, use them. The formula on page 3.10 yields a fair approximation and can be useful in computer programs.

μi 5,000 ±20%

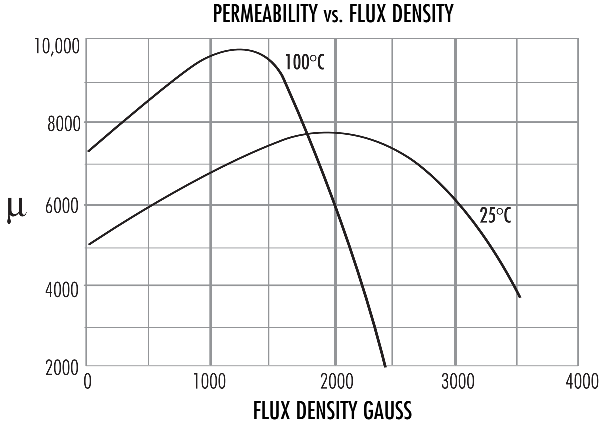
PERMEABILITY vs. TEMPERATURE



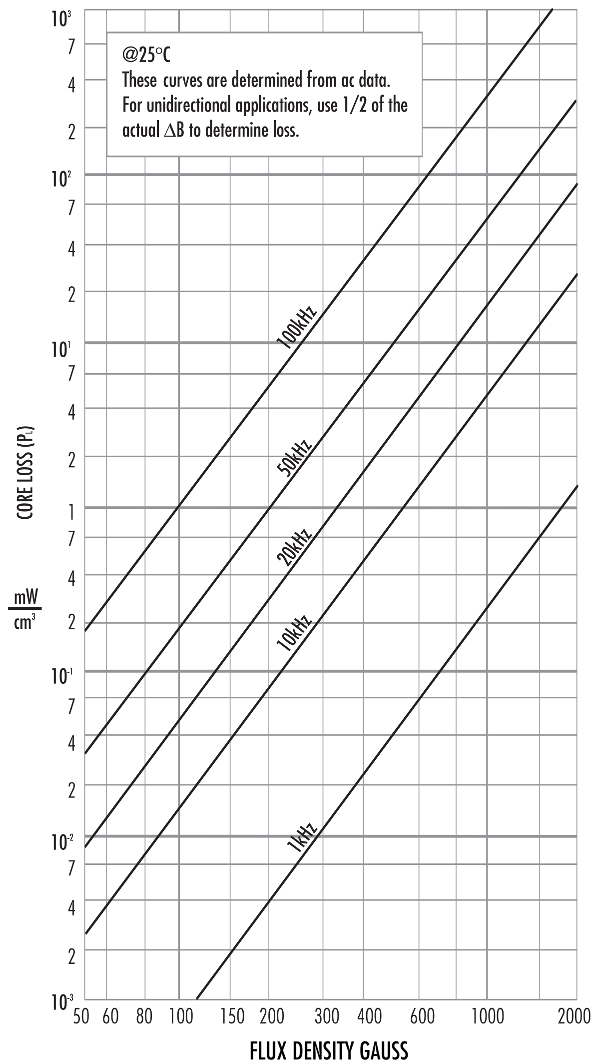
CORE LOSS vs. TEMPERATURE



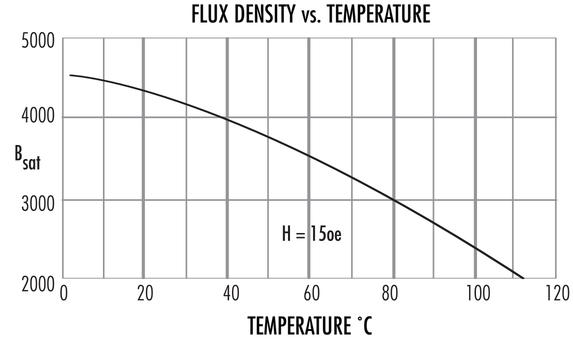
PERMEABILITY vs. FLUX DENSITY



CORE LOSS vs. FLUX DENSITY



FLUX DENSITY vs. TEMPERATURE



See Page 3.11 for B-H Data

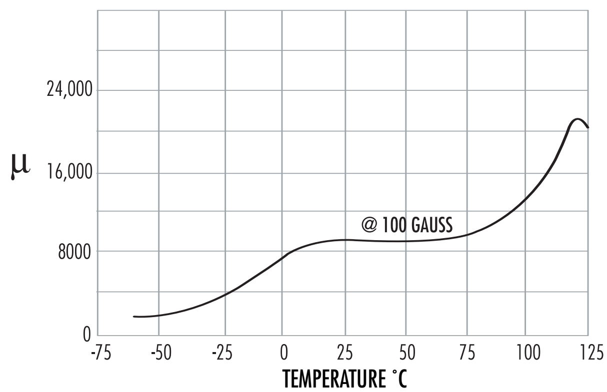
W Material

Saturation Flux Density - gausses 4,300 (at 15 oersted, 25°C) (430 mT)
Coercive Force - oersted. 0.04 (3A/m)
Curie Temperature . . . . 125°C
Disaccomadation factor. . . . . <3 x 10^{-6}

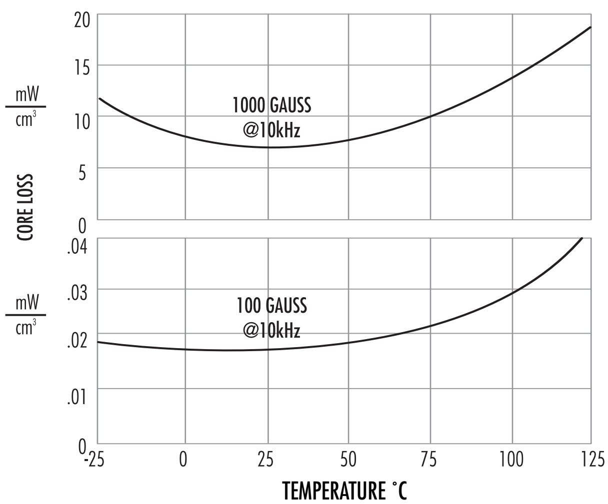
μ_i 10,000 ±30% at 10kHz

NOTE: The core loss curves are developed from empirical data. For best results and highest accuracy, use them. The formula on page 3.10 yields a fair approximation and can be useful in computer programs.

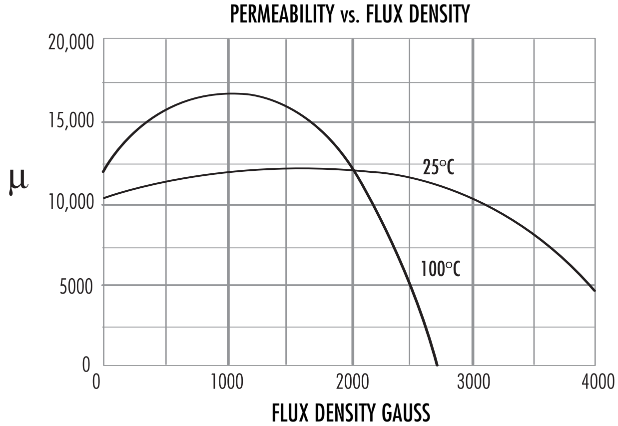
PERMEABILITY vs. TEMPERATURE



CORE LOSS vs. TEMPERATURE

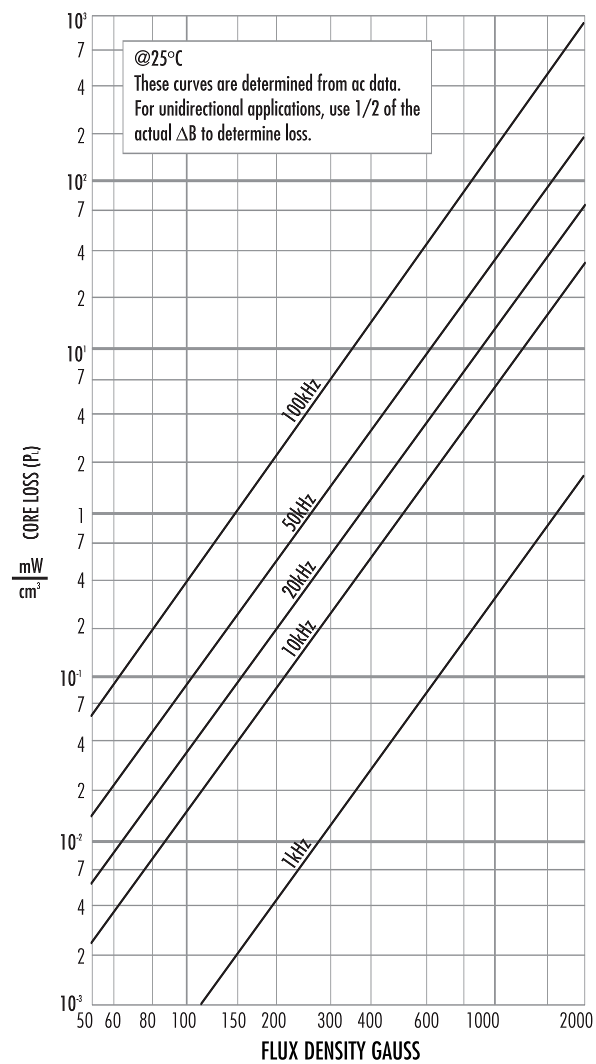


PERMEABILITY vs. FLUX DENSITY

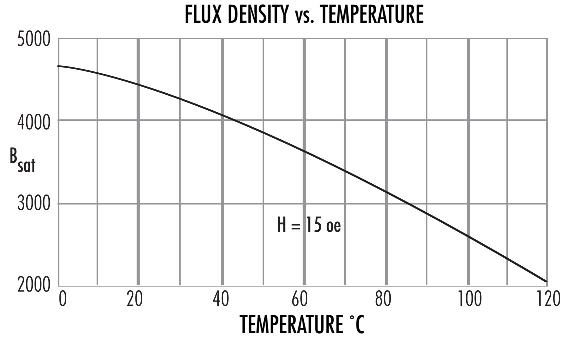


See Page 3.11 for B-H Data

CORE LOSS vs. FLUX DENSITY



FLUX DENSITY vs. TEMPERATURE



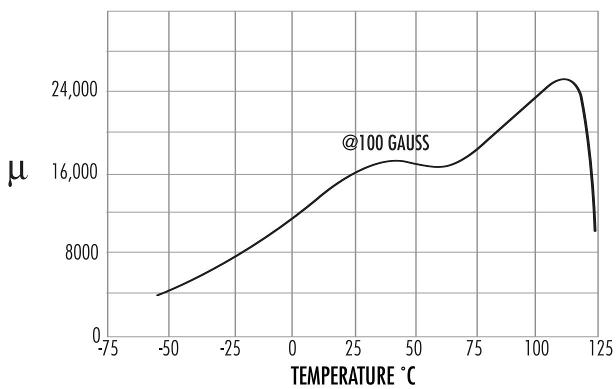
H Material

Saturation Flux Density - gausses 4,200 (at 15 oersted, 25°C) (420 mT)
Coercive Force - oersted 0.04 (3A/m)
Curie Temperature . . . . 120°C
Disaccomadation Factor . . . . <2.5 x 10^{-6} Typical

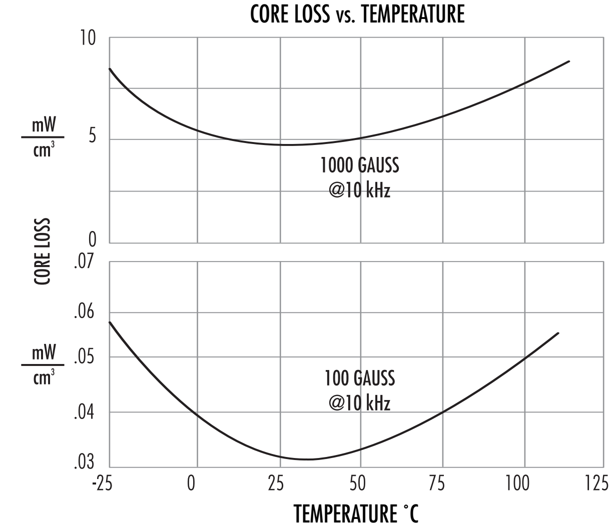
μ_i 15,000 ±30% at 10 kHz

NOTE: The core loss curves are developed from empirical data. For best results and highest accuracy, use them. The formula on page 3.10 yields a fair approximation and can be useful in computer programs.

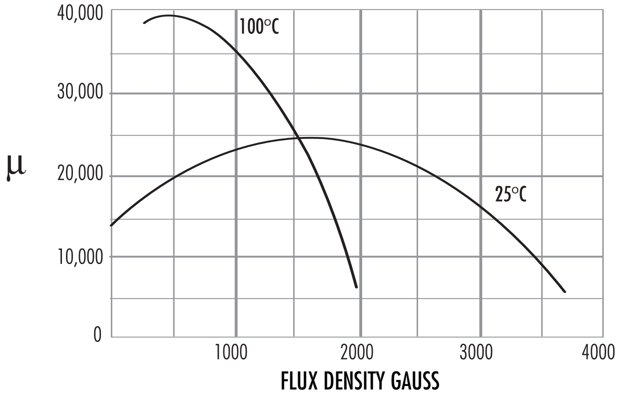
PERMEABILITY vs. TEMPERATURE



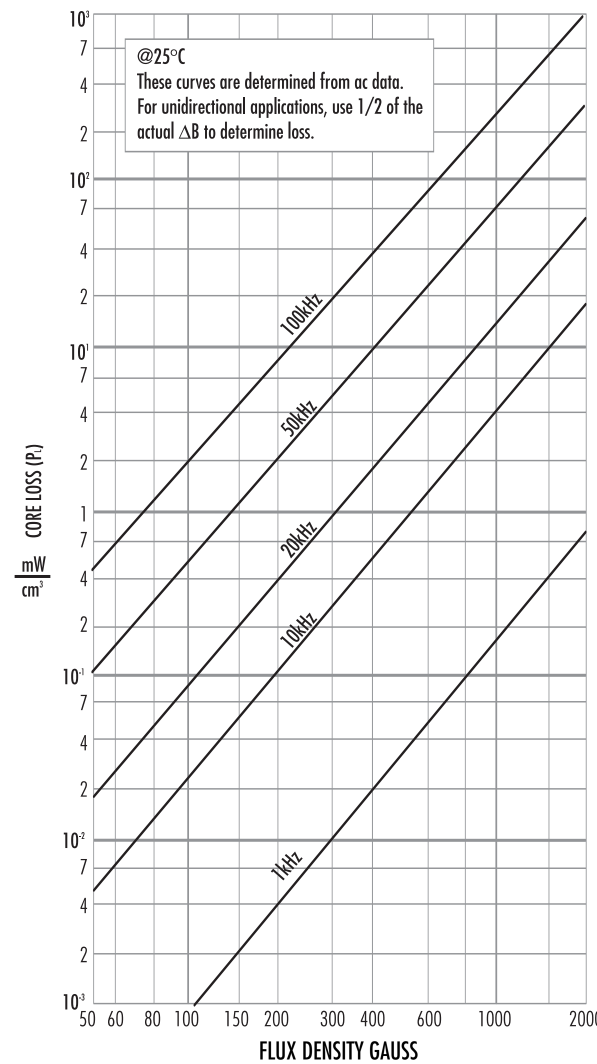
CORE LOSS vs. TEMPERATURE



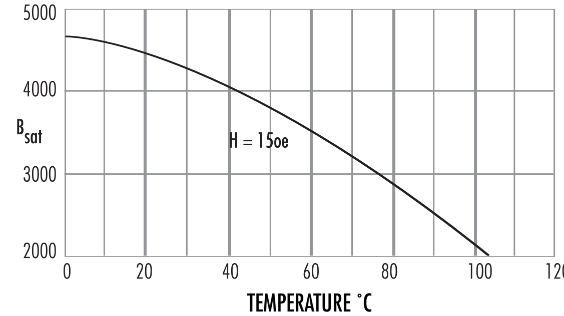
PERMEABILITY vs. FLUX DENSITY



CORE LOSS vs. FLUX DENSITY



FLUX DENSITY vs. TEMPERATURE



See Page 3.11 for B-H Data

Core Loss Equation

Included on pages Pages 3.4-3.9 are material characteristics for the various Magnetics power and inductor materials. For computer programming purposes, the core loss curves can be represented by the equation below.

The factors indicated in the chart are split into discrete frequency ranges, so that the equation offers a close approximation to the core loss curves on the above pages.

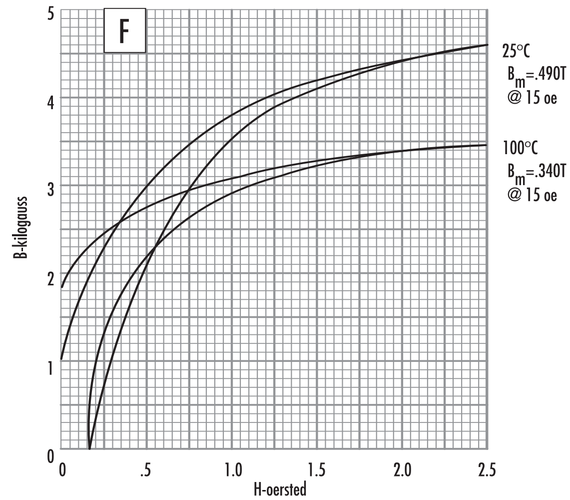
CORE LOSS EQUATION: $P_L = af^cB^d$

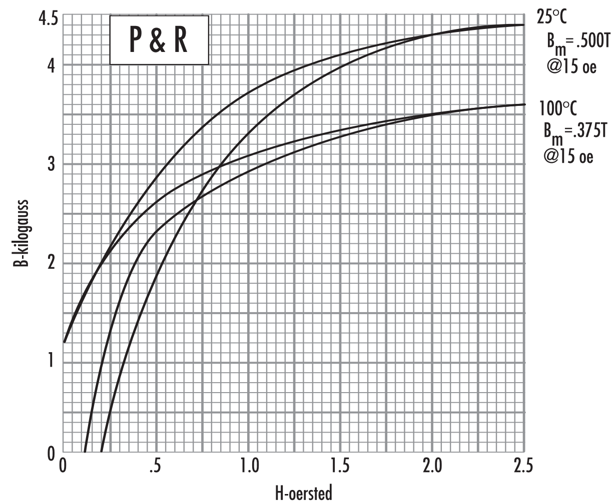
P is in mW/cm^3
B is in kG
f is in kHz

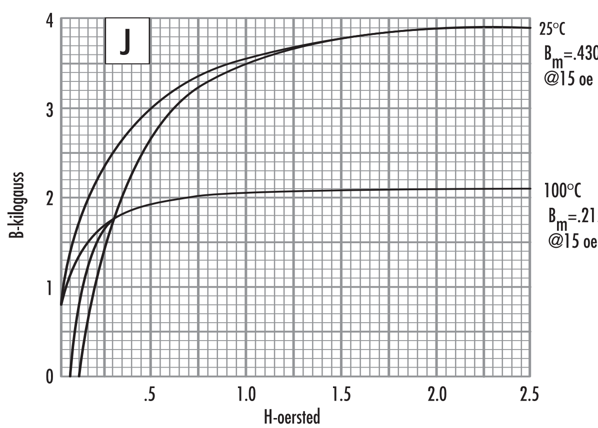
FACTORS APPLIED TO THE ABOVE FORMULA

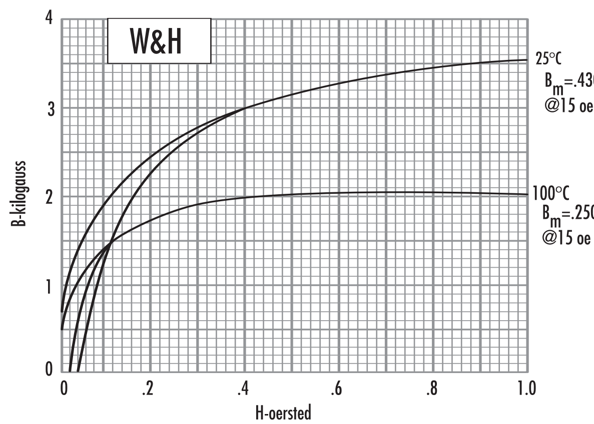
		a	c	d
R Material	f<100 kHz	0.074	1.43	2.85
	100 kHz ≤f<500 kHz	0.036	1.64	2.68
	f≥500 kHz	0.014	1.84	2.28
P Material	f<100 kHz	0.158	1.36	2.86
	100 kHz≤f<500 kHz	0.0434	1.63	2.62
	f≥500 kHz	7.36×10^{-7}	3.47	2.54
F Material	f<10 kHz	0.790	1.06	2.85
	10 kHz≤f<100 kHz	0.0717	1.72	2.66
	100 kHz≤f<500 kHz	0.0573	1.66	2.68
	f≥500 kHz	0.0126	1.88	2.29
J Material	f≤20 kHz	0.245	1.39	2.50
	f>20 kHz	0.00458	2.42	2.50
W Material	f≤20 kHz	0.300	1.26	2.60
	f>20 kHz	0.00382	2.32	2.62
H Material	f≤20 kHz	0.148	1.50	2.25
	f>20 kHz	0.135	1.62	2.15

B vs. H Curves (dc)









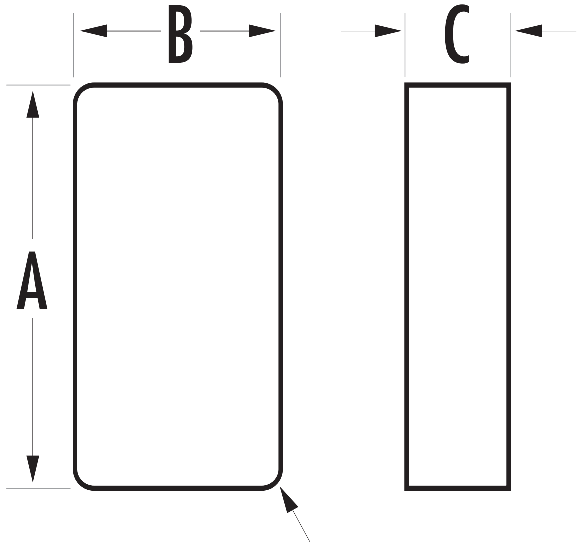
CONVERSION TABLE

MULTIPLY NUMBER OF	BY	TO OBTAIN
Oersteds	79.5	A/m
Oersteds	0.795	A/cm
Gausses	0.100	milli Teslas
Gausses	10^{-4}	Teslas
Teslas	10^{4}	Gausses

Ferrite Blocks

FEATURES OF MAGENTICS FERRITE BLOCKS

- LOW POROSITY
- EXTREME HARDNESS
- UNIFORM PHYSICAL PROPERTIES
- HIGH DENSITY
- EASE OF MACHINING



Ferrites can be pressed in block form and then machined into intricate shapes. Where large sizes are required, it is possible to assemble them from two or more smaller machined or pressed sections; the variety of sizes and shapes becomes limitless.

Without sacrificing magnetic properties, many manufacturing operations can be performed on ferrites, providing strict dimensional or mechanical tolerances:

Surface grinding
Cutting, slicing, slotting
ID and OD machining
Hole drilling
Special machining
Assembly of smaller parts

MATERIAL SELECTION

J material offers high permeability, see page 3.7.
R material is suitable for power applications, see page 3.4.

STANDARD BLOCKS and HOW TO ORDER

PART NUMBER	Dimensions (inches)			Wt.	Vol.
	A	B	C	(gms)	(cm^3)
J42500FB	2.50	1.00	0.50	98.3	20.5
J46213FB	2.45	1.95	0.50	188	39.2
R42500FB	2.50	1.00	0.50	98.3	20.5
R46213FB	2.45	1.95	0.50	188	39.2

Section 4

Power Design

Ferrite is an ideal core material for transformers, inverters and inductors in the frequency range 20 kHz to 3 MHz, due to the combination of low core cost and low core losses.

Ferrite is an excellent material for high frequency (20 kHz to 3 MHz) inverter power supplies. Ferrites may be used in the saturating mode for low power, low frequency operation (<50 watts and 10 kHz). For high power operation a two transformer design, using a tape wound core as the saturating core and a ferrite core as the output transformer, offers maximum performance. The two transformer design offers high efficiency excellent frequency stability, and low switching losses.

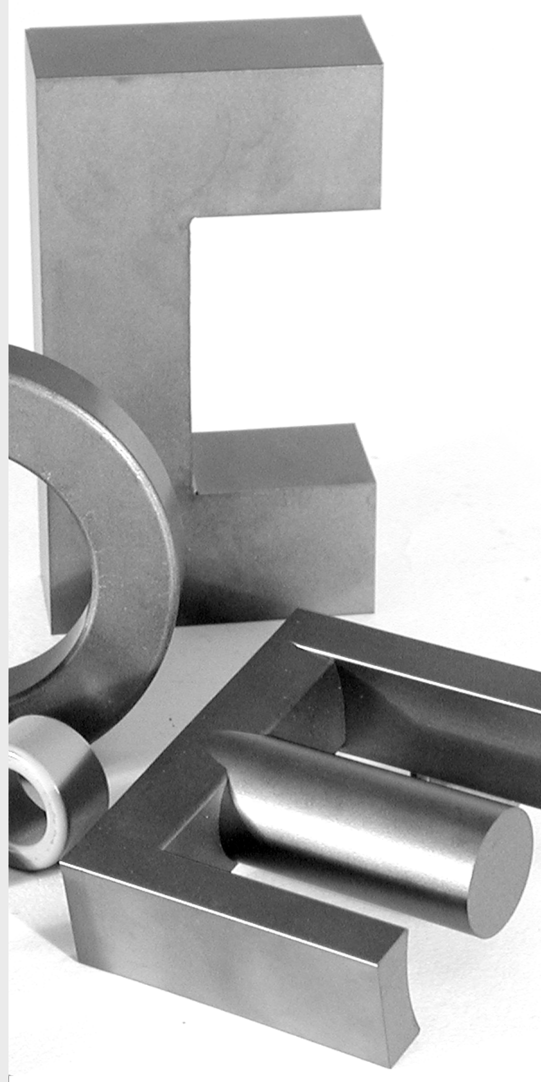
Ferrite cores may also be used in fly-back transformer designs, which offer low core cost, low circuit cost and high voltage capability. Powder cores (MPP, High Flux, Kool Mμ®) offer soft saturation, higher B_{max} and better temperature stability and may be the best choice in some flyback applications or inductors.

High frequency power supplies, both inverters and converters, offer lower cost, and lower weight and volume than conventional 60 hertz and 400 hertz power sources.

Many cores in this section are standard types commonly used in the industry. If a suitable size for your application is not listed, Magnetics will be happy to review your needs, and, if necessary, quote tooling where quantities warrant.

Cores are available gapped to avoid saturation under dc bias conditions. J and W materials are available with lapped surfaces.

Bobbins for many cores are available from Magnetics. VDE requirements have been taken into account in bobbin designs for EC, PQ and metric E Cores. Many bobbins are also available commercially.



Materials and Geometries

CORE MATERIALS

F, P, and R materials, offering the lowest core losses and highest saturation flux density, are most suitable for high power/high temperature operation. P material core losses decrease with temperature up to 70°C; R material losses decrease up to 100°C.

J and W materials offer high impedance for broad transformers, and are also suitable for low-level power transformers.

FERRITE
POWER MATERIALS SUMMARY

		F	P	R	J	W+
µi (20 gauss)	25°C	3,000	2,500	2,300	5,000	10,000
µp (2000 gauss)	100°C	4,600	6,500	6,500	5,500	12,000
Saturation	25°C	4,900	5,000	5,000	4,300	4,300
Flux Density (B_m Gauss)	100°C	3,700	3,900	3,700	2,500	2,500
Core Loss (mw/cm^3)	25°C	100	125	140		
(Typical)	60°C	180	80*	100		
@100 kHz, 1000 Gauss	100°C	225	125	70		

*@80°C +@10kHz

CORE GEOMETRIES

POT CORES

Pot Cores, when assembled, nearly surround the wound bobbin. This aids in shielding the coil from pickup of EMI from outside sources. The pot core dimensions all follow IEC standards so that there is interchangeability between manufacturers. Both plain and printed circuit bobbins are available, as are mounting and assembly hardware. Because of its design, the pot core is a more expensive core than other shapes of a comparable size. Pot cores for high power applications are not readily available.

DOUBLE SLAB AND RM CORES

Slab-sided solid center post cores resemble pot cores, but have a section cut off on either side of the skirt. Large openings allow large size wires to be accommodated and assist in removing heat from the assembly. RM cores are also similar to pot cores, but are designed to minimize board space, providing at least a 40% savings in mounting area. Printed circuit or plain bobbins are available. Simple one piece clamps allow simple assembly. Low profile is possible. The solid center post generates less core loss and this minimizes heat buildup.

EP CORES

EP Cores are round center-post cubical shapes which enclose the coil completely except for the printed circuit board terminals. The particular shape minimizes the effect of air gaps formed at mating surfaces in the magnetic path and provides a larger volume ratio to total space used. Shielding is excellent.

PQ CORES

PQ cores are designed especially for switched mode power supplies. The design provides an optimized ratio of volume to winding area and surface area. As a result, both maximum inductance and winding area are possible with a minimum core size. The cores thus provide maximum power output with a minimum assembled transformer weight and volume, in addition to taking up a minimum amount of area on the printed circuit board. Assembly with printed circuit bobbins and one piece clamps is simplified. This efficient design provides a more uniform cross-sectional area; thus cores tend to operate with fewer hot spots than with other designs.

E CORES

E cores are less expensive than pot cores, and have the advantages of simple bobbin winding plus easy assembly. Gang winding is possible for the bobbins used with these cores. E cores do not, however, offer self-shielding. Lamination size E shapes are available to fit commercially available bobbins previously designed to fit the strip stampings of standard lamination sizes. Metric and DIN sizes are also available. E cores can be pressed to different thickness, providing a selection of cross-sectional areas. Bobbins for these different cross sectional areas are often available commercially.

E cores can be mounted in different directions, and if desired, provide a low-profile. Printed circuit bobbins are available for low-profile mounting. E cores are popular shapes due to their lower cost, ease of assembly and winding, and the ready availability of a variety of hardware.

PLANAR E CORES

Planar E cores are offered in all of the IEC standard sizes, as well as a number of other sizes. Magnetics R material is perfectly suited to planar designs due to its low AC core losses and minimum losses at 100°C. Planar designs typically have low turns counts and favorable thermal dissipation compared with conventional ferrite transformers, and as a consequence the optimum designs for space and efficiency result in higher flux densities. In those designs, the performance advantage of R material is especially significant.

The leg length and window height (B and D dimensions) are adjustable for specific applications without new tooling. This permits the designer to adjust the final core specification to exactly accommodate the planar conductor stack height, with no wasted space. Clips and clip slots are available in many cases, which is especially useful for prototyping. I-cores are also offered standard, permitting further flexibility in design. E-I planar combinations are useful to allow practical face bonding in high volume assembly, and for making gapped inductor cores where fringing losses must be carefully considered due to the planar construction.

EC, ETD AND EER CORES

These shapes are a cross between E cores and pot cores. Like E cores, they provide a wide opening on each side. This gives adequate space for the large size wires required for low output voltage switched mode power supplies. It also allows for a flow of air which keeps the assembly cooler. The center post is round, like that of the pot core. One of the advantages of the round center post is that the winding has a shorter path length around it (11% shorter) than the wire around a square center post with an equal area. This reduces the losses of the windings by 11% and enables the core to handle a higher output power. The round center post also eliminates the sharp bend in the wire that occurs with winding on a square center post.

TOROIDS

Toroids are economical to manufacture; hence, they are least costly of all comparable core shapes. Since no bobbin is required, accessory and assembly costs are nil. Winding is done on toroidal winding machines. Shielding is relatively good.

SUMMARY

Ferrite geometries offer a wide selection in shapes and sizes. When choosing a core for power applications, parameters shown in Table 1 should be evaluated.

TABLE 1: FERRITE CORE COMPARATIVE GEOMETRY CONSIDERATIONS

	POT CORES	DOUBLE SLAB, RM CORES	EP CORES	PQ CORES	E CORES	EC, ETD, EER CORES	TOROIDS
See Catalog Section	6	7-8	9	10	11	12	13
Core Cost	High	High	Medium	High	Low	Medium	Very Low
Bobbin Cost	Low	Low	High	High	Low	Medium	None
Winding Cost	Low	Low	Low	Low	Low	Low	High
Winding Flexibility	Good	Good	Good	Good	Excellent	Excellent	Fair
Assembly	Simple	Simple	Simple	Simple	Simple	Medium	None
Mounting Flexibility**	Good	Good	Good	Fair	Good	Fair	Poor
Heat Dissipation	Poor	Good	Poor	Good	Excellent	Good	Good
Shielding	Excellent	Good	Excellent	Fair	Poor	Poor	Good

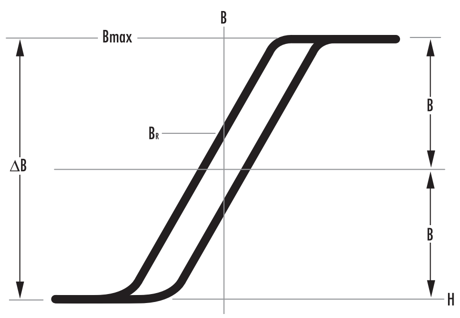
** Hardware is required for clamping core halves together and mounting assembled core on a circuit board or chassis.

General Formulas

TRANSFORMER CORE SIZE SELECTION

The power handling capacity on a transformer core can be determined by its WaAc product, where Wa is the available core window area, and Ac is the effective core cross-sectional area.

FIGURE 1



The WaAc/power-output relationship is obtained by starting with Faraday's Law:

$E=4B\ Ac\ Nf \times 10^{-8}$ (square wave) (1)

$E=4.44\ BAc\ Nf \times 10^{-8}$ (sine wave) (1a)

Where:

E=applied voltage (rms)	K=winding factor
B=flux density in gauss	I=current (rms)
Ac=core area in cm^2	P_i=input power
N=number of turns	P_o=output power
f=frequency in Hz	e=transformer efficiency
Aw=wire area in cm^2	
Wa=window area in cm^2:	
Core window for toroids	
Bobbin window for other cores	
C=current capacity in cm^2/amp	

Solving (1) for NAc

$$NAc=\frac{E \times 10^8}{4Bf} \quad (2)$$

The winding factor

$$K=\frac{NAw}{Wa} \text{ thus } N=\frac{KWa}{Aw} \text{ and } NAc=\frac{KWaAc}{Aw} \quad (3)$$

Combining (2) and (3) and solving for WaAc:

$$WaAc=\frac{E\ Aw \times 10^8}{4B\ fK}, \text{ where } WaAc=cm^4 \quad (4)$$

In addition:

$C=Aw/I$ or $Aw=IC$ $\quad e= P_o/ P_i \quad P_i=EI$

Thus:

$E\ Aw=EIC= P_i\ C= P_o\ C/e$

Substituting for EAw in (4), we obtain:

$$WaAc=\frac{P_oC \times 10^8}{4eB\ fK}$$

Assuming the following operational conditions:

$C= 4.05 \times 10^{-3}cm^2$/Amp (square wave) and
$2.53 \times 10^{-3}cm^2$/Amp (sine wave) for toroids

$C= 5.07 \times 10^{-3}cm^2$/Amp (square wave) and
$3.55 \times 10^{-3}cm^2$/Amp (sine wave) for pot cores and E-U-I cores.

e= 90% for transformers

e= 80% for inverters (including circuit losses)

K= 0.30 for pot cores and E-U-I cores (primary side only)

K= 0.20 for toroids (primary side only)

With larger wire sizes, and/or higher voltages, these K factors may not be obtainable. To minimize both wire losses and core size, the window area must be full.

NOTE: For Wire Tables and turns/bobbin data, refer to pgs 5.8.

We obtain the basic relationship between output power and the WaAc product:

$$WaAc = \frac{k' P_0 \times 10^8}{Bf}, \text{ Where } k' = \frac{C}{4eK}$$

For square wave operation

$k' = .00633$ for toroids, $k' = .00528$ for pot cores, $k' = .00528$ for E-U-I cores

A core selection chart (Table 3) using WaAc can be found on page 4.7. In addition a A core selection procedure which varies by topology can also be found on page 4.8. This procedure is based on the book "Switching Power Supply Design" by A.I. Pressman. While the formula above allows WaAc to be adjusted based on selected core geometry, the Pressman approach uses topology as the key consideration and allows the designer to specify current density.

GENERAL INFORMATION

An ideal transformer is one that offers minimum core loss while requiring the least amount of space. The core loss of a given core is directly effected by the flux density and the frequency. Frequency is the most important characteristic concerning a transformer. Faraday's Law illustrates that as frequency increases, the flux density decreases proportionately. Core losses decrease more when the flux density drops than when frequency rises.

For example, if a transformer were run at 250 kHz and 2 kG on R material at 100°C, the core losses would be approximately 400 mW/cm^3. If the frequency were doubled and all other parameters untouched, by virtue of Faraday's law, the flux density would become 1kG and the resulting core losses would be approximately 300mW/cm^3.

Typical ferrite power transformers are core loss limited in the range of 50-200mW/cm^3. Planar designs can be run more aggressively, up to 600 mW/cm^3, due to better power dissipation and less copper in the windings.

Specific Circuit Examples

CIRCUIT TYPES

Some general comments on the different circuits are:

The push-pull circuit is efficient because it makes bi-directional use of a transformer core, providing an output with low ripple. However, circuitry is more complex, and the transformer core saturation can cause transistor failure if power transistors have unequal switching characteristics.

Feed forward circuits are low in cost, using only one transistor. Ripple is low because relatively steady state current flows in the transformer whether the transistor is ON or OFF. The flyback circuit is simple and inexpensive. In addition, EMI problems are less. However, the transformer is larger and ripple is higher.

TABLE 2 CIRCUIT TYPE SUMMARY

CIRCUIT	ADVANTAGES	DISADVANTAGES
Push-pull	Medium to high power Efficient core use Ripple and noise low	More components
Feed forward	Medium power Low cost Ripple and noise low	Core use inefficient
Flyback	Lowest cost Few components	Ripple and noise high Regulation poor Output power limited (< 100 watts)

PUSH-PULL CIRCUIT

A typical push-pull circuit is shown in Figure 2A. The input signal is the output of an IC network, or clock, which switches the transistors alternately ON and OFF. High frequency square waves on the transistor output are subsequently rectified, producing dc.

FIGURE 2A – TYPICAL PUSH-PULL SPS CIRCUIT

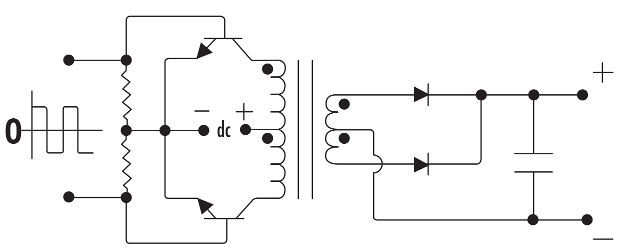
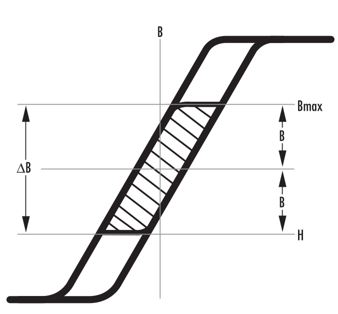


FIGURE 2B – HYSTERESIS LOOP OF MAGNETIC

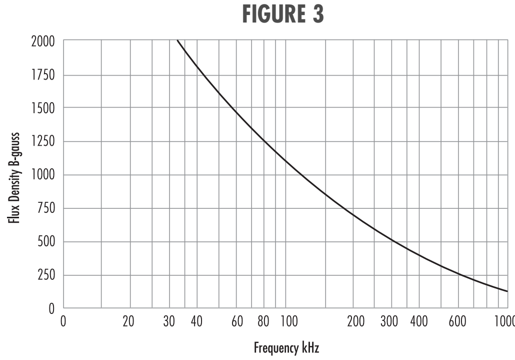


CORE IN PUSH-PULL CIRCUIT

For ferrite transformers, at 20 kHz, it is common practice to apply equation (4) using a flux density (B) level of ±2 kG maximum. This is illustrated by the shaded area of the Hysteresis Loop in Figure 2B. This B level is chosen because the limiting factor in selecting a core at this frequency is core loss. At 20 kHz, if the transformer is designed for a flux density close to saturation (as done for lower frequency designs), the core will develop an excessive temperature rise. Therefore, the lower operating flux density of 2 kG will usually limit the core losses, thus allowing a modest temperature rise in the core.

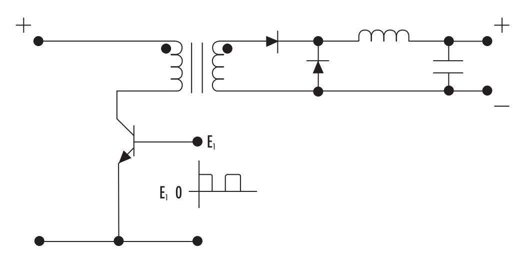
Above 20 kHz, core losses increase. To operate the SPS at higher frequencies, it is necessary to operate the core flux levels lower than ±2 kg. Figure 3 shows the reduction in flux levels for MAGNETICS "P" ferrite material necessary to maintain constant 100mW/cm^3 core losses at various frequencies, with a maximum temperature rise of 25°C.

FIGURE 3



FEED FORWARD CIRCUIT

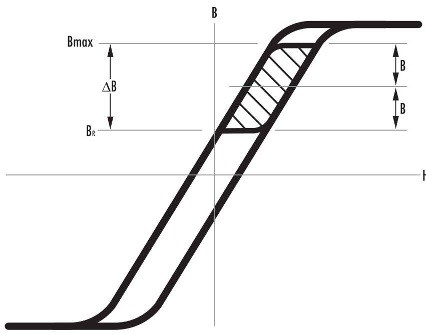
FIGURE 4A – TYPICAL FEED FORWARD SPS CIRCUIT



In the feed forward circuit shown in Figure 4A, the transformer operates in the first quadrant of the Hysteresis Loop. (Fig 4B). Unipolar pulses applied to the semiconductor device cause the transformer core to be driven from its B_R value toward saturation. When the pulses are reduced to zero, the core returns to its B_R value. In order to maintain a high efficiency, the primary inductance is kept high to reduce magnetizing current and lower wire losses. This means the core should have a zero or minimal air gap.

Specific Circuit Examples

FIGURE 4B
HYSTERESIS LOOP OF MAGNETIC CORE IN FEED FORWARD CIRCUIT

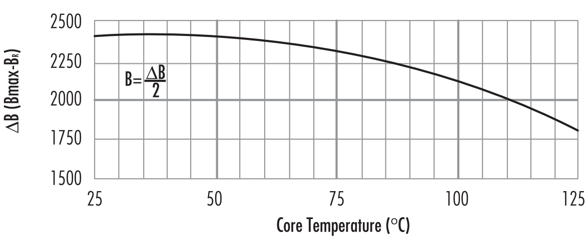


For ferrites used in this circuit, ΔB (or B max-B_R) is typically 2400 gauss or B (as applied to Equation 4) is ±1200 gauss as shown in Figure 4B. In the push-pull circuit, it was recommended that the peak flux density in the core should not exceed B = ±2000 gauss in order to keep core losses small. Because of the constraints of the Hysteresis Loop, the core in the feed forward circuit should not exceed a peak value of B = ±1200 gauss.

Core selection for a feed forward circuit is similar to the push-pull circuit except that B for Equation 4 is now limited to ±1200 gauss.

If the transformer operating temperature is above 75˚, the value of B will be further reduced. Figure 5 shows the variation of ΔB with temperature. Therefore the recommended ΔB value of 2400 (B= ±1200) gauss has to be reduced, the amount depending on the final projected temperature rise of the device.

FIGURE 5



The value of ΔB remains virtually unchanged over a large frequency range above 20 kHz. However, at some frequency, the adjusted value of B, as shown in Figure 3, will become less than the B determined by the above temperature considerations (Figure 5). Above this frequency, the B used to select a core will be the value obtained form Figure 3.

FLYBACK CIRCUIT
A typical schematic is shown in Figure 6A. Unipolar pulses cause dc to flow through the core winding, moving the flux in the core from B_R towards saturation (Fig. 6B). When the pulses go to zero the flux travels back to B_R as in the feed forward design. However, the difference between the feed forward and the flyback circuit is that the flyback requires the transformer to act as an energy storage device as well as to perform the usual transformer functions. Therefore, to be an effective energy storage unit, the core must not saturate and is usually a gapped structure.

FIGURE 6A
TYPICAL FLYBACK REGULATOR CIRCUIT

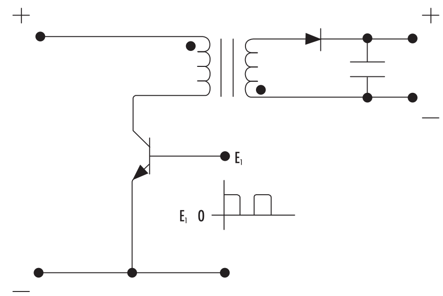
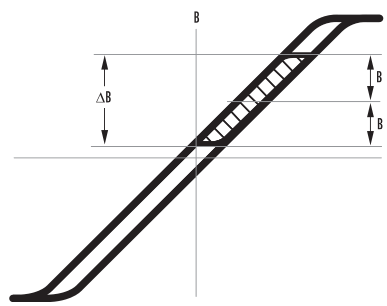


FIGURE 6B
HYSTERESIS LOOP OF MAGNETIC CORE IN FLYBACK CIRCUIT



In most designs, the air gap is large; therefore, B_R is small as noted on the Hysteresis Loop in Figure 6B and can be considered zero. The maximum flux density available is approximately 3600. This means ΔB is 3600 or B = ±1800 gauss. Core selection for this circuit can be done using Equation 4. The B value in Equation 4 is ±1800 gauss at 20 kHz and is used until a higher frequency (Figure 3) dictates a lower B required.

GENERAL FORMULA – CORE SELECTION FOR DIFFERENT TOPOLOGIES
The following formula has been gained from derivations in Chapter 7 of A.I. Pressman's book "Switching Power Supply Design" (see Reference No. 13, pg 14.4.)

$$WaAc = \frac{P_o D_{cma}}{K_t B_{max} f}$$

WaAc	= Product of window area and core area (cm^4)
Po	= Power Out (watts)
Dcma	= Current Density (cir. mils/amp)
B_{max}	= Flux Density (gauss)
f	= Frequency (hertz)
K_t	= Topology constant (for a space factor of 0.4):

Forward converter = .0005 Push-Pull = .001
Half-bridge = .0014 Full-bridge = .0014
Flyback = .00033 (single winding)
Flyback = .00025 (multiple winding)

For individual cores, WaAc is listed in this catalog under "Magnetic Data." Choice of B_{max} at various frequencies, D_{cma} and alternative transformer temperature rise calculation schemes are also discussed in Chapter 7 of the Pressman book.

Area Product Distribution (WaAc*)

TABLE 3 – FERRITE CORE SELECTION BY AREA PRODUCT DISTRIBUTION

WaAc* (cm^4)	PC	RS,DS,HS	RM, EP	RM SOLID	PQ	EE LAM	EE,EEM,EFD	EE,EI PLANAR	UU, UI	ETD, EER	EC	TC
See Section	6	7	8/9	8	10	11	11	11	11	12	12	13
0.001	40704							41309 (EE)				40601
0.002	40905		40707 (EP)				40904 40906					40603
0.004												
0.007	41107		41110(RM)									40705
0.010		41408 (RS,DS)	41010(EP)			41203			41106 (UI)		41003	41005
0.020	41408		41510(RM) 41313(EP)	41510		41205	41208 41209 41515 41707		41106(UU)		40907	41303
0.040			41812(RM)	41812			41709 42110					41206 41305
0.070	41811	42311 (RS,DS,HS)	41717(EP)		42610	41808						41306 41605
0.100	42213	42318 (HS)	42316(RM)	42316	42016 42614	41810 42510		42216(EE)				
0.200	42616	42318 (RS,DS) 42616 (RS,DS,HS)	42819(RM) 42120(EP)		42020 42620 43214		42211 42810 43009 42523	43618(EI) 43208(EI)	42515 (UI)			41809 42206
0.400		43019 (RS,DS,HS)		42819	42625	42520	42515 43007	43618(EE) 43208(EE)				42207
0.700	43019		43723(RM)		43220	43515	43013		42220(UU) 42512(UU) 42515(UU)	43517		42507
1.00	43622	43622 (RS,DS,HS)		43723	43230	44317	43520 43524 44011	44308(EI)	42530(UU)	44119	43434 43521(EER)	42908
2.00	44229 44529	44229 (RS,DS,HS)			43535	44721	44020 44924	44308(EE) 45810(EI)	44119(UU) 44121(UU)	45224 44216(EER)	43939 43615 44444 45032	43610 43813
4.00					44040	45724	44022 45021	46410(EI)	44125(UU) 44130(UU)	44949	44416	
7.00							45528 46016	45810(EE) 46409(EE)				
10.00							45530	46410(EE)		47035 47228		44916 44925 46113
20.00							48020				47054	47313 47325
40.00								49938(EE)				48613
100							49928		49925(UU) 49925(UI)			

*Bobbin window and core area product. For bobbins other than those in this catalog, WaAc may need to be recalculated.

Typical Power Handling

TABLE 4 – FERRITE CORE SELECTION LISTED BY TYPICAL POWER HANDLING CAPABILITIES (WATTS) (F, P AND R MATERIALS) (FOR PUSH-PULL SQUARE WAVE OPERATIONS, SEE NOTES BELOW)

WATTAGE @F= 20KHZ	@F= 50KHZ	@F= 100KHZ	@F= 250KHZ	POT-RS-RM CORES	DS CORES	EP CORES	PQ CORES	E-CORES	LOW-PROFILE PLANAR CORES	EC-ETD U CORES	TC TOROIDS
See Section				6/7/8	7	9	10	11	11	12	13
2	3	4	7	41408-PC		41313		41707	41709 42107 42110		41206 41303
5	8	11	21	41811-PC 42311-RS 42809-RM	42311	41717		41808	42610-PQ 42216-EC		41306 41605
12	18	27	53	42316-RM			42016	41810, 42211	42614-PQ		
13	20	30	59					42510			
15	22	32	62	42213-PC							
18	28	43	84	42318-RS	42318		42020		43618-E, I		42106
19	30	48	94		42616	42120			43208-E, I 44008-E, I		41809
26	42	58	113					42810, 42520			42206
28	45	65	127	42819-RM				42515			42109
30	49	70	137	42616-PC			42620				42207
33	53	80	156		43019				43618-EC		
40	61	95	185	43019-RS				43007	44008-EC		43205
42	70	100	195				42625		43208-EC		
48	75	110	215					43013			4,221,242,507
60	100	150	293	43019-PC 43723-RM			43220	42530, 43009 43515 (E375)		43517 (EC35)	
70	110	170	332		43622				44308-E, I	43434 (ETD34)	42908
105	160	235	460					44011 (E40)			
110	190	250	480	43622-PC			43230				
120	195	270	525							44119 (EC41)	
130	205	290	570					43524, 43520		43521	43806
140	215	340	663					44317 (E21)			42915, 43113
150	240	380	741						44308-EC	43939 (ETD39)	
190	300	470	917		44229						43610
200	310	500	975					44721 (E625)		45032	
220	350	530	1,034				43535				43813
230	350	550	1,073					44020 (42/15)		44216	
260	400	600	1,170								43615
280	430	650	1,268	44229-PC				45021 (E50) 44924		45224 (EC52)	
300	450	700	1,365	44529-PC				44022 (42/20)	45810-EC	44444 (ETD44)	
340	550	850	1,658				44040				
360	580	870	1,697								43825
410	650	1,000	1,950					45724 (E75)	46410-E, I	44949 (ETD49)	44416
550	800	1,300	2,535					45528 (55/21) 46016 (E60)	45810-EC		44715
650	1,000	1,600	3,120								44916 44920
700	1,100	1,800	3,510					45530 (55/25)	46409-EC		
850	1,300	1,900	3,705						46410-EC		44925
900	1,500	2,000	3,900							47035 (EC70)	
1,000	1,600	2,500	4,875							45959 (ETD59)	46113
1,000	1,700	2,700	5,265					47228			
1,400	2,500	3,200	6,240								44932
1,600	2,600	3,700	7,215								47313
2,000	3,000	4,600	8,970					48020		47054	
2,800	4,200	6,500	12,675						49938-EC		48613
11,700	19,000	26,500	51,500							49925 (U)	

Above is for push-pull converter. De-rate by a factor of 3 or 4 for flyback. De-rate by a factor of 2 for feed-forward converter.

NOTE: Assuming Core Loss to be Approximately 100mW/cm^3,
B Levels Used in this Chart are:@ 20kHz-2000 gauss @ 50kHz-1300 gauss @ 100kHz-900 gauss @ 250kHz-700 gauss.

SEE PAGE 4.7 — Area Product Distribution

Considerations

TEMPERATURE CONSIDERATIONS

The power handling ability of a ferrite transformer is limited by either the saturation of the core material or, more commonly, the temperature rise. Core material saturation is the limiting factor when the operating frequency is below 20kHz. Above this frequency temperature rise becomes the limitation.

Temperature rise is important for overall circuit reliability. Staying below a given temperature insures that wire insulation is valid, that nearby active components do not go beyond their rated temperature, and overall temperature requirements are met. Temperature rise is also very important for the core material point of view. As core temperature rises, core losses can rise and the maximum saturation flux density decreases. Thermal runaway can occur causing the core to heat up to its Curie temperature resulting in a loss of all magnetic properties and catastrophic failure. Newer ferrite power materials, like P and R material, attempt to mitigate this problem by being tailored to have decreasing losses to temperature of 70˚C and 100˚C respectively.

CORE LOSS—One of the two major factors effecting temperature rise is core loss. In a transformer, core loss is a function of the voltage applied across the primary winding. In an inductor core, it is a function of the varying current applied through the inductor. In either case the operating flux density level, or B level, needs to be determined to estimate the core loss. With the frequency and B level known, core loss can be estimated from the material core loss curves. A material loss density of 100mw/cm^3 is a common operating point generating about a 40˚C temperature rise. Operating at levels of 200 or 300 mw/cm^3 can also be achieved, although forced air or heat sinks may need to be used.

WINDING CONSIDERATIONS—Copper loss is the second major contributor to temperature rise. Wire tables can be used as a guide to estimate an approximate wire size but final wire size is dependent on how hot the designer allows the wire to get. Magnet wire is commonly used and high frequency copper loss needs to be considered. Skin effects causes current to flow primarily on the surface of the wire. To combat this, multiple strands of magnet wire, which have a greater surface area compared to a single heavier gauge, are used. Stranded wire is also easier to wind particularly on toroids. Other wire alternatives, which increase surface areas, are foil and litz wire. Foil winding allows a very high current density. Foil should not be used in a core structure with significant air gap since excessive eddy currents would be present in the foil. Litz wire is very fine wire bundled together. It is similar to stranded wire except the wire is woven to allow each strand to alternate between the outside and the inside of the bundle over a given length.

CORE GEOMETRY—The core shape also affects temperature and those that dissipate heat well are desirable. E core shapes dissipate heat well. Toroids, along with power shapes like the PQ, are satisfactory. Older telecommunication shapes, such as pot cores or RM cores, do a poor job of dissipating heat but do offer shielding advantages. Newer shapes, such as planar cores, offer a large flat surface ideal for attachment of a heat sink.

TRANSFORMER EQUATIONS

Once a core is chosen, the calculation of primary and secondary turns and wire size is readily accomplished.

$$Np = \frac{V_p \times 10^8}{4BAf} \qquad Ns = \frac{V_s}{V_p} Np$$

$$I_p = \frac{P_{in}}{P_{in}} = \frac{P_{out}}{eE_{in}} \qquad I_s = \frac{P_{out}}{E_{out}}$$

$$KWa = N_p A_{wp} = N_s A_{ws}$$

Where

A_{wp} = primary wire area $\qquad$ A_{ws} = secondary wire area

Assume K = 0.40 for toroids; 0.60 for pot cores and E-U-I cores

Assume $N_p A_{wp} = 1.1\ N_s A_{ws}$ to allow for losses and feedback winding

$$\text{efficiency } e = \frac{P_{out}}{E_{in}} = \frac{P_{out}}{P_{out} + \text{wire losses} + \text{core losses}}$$

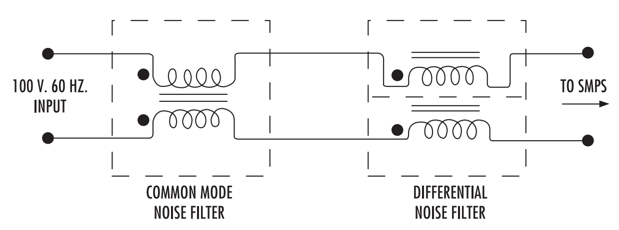
$$\text{Voltage Regulations (\%)} = \frac{R_s + (N_s/N_p)^2 R_p}{R_{load}} \times 100$$

INDUCTOR CORE SELECTION

EMI FILTERS

Switch Mode Power Supplies (SMPS) normally generate excessive high frequency noise which can affect electronic equipment like computers, instruments and motor controls connected to these same power lines. An EMI Noise Filter inserted between the power line and the SMPS eliminates this type of interference (Figure 8). A differential noise filter and a common mode noise can be in series, or in many cases, the common mode filter is used alone.

FIGURE 8



Inductor Design

INDUCTOR CORE SELECTION CONT...

COMMON MODE FILTER

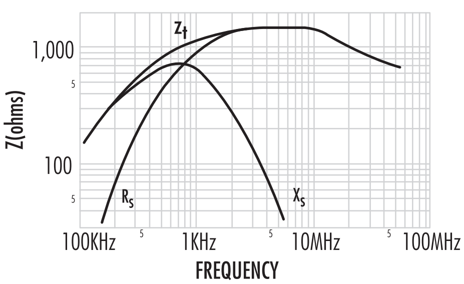
In a CMN filter, each winding of the inductor is connected in series with one of the input power lines. The connections and phasing of the inductor windings are such that flux created by one winding cancels the flux of the second winding. The insertion impedance of the inductor to the input power line is thus zero, except for small losses in the leakage reactance and the dc resistance of the windings. Because of the opposing fluxes, the input current needed to power the SMPS therefore will pass through the filter without any appreciable power loss.

Common mode noise is defined as unwanted high frequency current that appears in one or both input power lines and returns to the noise source through the ground of the inductor. This current sees the full impedance of either one or both windings of the CMN inductor because it is not canceled by a return current. Common mode noise voltages are thus attenuated in the windings of the inductor, keeping the input power lines free from the unwanted noise.

CHOOSING THE INDUCTOR MATERIAL

A SMPS normally operates above 20kHz. Unwanted noises generated in these supplies are at frequencies higher than 20kHz, often between 100kHz and 50MHz. The most appropriate and cost effective ferrite for the inductor is one offering the highest impedance in the frequency band of the unwanted noise. Identifying this material is difficult when viewing common parameters such as permeability and loss factor. Figure 9 shows a graph of impedance Z_t vs. frequency for a ferrite toroid, J42206TC wound with 10 turns.

FIGURE 9



The wound unit reaches its highest impedance between 1 and 10MHz. The series inductive reactance X_S and series resistance R_S (functions of the permeability and loss factor of the material) together generate the total impedance Z_t.

Figure 10 shows permeability and loss factor of the ferrite material in Figure 9 as a function of frequency. The falling off of permeability above 750kHz causes the inductive reactance to fall. Loss factor, increasing with frequency, cause the resistance to dominate the source of impedance at high frequencies.

Additional detailed brochures and inductors design software for this application are available from Magnetics.

FIGURE 10

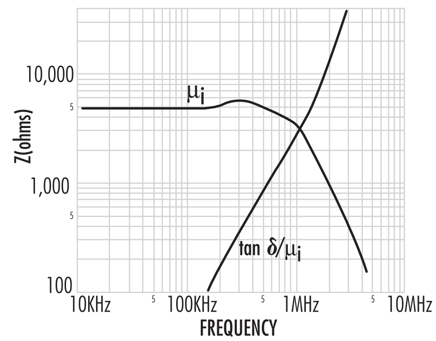
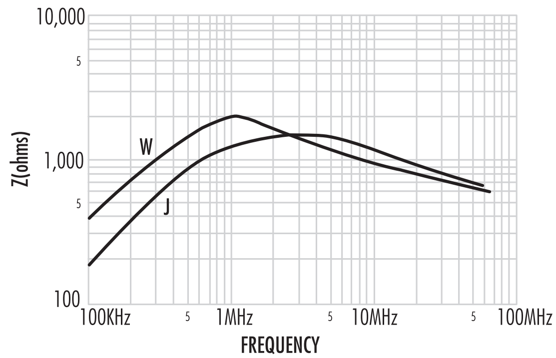


Figure 11 shows total impedance vs. frequency for two different materials. J material has a high total impedance over the range of 1 to 20MHz. It is most widely used for common mode filter chokes. Under 1MHz, W material has 20-50% more impedance than J. It is often used in place of J when low frequency noise if the major problem. For filter requirements specified at frequencies above and below 2MHz, either J or W is preferred.

FIGURE 11



CORE SHAPE

Toroids are most popular for a CMN filter as they are inexpensive and have low leakage flux. A toroid must be wound by hand (or individually on a toroid winding machine). Normally a non-metallic divider is placed between the two windings, and the wound unit is epoxied to a printed circuit header for attaching to a pc board.

An E core with its accessories is more expensive than a toroid, but assembly into a finished unit is less costly. Winding E core bobbins is relatively inexpensive. Bobbins with dividers for separating the two windings are available for pc board mounting.

E cores have more leakage inductance, useful for differential filtering in a common mode filter. E cores can be gapped to increase the leakage inductance, providing a unit that will absorb both the common mode and differential unwanted noise.

Inductor Design

CORE SELECTION

The following is a design procedure for a toroidal, single-layer common mode inductor, see Figure 12. To minimize winding capacitance and prevent core saturation due to asymmetrical windings, a single layer design is often used. This procedure assumes a minimum of thirty degrees of free spacing between the two opposing windings.

The basic parameters needed for common mode inductor design are current (I), impedance (Z_S), and frequency (f). The current determines the wire size. A conservative current density of 400 amps/cm^2 does not significantly heat up the wire. A more aggressive 800 amps/cm^2 may cause the wire to run hot. Selection graphs for both levels are presented.

The impedance of the inductor is normally specified as a minimum at a given frequency. This frequency is usually low enough to allow the assumption that the inductive reactance, X_S, provides the impedance, see Figure 9. Subsequently, the inductance, L_S can be calculated from:

$$L_S = \frac{X_S}{2\pi f} \qquad (1)$$

With the inductance and current known, Figures 13 and 14 can be used to select a core size based on the LI product, where L is the inductance in mH and I is the current in amps. The wire size (AWG) is then calculated using the following equation based on the current density (C_d) of 400 or 800 amps/cm^2:

$$AWG = -4.31 \times \ln\left(\frac{1.8891}{C_d}\right) \qquad (2)$$

The number of turns is determined from the core's A_L value as follows:

$$N = \left(\frac{L_S \times 10^6}{A_L}\right)^{1/2} \qquad (3)$$

DESIGN EXAMPLE

An impedance of 100Ω is required at 10kHz with a current of 3 amps. Calculating the inductance from equation 1, L_S = 1.59 mH.

With an LI product of 4.77 at 800 amps/cm^2, Figure 14 yields the core size for chosen material. In this example, W material is selected to give high impedance up to 1MHz, see Figure 11. Figure 14 yields the core W41809TC. Page 13.6 lists the core sizes and A_L values. Using an A_L of 12,200 mH/1,000 turns, equation 3 yields N = 12 turns per side. Using 800 amps/cm^2, equation 2 yields AWG = 21.

FIGURE 12: COMMON MODE INDUCTOR WINDING ARRANGEMENT

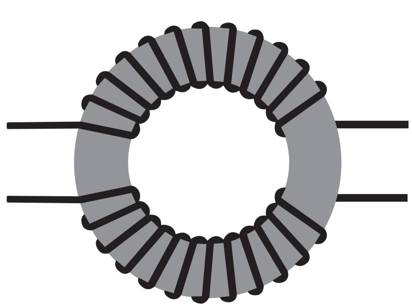


FIG. 13: CORE SELECTION AT 400 amps/cm^2

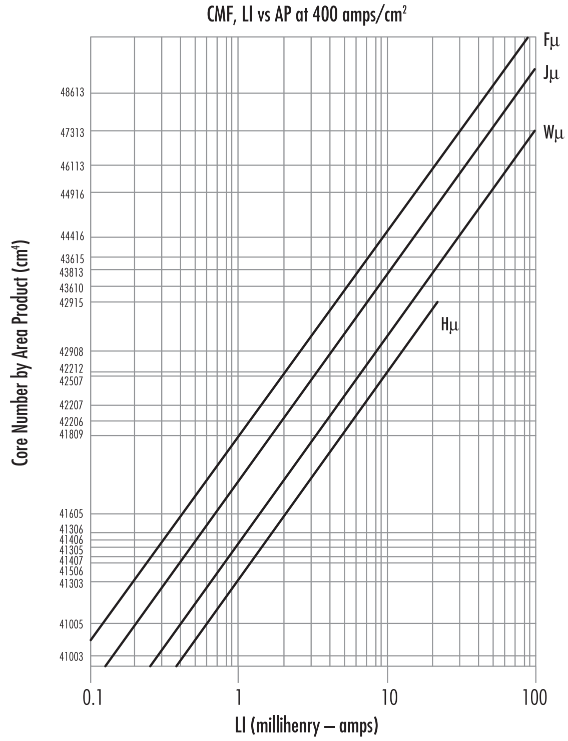
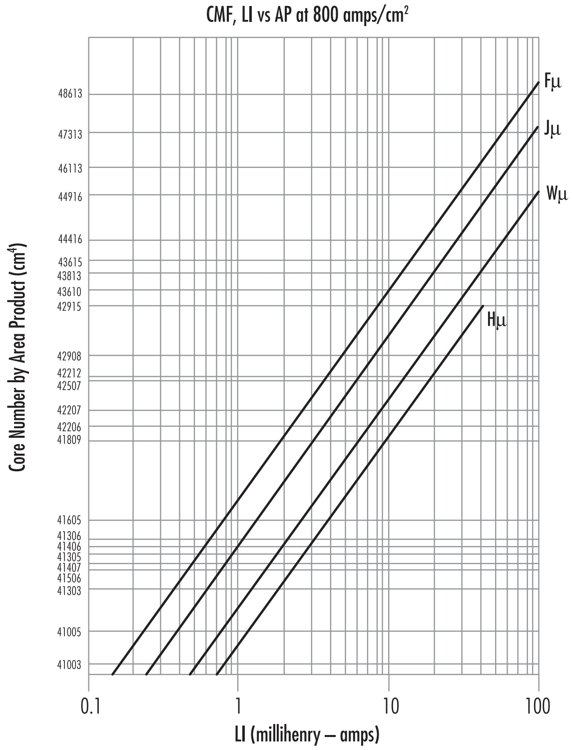


FIG. 14: CORE SELECTION AT 800 amps/cm^2



Inductor Design

HALL EFFECT DEVICES

Edwin H. Hall observed the "Hall Effect" phenomenon at John Hopkins University in 1897. He monitored the current flowing from top to bottom in a thin rectangular strip of gold foil by measuring the voltages at the geometric center of the left edge and the right edge of the strip. When no magnetic field was present, the voltages were identical. When a magnetic field was present perpendicular to the strip, there was a small voltage difference of a predictable polarity and magnitude. The creation of the transverse electric field, which is perpendicular to both the magnetic field and the current flow, is called the Hall Effect or Hall Voltage.

In metals the effect is small, but in semiconductors, considerable Hall voltages can be developed. Designers should consider using Hall sensors in many applications where mechanical or optical sensors have traditionally been used. To monitor ac or dc current flow in a wire, the wire is wrapped around a slotted ferromagnetic core, creating an electromagnet. The strength of the resulting magnetic field is used by the Hall sensor, inserted in the air gap, to measure the magnitude and direction of current flowing in the wire.

CORE SELECTION

In all cases, the effective permeability of a gapped core will be a function of the size of the air gap and the initial permeability of the core material. Once the gap becomes greater than a few thousandths of an inch, the effective permeability is determined essentially by the air gap.

ANALYTICAL METHOD

1. Determine the flux operating extremes based on either the $\Delta V/\Delta B$ of the circuit (volts/gauss), or the maximum flux sensitivity (gauss) of the sensor (as provided by the sensor data sheet).

2. Choose a core based on the maximum or minimum dimension requirements to allow windings, and based on the core cross-section dimensions. The cross-section dimensions should be at least twice the gap length to ensure a relatively homogeneous flux distribution bridging the gap.

3. Calculate the maximum required μ_e for the core:

$$\mu_e = \frac{B\ell_e}{.4\pi NI} \qquad (1)$$

where B = flux density (gauss)
ℓ_e = path length (cm)
N = turns
I = current (amps peak)

4. Calculate the minimum required gap length (inches):

$$\ell_g = \ell_e \left(\frac{1}{\mu_e} - \frac{1}{\mu_i} \right) (0.3937) \qquad (2)$$

where ℓ_g = gap length (inches)
ℓ_e = path length (cm)
μ_e = effective permeability
μ_i = initial permeability

5. If the minimum required gap is greater than the sensor thickness, ensure that the cross-section dimensions (length and width) are at least twice the gap length. If not, choose a larger core and recalculate the new gap length.

GRAPHICAL METHOD

1. Calculate NI/B (amp turns per gauss), knowing the flux operating extremes of $\Delta V/\Delta B$ or the maximum B sensitivity of the sensor.

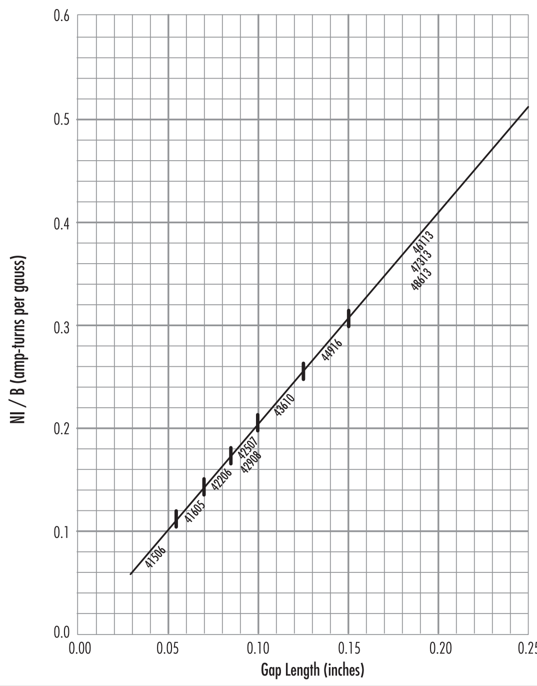
2. Using Figure 15, follow the NI/B value from the vertical axis to the diagonal line to choose a ferrite core size. Drop down from the diagonal line to the horizontal axis to determine the gap length. The core sizes indicated on the selector chart take into account gap length versus cross-section dimensions in order to maintain an even flux distribution across the gap under maximum current.

TOROID GAPPING

Ferrite cores are a ferromagnetic ceramic material. As such, they exhibit a very high hardness characteristic, they are very brittle, and they do not conduct heat very efficiently. Machining a slot into one side of a ferrite toroid can be a difficult process. Special techniques must be used to prevent chipping, cracking, or breaking of the cores.

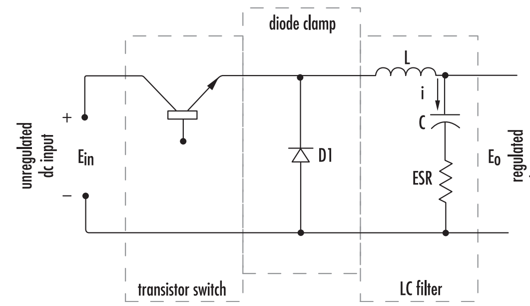
Diamond bonded-tool machining is the preferred method of cutting ferrite. The bonded diamond particle size should be approximately 100 to 170 mesh (150 to 90 µm). The peripheral speed of the cutting wheel should be 5,000 to 6,000 feet/minute (1,500 to 1,800 meters/minute). The depth of the cut may be as deep as 1" (25 mm), but in order to minimize residual stress, the cut should be limited to a maximum of 0.250" (6 mm) per pass, the smaller the better. During all cutting, the wheel and core should be flooded with ample amounts of coolant water to provide a lubricant as well as remove heat buildup that would cause thermal stress cracking of the core.

GAPPED TOROID SELECTOR CHART



Inductor Design

FIG. 15: HALL EFFECT DEVICE, CORE SELECTOR CHART



INDUCTOR CORE SIZE SELECTION (USING CORE SELECTOR CHARTS) DESCRIPTION

A typical regulator circuit consists of three parts: transistor switch, diode clamp, and an LC filter. An unregulated dc voltage is applied to the transistor switch which usually operates at a frequency of 1 to 50 kilohertz. When the switch is ON, the input voltage, E_{in}, is applied to the LC filter, thus causing current through the inductor to increase; excess energy is stored in the inductor and capacitor to maintain output power during the OFF time of the switch. Regulation is obtained by adjusting the ON time, t_{on}, of the transistor switch, using a feedback system from the output. The result is regulated dc output, expressed as:

$$E_{out} = E_{in}\, t_{on}\, f \qquad (1)$$

COMPONENT SELECTION

The switching system consists of a transistor and a feedback from the output of the regulator. Transistor selection involves two factors – (1) voltage ratings should be greater than the maximum input voltage, and (2) the frequency cut-off characteristics must be high compared to the actual switching frequency to insure efficient operation. The feedback circuits usually include operational amplifiers and comparators. Requirements for the diode clamp are identical to those of the transistor. The design of the LC filter stage is easily achieved. Given (1) maximum and minimum input voltage, (2) required output, (3) maximum allowable ripple voltage, (4) maximum and minimum load currents, and (5) the desired switching frequency, the values for the inductance and capacitance can be obtained. First, off-time (t_{off}) of the transistor is calculated.

$$t_{off} = (1 - E_{out}/E_{in\ max})\ /f \qquad (2)$$

When E_{in} decreases to its minimum value,

$$f_{min} = (1 - E_{out}/E_{in\ min})\ /t_{off} \qquad (3)$$

With these values, the required L and C can be calculated.

Allowing the peak to peak ripple current (Δi) through the inductor to be given by

$$\Delta i = 2\, I_{o\ min} \qquad (4)$$

the inductance is calculated using

$$L = E_{out}\, t_{off}\ /\ \Delta i \qquad (5)$$

The value calculated for (Δi) is somewhat arbitrary and can be adjusted to obtain a practical value for the inductance.The minimum capacitance is given by

$$C = \Delta i\ /8f_{min}\, \Delta e_o \qquad (6)$$

Finally, the maximum ESR of the capacitor is

$$ESR\ max = \Delta e_o/\Delta_i \qquad (7)$$

INDUCTOR DESIGN

Ferrite E cores and pot cores offer the advantages of decreased cost and low core losses at high frequencies. For switching regulators, F or P materials are recommended because of their temperature and dc bias characteristics. By adding air gaps to these ferrite shapes, the cores can be used efficiently while avoiding saturation.

These core selection procedures simplify the design of inductors for switching regulator applications. One can determine the smallest core size, assuming a winding factor of 50% and wire current carrying capacity of 500 circular mils per ampere.

Only two parameters of the two design applications must be known:

(a) Inductance required with dc bias

(b) dc current

1. Compute the product of LI^2 where:
   L= inductance required with dc bias (millihenries)
   I= maximum dc output current - $I_{o\ max} + \Delta_i$

2. Locate the LI^2 value on the Ferrite Core Selector charts on pgs 4.15–4.18. Follow this coordinate in the intersection with the first core size curve. Read the maximum nominal inductance, A_L, on the Y-axis. This represents the smallest core size and maximum A_L at which saturation will be avoided.

3. Any core size line that intersects the LI^2 coordinate represents a workable core for the inductor of the core's A_L value is less than the maximum value obtained on the chart.

4. Required inductance L, core size, and core nominal inductance (A_L) are known. Calculate the number of turns using

   $$N = 10^3\sqrt{\frac{L}{A_L}}$$

   where L is in millihenries

5. Choose the wire size from the wire table on pg 5.8 using 500 circular mils per amp.

Inductor Design

EXAMPLE

Choose a core for a switching regulator with the following requirements:

E_o	=5 volts
Δe_o	=0.50 volts
$I_{o\ max}$	=6 amps
$I_{o\ min}$	=1 amp
$E_{in\ min}$	=25 volts
$E_{in\ max}$	=35 volts
f	=20 KHz

1. Calculate the off-time and minimum switching, f_{min}, of the transistor switch using equations 2 and 3.

   t_{off} = (1 – 5/35)/20,000 = 4.3 x 10^{-5} seconds and

   f_{min} = (1 – 5/25)/4.3 x 10^{-5} seconds = 18,700 Hz.

2. Let the maximum ripple current, Δi, through the inductor be

   Δi = 2(1) = 2 amperes by equation 4.

3. Calculate L using equation 5.

   L = 5(4.3 x 10^{-5})/2 = 0.107 millihenries

4. Calculate C and ESR max using equations 6 and 7.

   C = 2/8 (18,700) (0.50) = 26.7 μ farads
   and ESR max = 0.50/2 = .25 ohms

5. The product of LI^2 = (0.107) $(8)^2$ = 6.9 millijoules

6. Due to the many shapes available in ferrites, there can be several choices for the selection. Any core size that the LI^2 coordinate intersects can be used if the maximum A_L is not exceeded.
   Following the LI^2 coordinate, the choices are:

(a) 45224 EC 52 core,	A_L315
(b) 44229 solid center post core,	A_L315
(c) 43622 pot core,	A_L400
(d) 43230 PQ core,	A_L250

7. Given the A_L, the number of turns needed for the required inductance is:

A_L	Turns
250	21
315	19
400	17

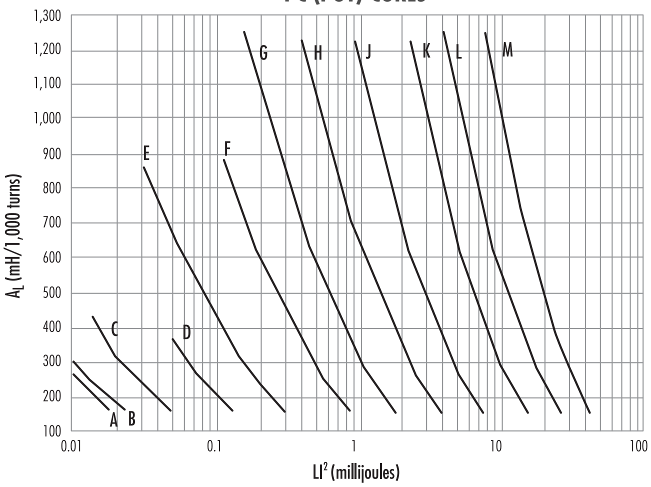
8. Use #14 wire

Note: MAGNETICS® Molypermalloy and Kool Mu® powder cores have a distributed air gap structure, making them ideal for switching regulator applications. Their dc bias characteristics allow them to be used at high drive levels without saturating. Information is available in Magnetics Powder Core Catalog and Brochure SR-IA, "Inductor Design in Switching Regulators."

FOR REFERENCES, SEE PAGE 14.4

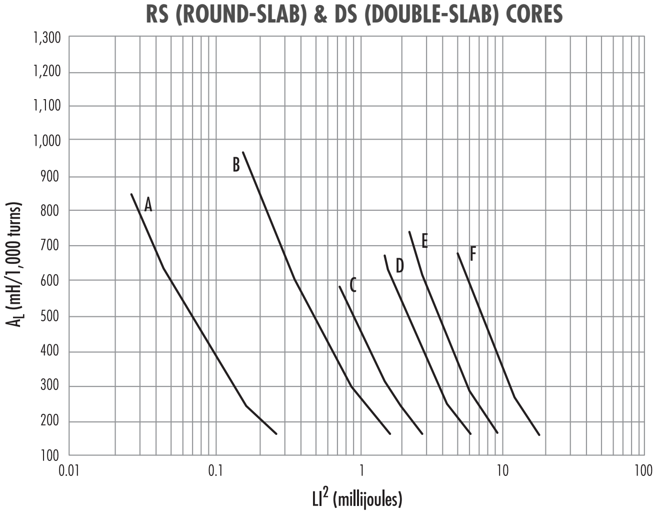
Selector Charts

PC (POT) CORES



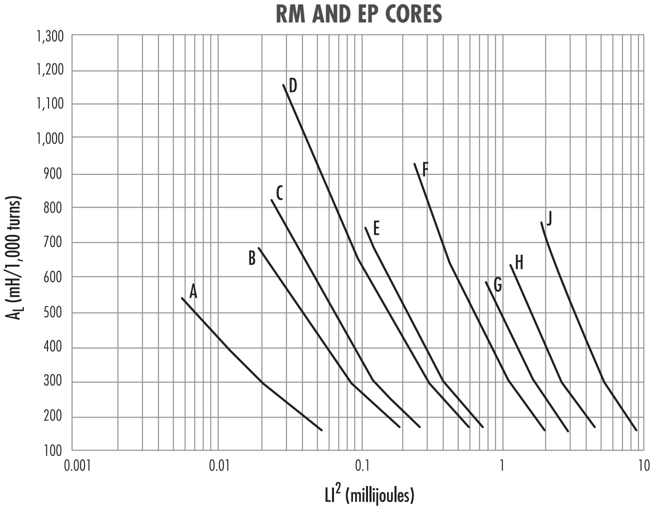
A — 40903
B — 40704
C — 40905
D — 41107
E — 41408
F — 41811
G — 42213
H — 42616
J — 43019
K — 43622
L — 44229
M — 44529

RS (ROUND-SLAB) & DS (DOUBLE-SLAB) CORES



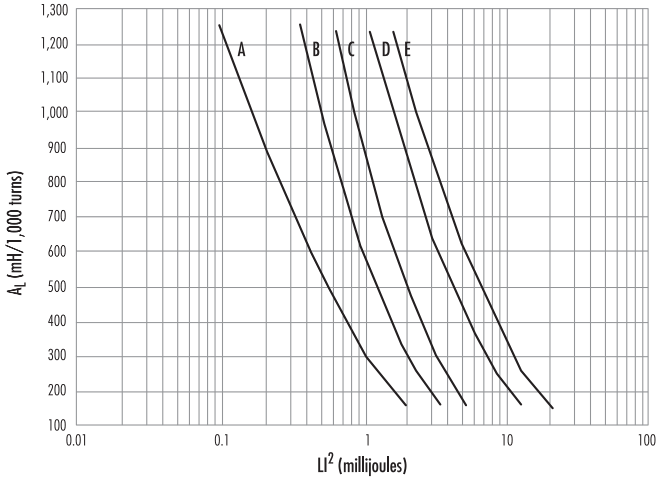
A — 41408 (RS)
B — 42311 (DS, RS)
42318 (DS, RS)
C — 42616 (DS)
D — 43019 (DS, RS)
E — 43622 (DS)
F — 44229 (DS)

RM AND EP CORES

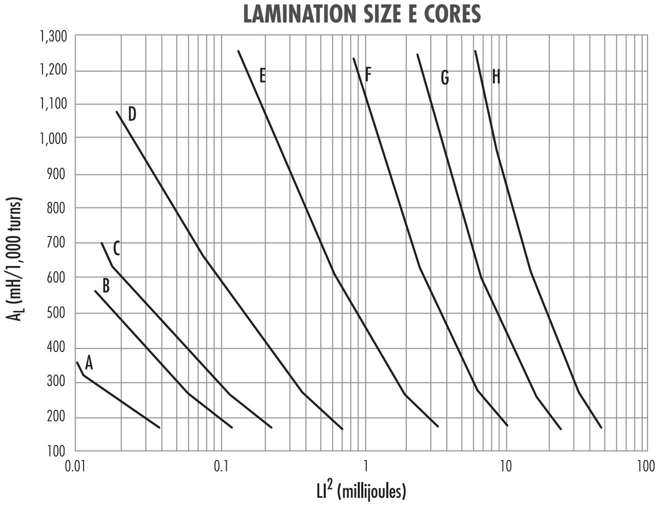


A — 40707 (EP7)
41010 (EP10)
41110 (RM4)
B — 41313 (EP13)
C — 41510 (RM5)
D — 41717 (EP17)
E — 41812 (RM6)
F — 42316 (RM8)
G — 42120 (EP20)
H — 42809 (RM10 PLANAR)
42819 (RM10)
J — N43723 (RM12)

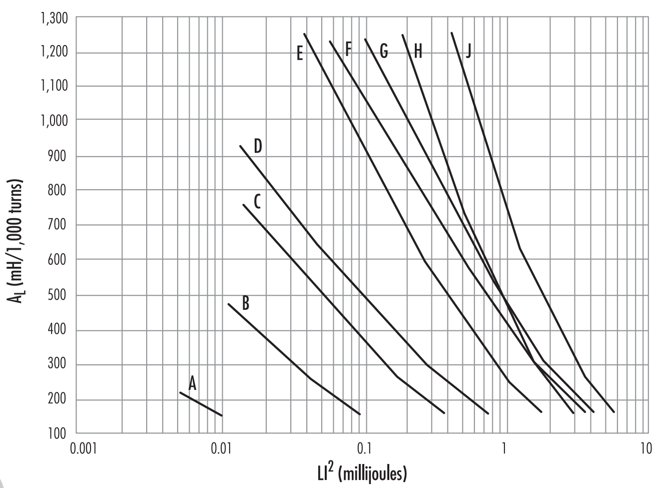
Selector Charts



A — 42016
42020
B — 42614
C — 42610
42620
42625
43214
D — 43220
43230
E — 43535
44040

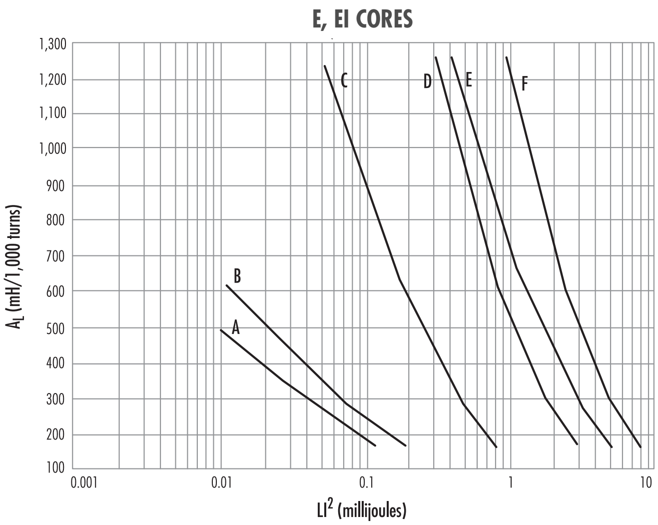


A — 41203 (EE)
B — 41707 (EE)
C — 41808 (EE)
D — 42510 (EE)
E — 43009 (EE)
43515 (EE)
F — 44317 (EE)
G — 44721 (EE)
H — 45724 (EE)

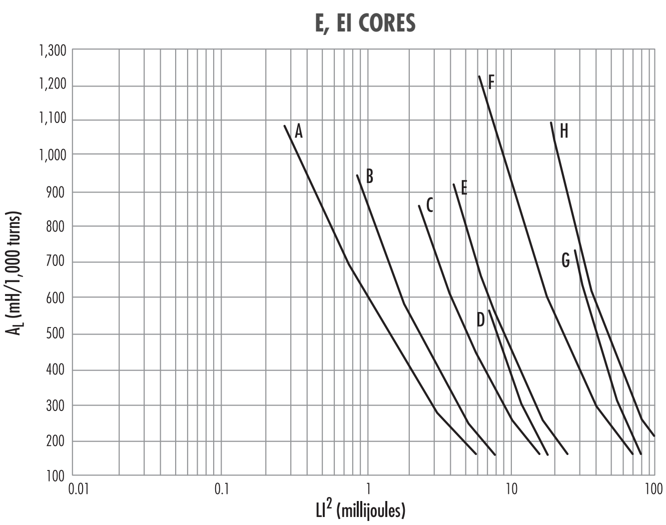


A — 40904 (EE)
B — 41208 (EE)
41209 (EE)
C — 41205 (EE)
42211 (EE)
D — 42515 (EE)
E — 41810 (EE)
43007 (EE)
F — 43524 (EE)
G — 42530 (EE)
43520 (EE)
H — 42520 (EE)
J — 42810 (EE)
43013 (EE)

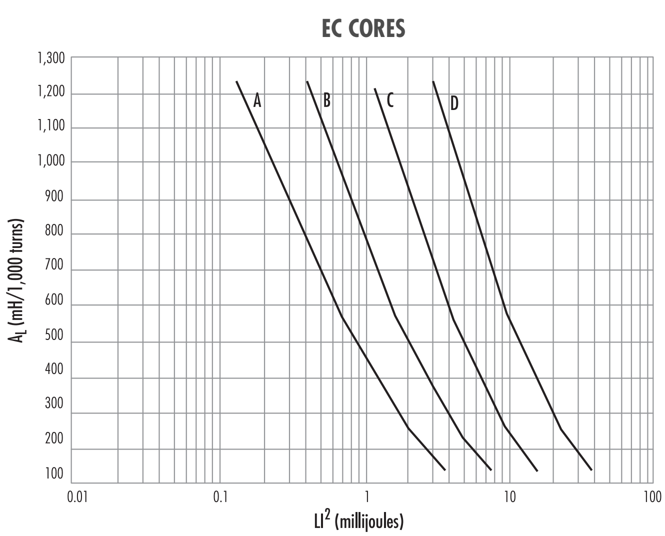
Selector Charts



A — 42110 (EE)
B — 41709 (EE)
C — 41805 (EE, EI)
D — 42216 (EE, EI)
E — 44008 (EE, EI)
F — 43208 (EE, EI)
43618 (EE, EI)

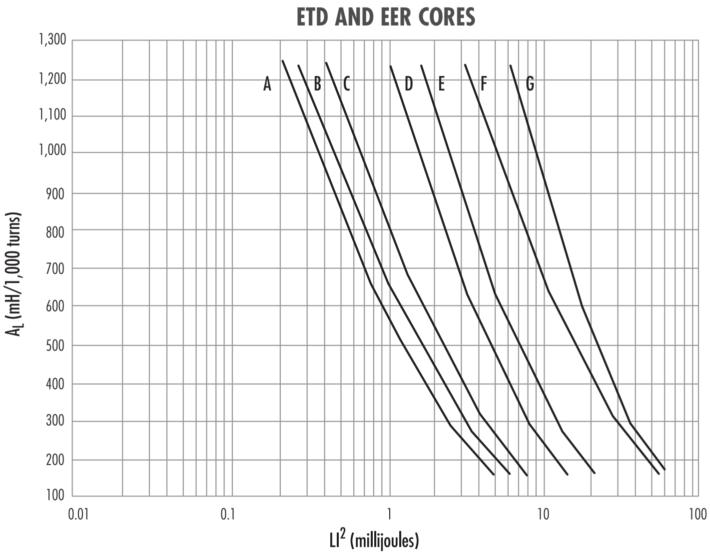


A — 44016 (EE)
B — 44011 (EE)
C — 44020 (EE)
D — 44308 (EE, EI)
E — 44022 (EE)
44924 (EE)
45021 (EE)
46016 (EE)
F — 45528 (EE)
45530 (EE)
47228 (EE)
48020 (EE)
G — 46410 (EE)
H — 49938 (EE, EI)

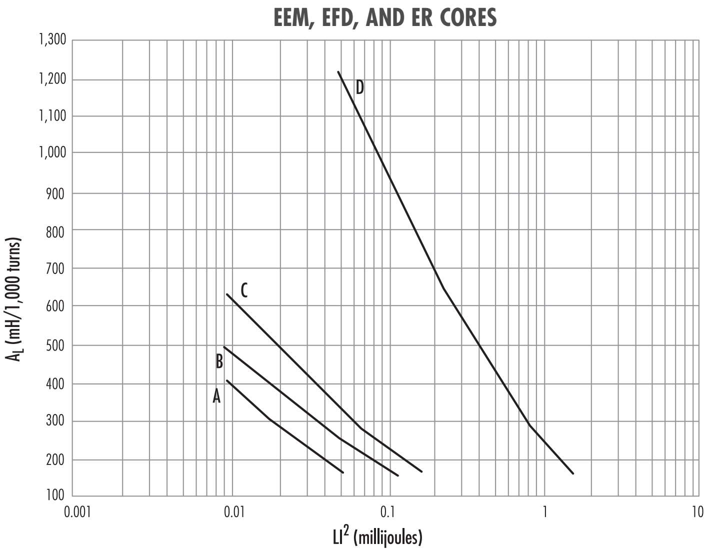


A — 43517
B — 44119
C — 45224
D — 47035

Selector Charts



A — 43434 (ETD34)
B — 43521 (EER35L)
C — 43939 (ETD39)
D — 44216 (EER42)
44444 (ETD44)
E — 44949 (ETD49)
F — 47054
G — 45959 (ETD59)

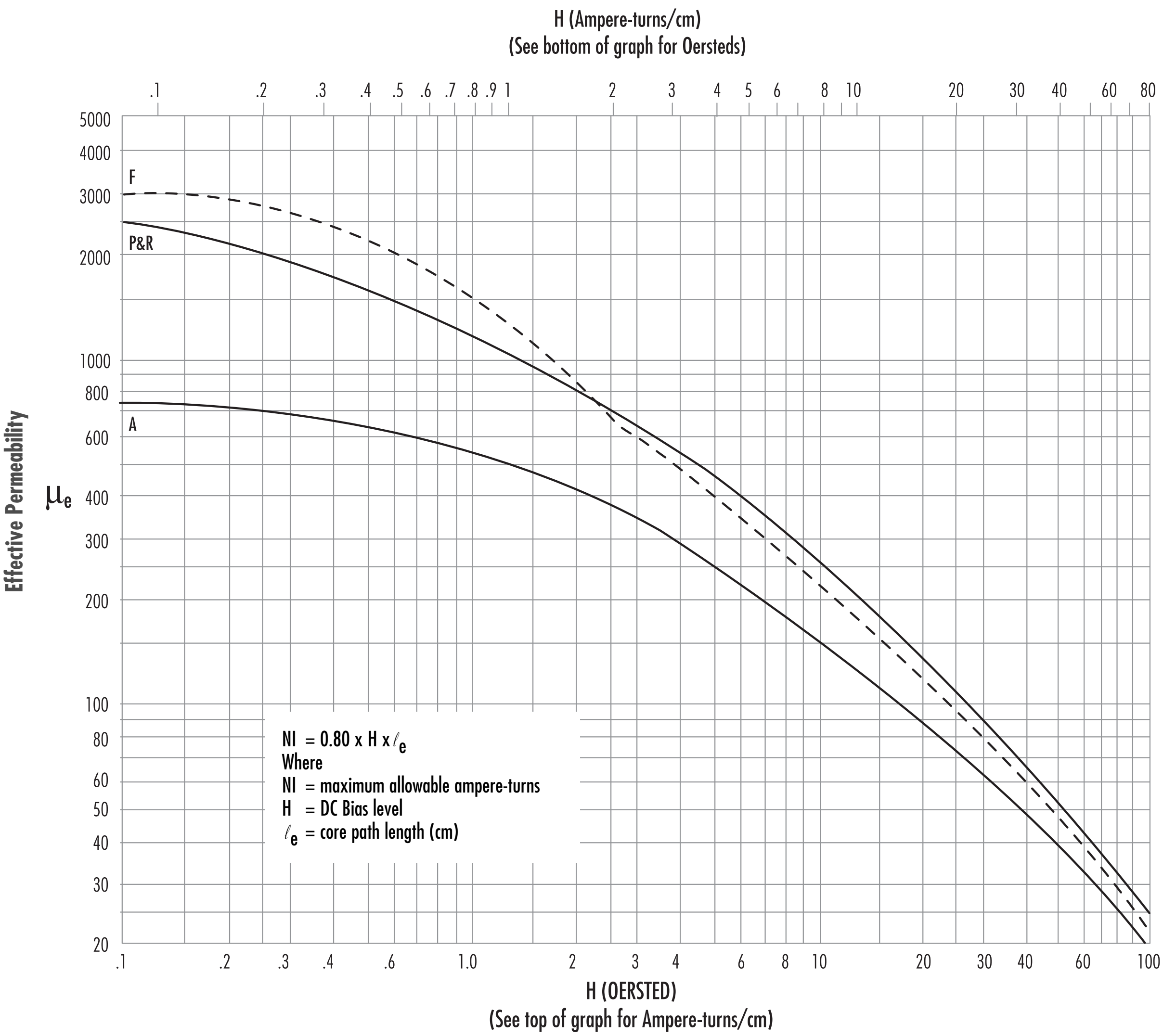


A — 41309 (EEM12.7)
40906 (ER 9.5)
B — 42110
41515 (EFD15)
C — 41709
D — 42523 (EFD25)

DC Bias Data

DC BIAS DATA — FOR GAPPED APPLICATIONS

μ_e vs. H



The above curves represent the locus of points up to which *effective permeability* remains constant. They show the maximum allowable DC bias, in ampere-turns, without a reduction in inductance. Beyond this level, inductance drops rapidly.

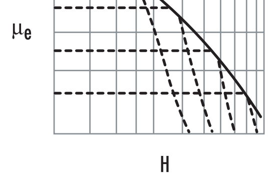
Example: How many ampere-turns can be supported by an R42213A315 pot core without a reduction in inductance value?
ℓ_e = 3.12 cm μ_e = 125

Maximum allowable H = 25 Oersted (from the graph above)
NI (maximum) = 0.80 x H x ℓ_e = 62.4 ampere-turns
OR (Using top scale, maximum allowable H = 20 A-T/cm.)
NI (maximum) = A-T/cm x ℓ_e
= 20 x 3.12
= 62.4 A-T

$$\mu_e = \frac{A_L \bullet \ell_e}{4\pi A_e}$$

$$\frac{1}{\mu_e} = \frac{1}{\mu_i} + \frac{\ell_g}{\ell_e}$$

A_e = effective cross sectional area (cm^2)
A_L = inductance/1,000 turns (mH)
μ_i = initial permeability
ℓ_g = gap length (cm)



Notes

Pot Cores Low Level Applications

The information contained in this section is primarily concerned with the design of linear inductors for high frequency LC tuned circuits using ferrite pot cores. Magnetics has arranged the data in this section for ease in (1) determining the optimum core for these LC circuits and (2) ordering the items necessary for any particular Pot Core assembly.

Featured are magnetic data, temperature characteristics, core dimensions, accessories, and other important design criteria. *Standard Q curves are available on special request, contact Magnetics Application Engineering.*

The data presented in this section are compiled mainly for selecting cores for high Q resonant LC circuits. However, much of this information can also be used to design pot cores into many other applications, including high frequency transformers, chokes, and other magnetic circuit elements.

POT CORE ASSEMBLY

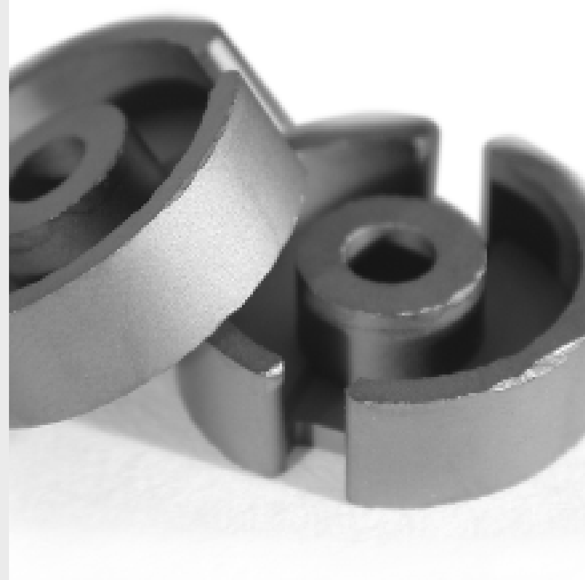
A ferrite pot core assembly includes the following items:

1. TWO MATCHED POT CORE HALVES
2. BOBBIN ON WHICH THE COILS ARE WOUND
3. TUNING ASSEMBLY
4. A CLAMP FOR HOLDING THE CORE HALVES TOGETHER

The pot core shape provides a convenient means of adjusting the ferrite structure to meet the specific requirements of the inductor. Both high circuit Q and good temperature stability of inductance can be obtained with these cores. The self-shielded pot core isolates the winding from stray magnetic fields or effects from other surrounding circuit elements.

The effective permeability (μ_e) is adjusted by grinding a small air gap in the center post of the pot core. For transformers and some inductors, no ground air gap is introduced, and the effective permeability is maximized. The effective permeability of the pot core will always be less than the material initial permeability (μ_i) because of the small air gap at the mating surfaces of the pot core halves. For other inductors where stability of inductance, Q, and temperature coefficient must be closely specified, a controlled air gap is carefully ground into the center post of one or both of the pot core halves. When fitted together, the total air gap then will determine the effective permeability and control the magnetic characteristics of the pot core. Finer adjustment of the effective permeability (gapped pot core inductance) can be accomplished by moving a ferrite cylinder or rod into the air gap through a hole in the center post.

Magnetics ferrites are available in various initial permeabilities (μ_i) which for filter applications cover frequency ranges into the megahertz region. Magnetics produces a wide variety of pot core sizes which include fourteen (14) international standard sizes*. These range from 5 x 6 mm to 45 x 29 mm, these dimensions representing OD and height of a pair. Each pot core half is tested and matched with another half to produce a core with an inductance tolerance of ± 3% for most centerpost ground parts.



*IEC Publication No. 133 (1961).

Advantages of Pot Core Assemblies

ADVANTAGES OF POT CORE ASSEMBLIES

- SELF-SHIELDING
  Because the wound coil is enclosed within the ferrite core, self-shielding prevents stray magnetic fields from entering or leaving the structure.

- COMPACTNESS
  Self-shielding permits more compact arrangement of circuit components, especially on printed circuit boards.

- MECHANICAL CONVENIENCE
  Ferrite pot cores are easy to assemble, mount, and wire to the circuit.

- LOW COST
  As compared to other core materials, ferrites are easier to make in unusual configurations (such as pot cores), resulting in a lower cost component. In addition, winding a pot core is usually quick and inexpensive because coils can be pre-wound on bobbins. When other costs of assembly, mounting, wiring, and adjustment are added, the total cost is often less than with other core materials or shapes.

- ADJUSTABILITY
  Final adjustment is accomplished by moving a threaded core in and out of the centerpost, and adjustment in the field is relatively easy as compared to any other type of construction.

- IMPROVED TEMPERATURE STABILITY AND Q
  Air gaps inserted between the mating surfaces of the centerposts provide good temperature stability and high Q.

- WIDE CORE SELECTION
  Many combinations of materials, physical sizes, and inductances offer the design engineer a large number of choices in core selection.

- LOW LOSSES AND LOW DISTORTION
  Since ferrites have high resistivities, eddy current losses are extremely low over the applicable frequency range and can be neglected. Hysteresis losses can be kept low with proper selection of material, core size, and excitation level.

SPECIAL ADVANTAGES OF MAGNETICS POT CORE ASSEMBLIES

- UNIQUE ONE PIECE CLAMP
  Provides simple assembly of the two core halves. Easy bending action allows insertion of the core assembly into the clamp, and spring tension holds the assembly rigidly and permanently in place. Rivet, screw, or circuit board tab mounting is available.

- CHOICE OF LINEAR OR FLAT TEMPERATURE CHARACTERISTICS
  Provides a close match to corresponding capacitors.

- CONSISTENCY AND UNIFORMITY
  Modern equipment with closely controlled manufacturing processes produce ferrite pot cores that are magnetically uniform, not only within one lot but from lot to lot.

Important Considerations

The selection of a pot core for use in LC resonant circuits and high frequency inductors requires a careful analysis of the design, including the following:

- OPERATING FREQUENCY.
- INDUCTANCE OF THE WOUND POT CORE ASSEMBLY.
- TEMPERATURE COEFFICIENT OF THE INDUCTOR.
- Q OF THE INDUCTOR OVER THE FREQUENCY RANGE.
- DIMENSIONAL LIMITATIONS OF THE COIL ASSEMBLY.
- MAXIMUM CURRENT FLOWING THROUGH THE COIL.
- LONG TERM STABILITY.

The important characteristics which strongly influence the above requirements are:

1. Relative loss factor - $\frac{1}{\mu_i Q}$. This factor reflects the relative losses in the core and varies with different ferrite materials and changes in operating frequency. When selecting the proper material, it is best to choose the one giving the lowest $\frac{1}{\mu_i Q}$ over the range of operating frequencies. In this way, the highest circuit Q can be expected. In a situation where the $\frac{1}{\mu_i Q}$ curves may cross over or coincide at various frequencies, each ferrite material should be considered in view of all circuit parameters of importance, including size, temperature coefficient, and disaccommodation, as well as Q. With this analysis, little doubt is left concerning the optimum selection of a proper core material.

2. Inductance factor (A_L). The selection of this parameter is based on a logarithmic progressive series of values obtained by dividing a logarithmic decade into 5 equal parts (International Standardization Organization R5 series of preferred numbers). Since the (A_L) values for the various core sizes are standard, they may be graphed or charted for ease of determining the required turns (N) to give the value of inductance needed. Pot cores with various (A_L) values are obtained by grinding closely-controlled air gaps in the centerposts of the cores. Small gaps are processed by gapping one core half. For larger gaps, both halves are gapped.

3. Temperature Coefficient (TC_e). The temperature coefficient of the pot core is important in LC tuned circuits and filters when attempting to stabilize the resonant frequency over a wide range of temperatures. This temperature coefficient (TC_e) is determined by the properties of the ferrite material and the amount of air gap introduced. Ferrite materials have been designed to produce gapped pot core temperature coefficients that balance the opposite temperature characteristics of polystyrene capacitors, or match similar flat temperature coefficients of silvered mica capacitors. Therefore, careful selection of both capacitors and pot cores with regard to temperature coefficient will insure the optimum temperature stability.

4. Quality Factor (Q)*. The quality factor is a measure of the effects of the various losses on circuit performance. From the designer's point of view, these losses should include core losses, copper losses, and winding capacitive losses. Therefore, Q will be affected greatly by the number and placement of the turns on the bobbin, and the type and size of wire used. At higher frequencies, litz wire would reduce the eddy current losses in the windings and produce a higher Q than solid wire. Q data include the effects of winding and capacitive losses, which, if removed, would produce significantly higher calculated Q values. Consequently, the Q curves represent more realistically the actual Q values that would be obtained from circuit designs.

5. Dimensional Limitations. Many circuit designs contain dimensional and weight limitations which restrict the size of the inductor and the mounting techniques used. Sometimes, minimum weight or volume is sacrificed to obtain better circuit performance.

6. Current Carrying Capacity. Inductive circuits containing ferrite pot cores are normally operated at extremely low levels of AC excitation to insure the best possible performance. However, the current flowing in the coil may be much higher than anticipated due to superimposed DC currents, or unexpected surges of AC. Therefore, the selection of the wire size used in an inductor design is influenced by both of these factors. Wire data is presented in this catalog as a guide in considering these operating conditions. - Refer to Tables 5 and 6, page 5.10.

7. Long Term Stability (DF_e). In critical inductive designs, especially resonant circuits, the designer must be concerned with long term drift in resonant frequency. This stability drift (or decrease in inductance), known as disaccommodation, can be calculated for each pot core size and inductance factor (A_L). It occurs at a logarithmic rate, and the long term change of inductance may be calculated from the formula: $\frac{\Delta L}{L} = DFe \times \log \frac{t_2}{t_1}$

where $\frac{\Delta L}{L}$ is the decrease in inductance between the times t_1 and t_2, DF_e is the Effective Disaccommodation Coefficient of the core selected, and t_1 is the elapsed time between manufacture of the core (stamped on shipping container) and its assembly into the circuit, while t_2 is the time from manufacture of the core to the end of the expected life of the device. Disaccommodation starts immediately after the core is manufactured as it cools through its Curie Temperature. At any later time as the core is demagnetized, or thermally or mechanically shocked, the inductance may increase to its original value and disaccommodation begins again. Therefore, consideration must be given to increases in inductance due to magnetic, thermal or physical shock, as well as decreases in inductance due to time. If no extreme conditioning is expected during the equipment life, changes in inductance will be small, because most of the change occurs during the first few months after manufacture of the core.

*Q curves referred to here are available on special request. Contact Magnetics Applications Engineering.

Important Considerations

LIMITS ON EXCITATION

Inductors designed using pot cores are usually identified as linear magnetic components because they are operated within the range of negligible change of effective permeability with excitation. To calculate suggested maximum AC excitation levels, use the following formula:

$$B = \frac{E_{rms} \times 10^8}{4.44\ A_e N f}$$

4.44 for sine wave
4.0 for square wave

where
- B = 200 gausses, the suggested conservative limit.
- N = turns on pot core
- f = operating frequency in hertz.
- A_e = effective area of the pot core in cm^2.

Because superimposed DC current also affects linearity of inductance in pot cores, consideration for DC currents must also be given. The equation shown above must be modified to include effect of DC bias. The combined equation now becomes:

$$B_{(combined)} = \frac{E_{rms} \times 10^8}{4.44\ A_e N f} + \frac{N I_{dc} A_L}{10 A_e}$$

where
- B = 200 gausses, the suggested conservative limit.
- I_{dc} = bias current in amperes.

See pages 4.15 - 4.19 for DC bias data on Magnetics power ferrites.

Notes

Assembly Notes

Magnetics ferrite pot cores can be assembled with or without clamping hardware or tuning devices.

Mounting clamps are available for the 40905, 41107, 41408, 41811, 42213, 42616, 43019, 43622, and 44229 pot core sizes. These clamps normally eliminate the need to cement the pot core halves together. The mating surfaces of the pot core must be cleaned to remove moisture, grease, dust, or other foreign particles, before clamping or cementing.

If the cementing method is chosen, a small amount of cement is placed on the mating surface of the pot core skirt, being careful to keep the center-post free of all cement. The pot core halves are brought together and rotated together under slight pressure to distribute the cement evenly around the skirt. The halves are separated and the wound bobbin is set in place. A small amount of cement is now placed on the exposed flange of the bobbin to bond it in the pot core assembly and thus insure no movement. The other core half is replaced, the centerpost holes and wire aperture aligned, and the unit clamped together in a pressure jig. Permanent bonding is accomplished by curing the cement at elevated temperatures according to the manufacturer's recommendations. After curing, storage for a minimum of 24 hours, and heat cycling between room temperature and 70°C may be required before final testing or tuning is completed.

The tuning adjusters can be inserted into the pot core immediately after the cemented core halves have been cured and the assembly can then be heat cycled. Some adjusters require insertion of the base into the centerpost hole prior to assembly of the pot core into the clamp when a clamp is used for mounting pg 5.8. The adjuster is usually made in two parts - the plastic base with a threaded hole, and a ferrite cylinder imbedded in a plastic screw. The base is pressed into the centerpost of the pot core, and the plastic screw is turned into the base until the ferrite cylinder enters the air gap. Tuning is completed when the inductance of the pot core assembly reaches the proper value. If this initial adjustment is expected to be the final one, cementing is recommended to prevent accidental detuning. If precise inductance values are expected, final tuning should not be completed earlier than 24 hours after the pot core assembly has been cured or clamped.

"TB-P" bases, which are polypropylene, may be etched in order to roughen the adhering surface and improve the bonding that is achieved.

Plastic screw drivers are available upon request for use in final tuning.

Tuning assemblies are available for most standard size pot cores. Contact Magnetics Application Engineering for details.

Assembly Notes

FIGURE 1

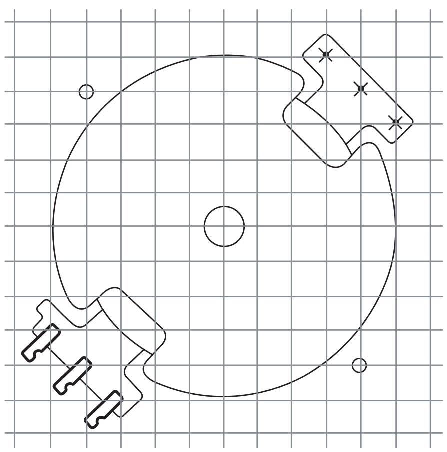


FIGURE 2

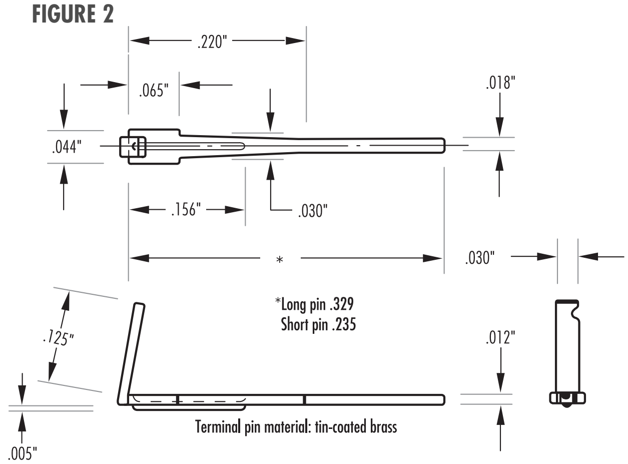
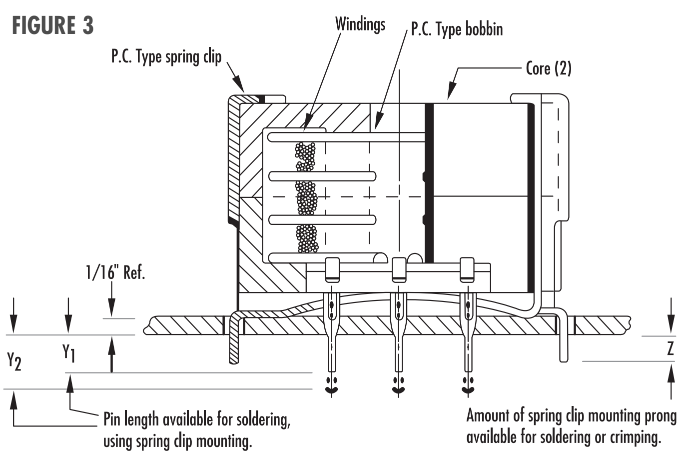


FIGURE 3



PRINTED CIRCUIT BOBBINS AND MOUNTING HARDWARE

Many sizes in the standard pot cores can be supplied with printed circuit board bobbins. The grid pattern (Figure 1) illustrates the location of 6 pin type bobbins. The soldering pins are arranged to fit a grid of 0.1 ", and they will also fit printed circuit boards with 2.50 mm grids. The pin length is sufficient for a board thickness up to .187". Terminal pin details are illustrated in Figure 2. The board holes should be .046" + .003" in diameter (#56 drill). The bobbin should be cemented to the lower pot core half.

For some core types, printed circuit board mounting clamps are also available. A cross section of a completed core assembly using clamps is shown in Figure 3. When clamps are not available, the pot core halves must be cemented together.

Printed circuit board hardware for EP, RM and RS cores is described in the sections covering these core types.

PRINTED CIRCUIT BOBBINS SOLDERING INSTRUCTIONS

1. A solder pot should be used to solder the leads to the terminals. Preferred solder is 63/37 tin/lead eutectic. The solder temperature should be between 275°-300°C. Lower or higher temperatures will both damage the bobbin. Modern soldering techniques commonly use temperatures in excess of the softening points of all thermoplastic bobbin materials. Extreme care is required to prevent loosening of the terminals during soldering.

2. Insulation should be removed from the ends of the wire before soldering. This is especially important when litz wire is used. The preferred method is by burning.

3. Dip wound terminals into liquid soldering flux. A rosin based flux in alcohol solution should be used. Allow flux to air dry.

4. The bobbin should be immersed only far enough to cover the terminals.

5. The part should be immersed in the solder for 2-4 seconds, depending on the size of the wire used.

Wire Tables

TABLE 5 - MAGNET WIRE

WIRE SIZE AWG	WIRE AREA (MAX.)* HEAVY Circular Mils	cm^2 10^3	TURNS** per in^2	per cm^2	RESISTANCE Ohms/1000'	CURRENT CAPACITY (MA) @750 Cir. Mil/amp	@500 Cir. Mil/amp
10	11,470	58.13	89	13.8	.9987	13,840	20,768
11	9,158	46.42	112	17.4	1.261	10,968	16,452
12	7,310	37.05	140	21.7	1.588	8,705	13,058
13	5,852	29.66	176	27.3	2.001	6,912	10,368
14	4,679	23.72	220	34.1	2.524	5,479	8,220
15	3,758	19.05	260	40.3	3.181	4,347	6,520
16	3,003	15.22	330	51.2	4.020	3,441	5,160
17	2,421	12.27	410	63.6	5.054	2,736	4,100
18	1,936	9.812	510	79.1	6.386	2,165	3,250
19	1,560	7.907	635	98.4	8.046	1,719	2,580
20	1,246	6.315	800	124	10.13	1,365	2,050
21	1,005	5.094	1,000	155	12.77	1,083	1,630
22	807	4.090	1,200	186	16.20	853	1,280
23	650	3.294	1,500	232	20.30	681	1,020
24	524	2.656	1,900	294	25.67	539	808
25	424	2.149	2,400	372	32.37	427	641
26	342	1.733	3,000	465	41.0	338	506
27	272	1.379	3,600	558	51.4	259	403
28	219	1.110	4,700	728	65.3	212	318
29	180	0.9123	5,600	868	81.2	171	255
30	144	0.7298	7,000	1,085	104	133	200
31	117	0.5930	8,500	1,317	131	106	158
32	96.0	0.4866	10,500	1,628	162	85	128
33	77.4	0.3923	13,000	2,015	206	67	101
34	60.8	0.3082	16,000	2,480	261	53	79
35	49.0	0.2484	20,000	3,100	331	42	63
36	39.7	0.2012	25,000	3,876	415	33	50
37	32.5	0.1647	32,000	4,961	512	27	41
38	26.0	0.1318	37,000	5,736	648	21	32
39	20.2	0.1024	50,000	7,752	847	16	25
40	16.0	0.0811	65,000	10,077	1,080	13	19
41	13.0	0.0659	80,000	12,403	1,320	11	16
42	10.2	0.0517	100,000	15,504	1,660	8.5	13
43	8.40	0.0426	125,000	19,380	2,140	6.5	10
44	7.30	0.037	150,000	23,256	2,590	5.5	8
45	5.30	0.0269	185,000	28,682	3,348	4.1	6.2

Wire Tables

TABLE 6 - LITZ WIRE

LITZ Wire Size	TURNS*** per in^2	TURNS*** per cm^2	LITZ Wire Size	TURNS*** per in^2	TURNS*** per cm^2
5/44	28,000	4,341	72/44	1,500	232
6/44	25,000	3,876	80/44	1,400	217
7/44	22,000	3,410	90/44	1,200	186
12/44	13,000	2,016	100/44	1,100	170
20/44	7,400	1,147	120/44	900	140
30/44	4,000	620	150/44	700	108
40/44	3,000	465	180/44	500	77
50/44	2,300	356	360/44	250	38
60/44	1,900	294			

*Areas are for maximum wire area plus maximum insulation buildup.

** Based on a typical machine layer wound coil.

*** Based on a typical layer wound coil.

Plastics Information

	Specific Gravity	Water Absorption, 24h 73°F (%)	Tensile Strength (10^3 psi)	Tensile Modulus (10^3 psi)	Flexural Strength (10^3 psi)	Flexural Modulus (10^5 psi)	Izod Impact, Notched (ft.-lb/in)	Temperature Class*	Coefficient of expansion (10^{-5} in/in°C)	Deflection Temperature 264 psi (°C)	Dielectric Strength (v/mil)	Dielectric Constant (@1kHz)	Dissipation Factor (@1kHz)	Vol. Resistivity @73°F, 50% RH (ohm-cm)	Arc Resistance (Sec)	Flammability	Oxygen Index (%O_2)	UL Card No.	Max solder temperature (°C)
ASTM Test	D792	D570	D638	D638	D790	D790	D256		D696	D648	D149	D150	D150	D257	D495	UL94			
Rynite FR-515	1.53	0.07	15.5		23	8.5	1.2	H	1.7	210	670	3.1	0.004	10^{15}	67	V-0	30	E69578	250
Rynite FR-530	1.67	0.05	22		32	1.5	1.6	H	1.4	224	650	3.8	0.011	10^{15}	117	V-0	33	E69578, E69939, E81777	270
Delrin	1.42	0.25	19.5		29	1.4	1.6	A	2.3	1.63	550	3.8				HB	16	E66288R	
Delrin 900	1.42	0.25	10	4.5		4.2	1.3		10.4	130	500	3.7	0.005	10^{15}	220	HB		E66288	175
Zytel 101	1.14	1.2	12		23	0.41	1.0	B	4.0	232	480	3.9	0.02	10^{13}		HB	28	E41938	250
Zytel FR-50	1.56	0.6	22.8			11.9	1.9	B	2.2	241	437	3.6	0.009	10^{14}	103	V-0		E41938	250
Zytel 70G33L	1.38		18			9.0	2.0			249	530	3.7			135	HB		E41938	255
RTP 205FR	1.66	0.6	21	16	33	15.0	2.0		3.4	232	475	3.8	0.015	10^{14}		V-0		E84658	248
LNP RF1008	1.46	0.6	31		42	16.0	2.60			260						HB		E45195	260
Technyl A20-V25	1.38	0.75	19.6		29.7				2.5	250				10^{14}		V-0	32	E44716	
Crastin S660FR	1.45		7.5		11.7	3.9	0.8	B		179	560	3.1	0.002	10^{16}		V-0	30	E69578(M)	240
E4008	1.70	0.02	21.7		20.1	17.7	2.0					4.5		10^{13}	130	V-0	48	E54705(M)	330
Rogers RX630	1.75	0.07	12		23-28	22	1.2	B	1.9	232	500	4.5	0.019	10^{13}	180	V-0	40	E20305	400
Rogers RX660B	1.75	0.07	12		23-28	22	1.2	B	1.9	232	500	4.5	0.019	10^{13}	180	V-0	40	E123472	400
Vyncolite X-611	1.75	0.07	12		23-28	22	1.2	B	1.9	232	500	4.5	0.019	10^{13}	180	V-0	40	E63312(M)	400
Fiberite 4017F	1.79		9.5		17.5	23	0.6	B	1.9	229	400	4.6 @1MHz	0.026 @1MHz	$2x10^{13}$	180	V-0	42.1	E46372	
PM9630	1.82				27				1.5	249	305			10^{11}	80	V-0		E41429	
T3733J	1.41	0.40	8		11		42			170	300			10^{12}		V-1		E59481(S)	

*A-105°C, B-130°C, H-180°C

THERMOPLASTIC MATERIALS

NAME	TYPE
Rynite FR-515	Thermoplastic Polyester (PET)
Rynite FR-530	Thermoplastic Polyester (PET)
Delrin, Delrin 900	Acetal Resin
LNP RF1008	6/6 Nylon, 40 % glass-filled
Zytel 70633L	6/6 Nylon, 33% glass-filled
RTP 205FR	6/6 Nylon, 30% glass-filled
Zytel 101	6/6 Nylon, 30% glass-filled
Technyl A20-V25	6/6 Nylon, 25% glass-filled
Zytel FR-50	6/6 Nylon, 25% glass-filled
Crastin S660FR	PBT
E-4008	Thermoplastic LCP

THERMOSET PHENOLIC MATERIALS

Rogers RX360	Fiberlite 4017F
Rogers RX660B	PM9630
Vyncolyte X-611	T373J

Magnetics is a UL-recognized molder in the QMMY2 fabricated parts program. Many bobbins shown in this catalog are covered. Contact Magnetics for details on specific parts.

This document reports typical data as compiled from various suppliers' literature. Magnetics assumes no responsibility for the use of the information presented herein and hereby disclaims all liability in regard to use.

Modern soldering techniques commonly use temperatures in excess of the softening points of all thermoplastic bobbin materials. These typically run from 400°C - 600°C. Extreme care is required to prevent loosening of the terminals during soldering.

Crastin-DuPont, Wilmington, DE
Delrin-DuPont, Wilmington, DE
Rynite-DuPont, Wilmington, DE
Zytel DuPont, Wilmington, DE
Rogers RX630-Rogers Corporation, Manchester, CT
Rogers RX660B-Rogers Corporation, Manchester, CT
PM9360-Sumitomo Chemical Company. Ltd., Tokyo, Japan
E-4008-Sumitomo Chemical Company. Ltd., Tokyo, Japan
Fiberite-ICI Inc., Winona, MN
LNP-LNP engineering Plastics, Exton,PA
RTP-RTP Company, Winona, MN
Technyl-Nytech, Lyon, France
T373J-Chang Chun Plastics Co. Ltd., Taipei, Taiwan
Vyncolite RX611-31-Vynckier S.A., Belgium

Notes

Pot Cores

POT CORES

The pot core shape is a convenient means of adjusting the ferrite structure to meet the specific requirements of an application. Both high circuit Q and good temperature stability of inductance can be obtained with these cores. Pot cores, when assembled, nearly surround the wound bobbin. This self-shielded geometry isolates the winding from stray magnetic fields or effects from other surrounding circuit elements.

Both plain and printed circuit bobbins are available, as are mounting and assembly hardware.

Typical applications for pot cores include; differential inductors, power transformers, power inductors, converter and inverter transformers, filters, both broadband and narrow transformers and telecom inductors.

Magnetics produces a wide variety of sizes, which include fourteen (14) international standard sizes. Standard pot cores are ungapped, but any practical gap is also available (see page1.8-1.11)

HOW TO ORDER

O P 4 14 08 UG XX

- O — STANDARD POT CORE
- P — FERRITE CORE MATERIAL
- 4 — USED FOR ALL FERRITE TYPES
- 14 — APPROXIMATE DIAMETER IN MM
- 08 — APPROXIMATE HEIGHT IN MM
- UG — GEOMETRY CODE/GAP CODE (SEE PAGE 1.6)
- XX — SPECIAL SPECIFICATION CODE

Pot Core
Data (ungapped)

Any practical gap available. See pages 1.8-1.11

MECHANICAL DIMENSIONS												
PART	**FIG.**		**A**	**B**	**2B**	**C**	**D**	**2D**	**E**	**F**	**G**	**H**
0_40302UG	**1**	mm	3.940 ± .080	.953 ± .050	1.910 ± .100	-	.445 min	.889 min	2.92 min	1.45 max	.813 ± .100	-
		in	.155 ± .003	.0375 ± .002	.075 ± .004	-	.0175 min	.035 min	.115 min	.057 max	.032 ± .004	-
0_40506UG	**1**	mm	4.570 ± .127	2.03 ± .050	4.06 ± .100	-	1.340 min	2.690 min	3.680 min	2.200 max	1.30 ± .100	-
		in	.180 ± .005	.080 ± .002	.160 ± .004	-	.053 min	.106 min	.145 min	.087 max	.051 ± 004	-
0_40507UG	**2**	mm	5.720 ± .080	1.620 ± .050	3.250 ± .100	-	1.090 min	2.180 min	4.490 min	2.490 max	1.50 ± .100	.991 ± .050
		in	.225 ± .003	.064 ± .002	.128 ± .004	-	.043 min	.086 min	.177 min	.098 max	.059 ± .004	.039 ± .002
0_40704UG	**3**	mm	7.240 ± .150	2.080 ± .050	4.160 ± .100	4.720 nom	1.400 min	2.790 min	5.740 min	3.000 max	1.520 min	1.09 ± .050
		in	.285 ± .006	.082 ± .002	.164 ± .004	.186 nom	.055 min	.110 min	.226 min	.118 max	.060 min	.043 ± .002
0_40903UG	**3**	mm	9.14 ± .15	1.524 ± .000,-.120	3.05 ± .120	6.6 nom	.749 min	1.50 min	7.49 min	3.88 max	1.78 min	2.01 ± .05
		in	.360 ± .006	.060 ± .000,-.005	.120 ± .005	.260 nom	.0295 min	.059 min	.295 min	.153 max	.070 min	.079 ± .05
0_40905UG	**3**	mm	9.140 ± .150	2.690+.000,-.120	5.26 ± .120	6.600 nom	1.800 min	3.61 min	7.490 min	3.880 max	1.780 min	2.010 ± .050
		in	.360 ± .006	.106+.000, -.005	.207 ± .005	.260 nom	.071 min	.142 min	.295 min	.153 max	.070 min	.079 ± .002
0_41107UG	**4**	mm	11.100 ± .200	3.250 ± .050	6.500 ± .100	6.80	2.21	4.42	9.0	4.700	22	2.1 ± 0.1
		in	.437 ± .008	.128 ± .003	.256 ± .006	.297 nom	.087 min	.174 min	.354 min	.185 max	.070 min	.081 ± .002
0_41408UG	**4**	mm	14.3+.000,-.500	4.2 ± .050	8.4 ± .100	9.500 nom	2.80 min	5.6 min	11.600 min	6.0 max	2.70 min	3.00+.010,-.000
		in	.553 ± .010	.167 +.000, -.005	.334+.000, -.011	.376 nom	.110 min	.220 min	.457 min	.236 max	.120 min	.122 ± .003

To order, add material code to part number.

FIGURE 1

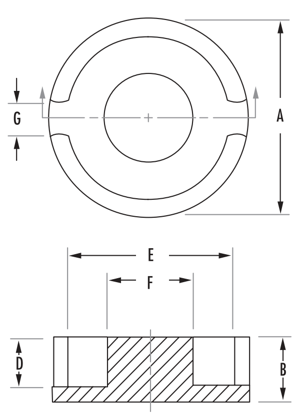
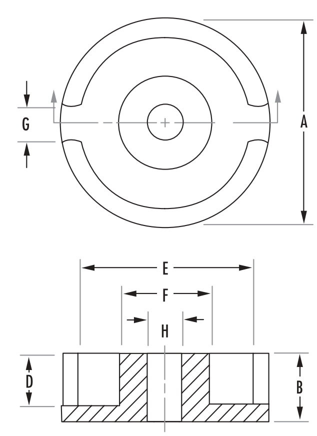


FIGURE 2



Pot Core Data (ungapped)

A_L (mH/1000T)

	POWER MATERIALS			HIGH PERMEABILITY MATERIALS		MAGNETIC DATA						AVAILABLE HARDWARE				
	R	P	F*	J	W	l_e (mm)	A_e (mm^2)	A MIN (mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	WaAc	STANDARD BOBBIN	PRINTED CIRCUIT BOBBIN	MOUNTING CLAMP	SURFACE MOUNT HEADER	TUNING ASSEMBLY**
Nom			350		-	4.29	2.1	1.5	9.0	0.076	-					
						Note: +/- 35% for Ind. specs										
Nom			500	606	-	8.88	4.1	3.6	36.0	0.210	-	✓				
						Note: +40%/-30% for Ind. specs										
Nom			775	930	-	7.75	4.4	3.9	34.0	0.200	-					
						Note: +40%/-30% for Ind. specs										
						9.9	7.0	5.9	69.0	0.500	-	✓				
Min	620	675	1,200	1,580	3,000	*Note: +40%/-30% for F*										
						6.24	6.1	-	38.0	0.1843	-					
Min	865	940	1,670	2,200	4,150											
						12.5	10.1	8.0	126.0	1.000	0.003	✓		✓		
Min	760	825	1,365	2,045	4,220											
						15.5	16.2	13.2	251	1.800	0.00815	✓		✓	✓	
Min	1,150	1,250	1,667	2,925	5,750											
						19.8	25.1	19.8	495	3.200	0.024	✓	✓	✓	✓	
Min	1,540	1,680	2,800	3,805	6,300											

* F material nominal ± 25% except where noted
** See page 5.6 for tuning assembly information

FIGURE 3

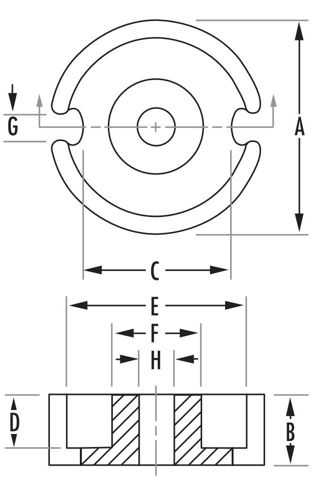
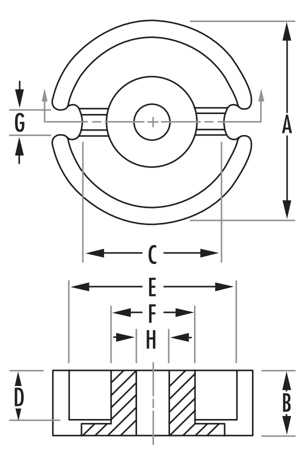


FIGURE 4



Pot Core Data (ungapped)

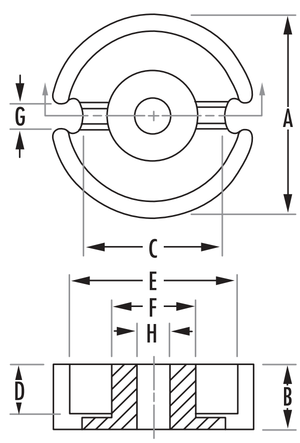
Any practical gap available. **See pages 1.8-1.11**

MECHANICAL DIMENSIONS

PART	FIG.		A	B	2B	C	D	2D	E	F	G	H
0_41811UG	**4**	mm	18.0 ± .4	5.33 ± .05	10.6 ± .1	13.4 ± .3	3.7 ± .1	7.4 ± .2	15.15 ± .25	7.45 ± .15	3.8 ± 0.6	3.100 ± .1
0_42213UG	**4**	mm	21.600 ± .380	6.7 ± .1	13.4 ± .2	15.0 nom	4.59 min	9.200 min	17.900 min	9.400 max	2.990 min	4.550 ± .100
		in	.851 ± .015	.264 ± .004	.528 ± .008	.590 nom	.181 min	.362 min	.705 min	.370 max	.118 min	.179 ± .004
0_42616UG	**4**	mm	25.5 ± .5	8.05 ± .1	16.1 ± .2	18.0 ± .4	5.5 + .2, -0	11.0 + 4, -0	21.6 ± .4	11.3 ± .2	3.8 ± .6	5.5 ± .1
0_43019UG	**4**	mm	30.0 ± .5	9.45 ± .05	18.9 ± .1	20.5 ± .5	6.5 ± .1	13 ± .2	25.4 ± .4	13.3 ± .2	4.3 ± .6	5.5 ± .1
0_43622UG	**4**	mm	35.6 ± .6	10.95 ± .05	21.9 ± .1	26.2 ± .6	7.4 ± .1	14.8 ± .2	30.4 ± .5	15.9 ± .3	4.9 ± .6	5.55 ± .15
0_44229UG	**4**	mm	42.400 ± .710	14.800 ± .200	29.600 ± .410	32.000 nom	10.200 min	20.400 min	35.600 min	17.700 max	4.490 min	5.5600 ± .100
		in	1.669 ± .028	.582 ± .008	1.164 ± .016	1.260 nom	.402 min	.804 min	1.402 min	.697 max	.177 min	.219 ± .004
0_44529UG	**4**	mm	45.000 ± .900	14.600 ± .100	29.200 ± .200	32.990 ± .510	9.400 min	18.800 min	36.500 min	20.700 max	4.490 min	5.560 ± .130
		in	1.772 ± .035	.575 ± .004	1.150 ± .008	1.299 ± .020	.370 min	.740 min	1.438 min	.814 max	.177 min	.219 ± .005

To order, add material code to part number.

FIGURE 4



Pot Core Data (ungapped)

	A_L (mH/1000T) POWER MATERIALS			A_L (mH/1000T) HIGH PERMEABILITY MATERIALS		MAGNETIC DATA						AVAILABLE HARDWARE				
	R	P	F*	J	W	l_e (mm)	A_e (mm^2)	A MIN (mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	WaAc	STANDARD BOBBIN	PRINTED CIRCUIT BOBBIN	MOUNTING CLAMP	SURFACE MOUNT HEADER	TUNING ASSEMBLY**
Min	2,300	2,500	4,000	5,625	8,400	25.8	43.3	36.0	1120	7.3	0.073	✓	✓	✓	✓	✓
Min	3,030	3,300	4,900	6,825	11,200	31.2	63.9	50.9	2000	13.0	0.187	✓	✓	✓		✓
Min	3,910	4,250	6,350	8,775	14,000	37.6	93.9	77.4	35.30	20.0	0.392	✓	✓	✓		✓
Min	5,010	5,450	8,100	10,200	18,750	45.2	137.0	116.0	6190	34.0	0.737	✓	✓	✓		✓
Min	6,530	7,100	10,200	13,125	24,500	53.2	202.0	172.0	10700	57.0	1.53	✓	✓	✓		✓
Min	6,900	7,500	12,000	15,000	28,000	68.5	266.0	213.0	18200	104.0	3.69	✓		✓		✓
Min	9,660	10,500	14,300	18,750	35,000	67.2	360.0	299.0	24200	149.6	3.85	✓				

* F material nominal ± 25%

** See page 5.6 for tuning assembly information

Bobbins

PART	FIG.	CORE SIZE		MECHANICAL DIMENSIONS A MAX	B MAX	C MIN	D MAX	E NOM	F NOM	NOMINAL WINDING AREA PER SECTION in^2	cm^2	AVERAGE LENGTH OF TURN FT	MATERIAL
00B050601	**1**	**40506**	mm	3.657	2.540	2.260	2.667	2.006	0.355	0.00150	0.0097	0.0322	Thermoplastic
			in	0.144	0.100	0.089	0.105	0.079	0.014				polyester (PET)
00B070401	**2**	**40704**	mm	5.740	2.743	3.048	3.657	2.082	-	0.00380	0.0250	0.0479	Glass-filled nylon
			in	0.226	0.108	0.120	0.144	0.082	-				
00B090501	**3**	**40905**	mm	7.416	3.530	3.962	5.181	2.540	-	0.00470	0.0300	0.0633	Delrin
			in	0.292	0.139	0.156	0.204	0.100	-				
00B090501FR	**3**	**40905**	mm	7.416	3.530	3.962	5.181	2.540	-	0.00470	0.0300	0.0633	Crastin S660FR
			in	0.292	0.139	0.156	0.204	0.100	-				
00B110701	**3**	**41107**	mm	8.915	4.318	4.775	5.994	3.327	-	0.00785	0.0500	0.0751	Delrin
			in	0.351	0.170	0.188	0.236	0.131	-				
00B110702	**3**	**41107**	mm	8.915	4.318	4.775	5.994	1.447	-	0.00342	0.0220	0.0751	Delrin
2 Section			in	0.351	0.170	0.188	0.236	0.057	-				
00B140801	**3**	**41408**	mm	11.53	5.511	6.070	7.289	4.521	-	0.01530	0.0980	0.0953	Delrin
			in	0.454	0.217	0.239	0.287	0.178	-				
00B140802	**3**	**41408**	mm	11.53	5.511	6.070	7.289	2.032	-	0.00688	0.0440	0.0953	Delrin
2 Section			in	0.454	0.217	0.239	0.287	0.080	-				
00B140802FR	**3**	**41408**	mm	11.53	5.511	6.070	7.289	2.032	-	0.00688	0.0440	0.0953	Crastin S660FR
2 Section			in	0.454	0.217	0.239	0.287	0.080	-				

FIGURE 1

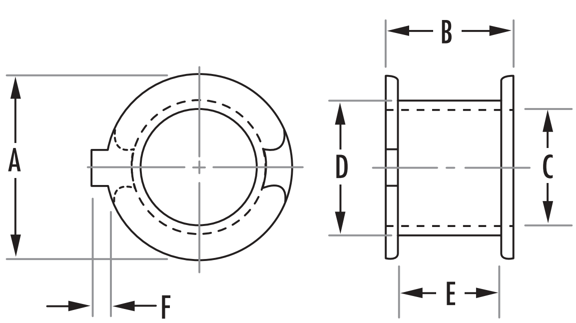
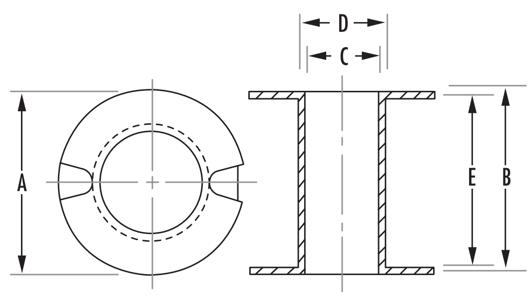


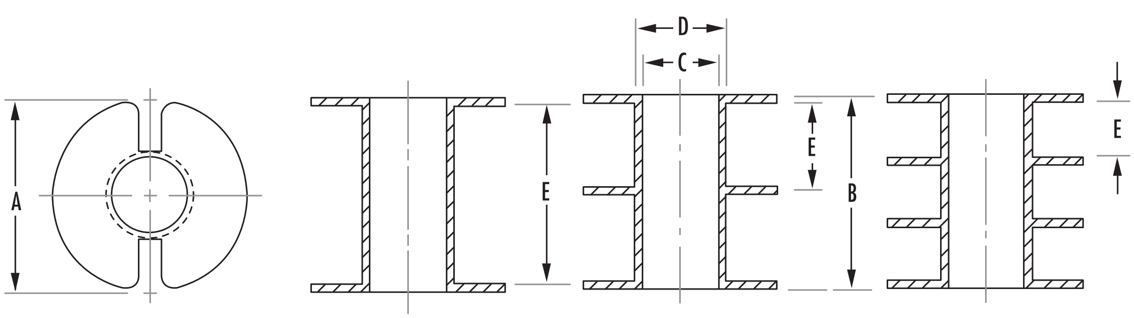
FIGURE 2



Bobbins

PART	FIG.	CORE SIZE		A MAX	B MAX	C MIN	D MAX	E NOM	F NOM	NOMINAL WINDING AREA PER SECTION in^2	NOMINAL WINDING AREA PER SECTION cm^2	AVERAGE LENGTH OF TURN FT	MATERIAL
00B181101	**3**	**41811**	mm	14.909	7.137	7.670	8.89	6.096	-	0.02645	0.1700	0.120	Delrin
			in	0.587	0.281	0.302	0.350	0.240	-				
00B181101FR	**3**	**41811**	mm	14.909	7.137	7.670	8.89	6.096	-	0.02645	0.1700	0.120	Crastin S660FR
			in	0.587	0.281	0.302	0.350	0.240	-				
00B181102	**3**	**41811**	mm	14.909	7.137	7.670	8.89	2.819	-	0.01315	0.0840	0.120	Delrin
2 Section			in	0.587	0.281	0.302	0.350	0.111	-				
00B181102FR	**3**	**41811**	mm	14.909	7.137	7.670	8.89	2.819	-	0.01315	0.0840	0.120	Crastin S660FR
			in	0.587	0.281	0.302	0.350	0.111	-				
00B181103	**3**	**41811**	mm	14.909	7.137	7.670	8.89	1.727	-	0.00755	0.0490	0.120	Delrin
3 Section			in	0.587	0.281	0.302	0.350	0.068	-				
00B221301	**3**	**42213**	mm	17.830	9.118	9.474	10.693	8.128	-	0.04530	0.2920	0.145	Delrin
			in	0.702	0.359	0.373	0.421	0.320	-				
00B221301FR	**3**	**42213**	mm	17.830	9.118	9.474	10.693	8.128	-	0.04530	0.2920	0.145	Crastin S660FR
			in	0.702	0.359	0.373	0.421	0.320	-				
00B221302	**3**	**42213**	mm	17.830	9.118	9.474	10.693	3.835	-	0.02140	0.1380	0.145	Delrin
2 Section			in	0.702	0.359	0.373	0.421	0.151	-				
00B221302FR	**3**	**42213**	mm	17.830	9.118	9.474	10.693	3.835	-	0.02140	0.1380	0.145	Crastin S660FR
2 Section			in	0.702	0.359	0.373	0.421	0.151	-				
00B221303	**3**	**42213**	mm	17.830	9.118	9.474	10.693	2.413	-	0.01350	0.0870	0.145	Delrin
3 Section			in	0.702	0.359	0.373	0.421	0.095	-				

FIGURE 3



Bobbins (con't)

PART	FIG.	CORE SIZE		MECHANICAL DIMENSIONS						NOMINAL WINDING AREA PER SECTION		AVERAGE LENGTH OF TURN FT	MATERIAL
				A MAX	B MAX	C MIN	D MAX	E NOM	F NOM	in^2	cm^2		
00B261601	**3**	**42616**	mm	21.132	10.922	11.557	12.776	9.931	-	0.06530	0.4210	0.173	Delrin
			in	0.832	0.430	0.455	0.503	0.391	-				
00B261601FR	**3**	**42616**	mm	21.132	10.922	11.557	12.776	9.931	-	0.06530	0.4210	0.173	Crastin S660FR
			in	0.832	0.430	0.455	0.503	0.391	-				
00B261602	**3**	**42616**	mm	21.132	10.922	11.557	12.776	4.749	-	0.03140	0.2020	0.173	Delrin
2 Section			in	0.832	0.430	0.455	0.503	0.187	-				
00B261603	**3**	**42616**	mm	21.132	10.922	11.557	12.776	3.022	-	0.01990	0.1280	0.173	Delrin
3 Section			in	0.832	0.430	0.455	0.503	0.119	-				
00B261603FR	**3**	**42616**	mm	21.132	10.922	11.557	12.776	3.022	-	0.01990	0.1280	0.173	Crastin S660FR
3 Section			in	0.832	0.430	0.455	0.503	0.119	-				

FIGURE 3

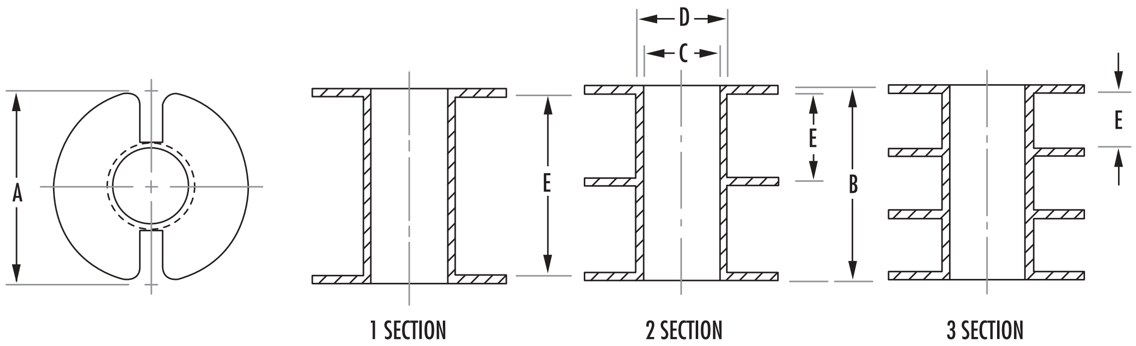
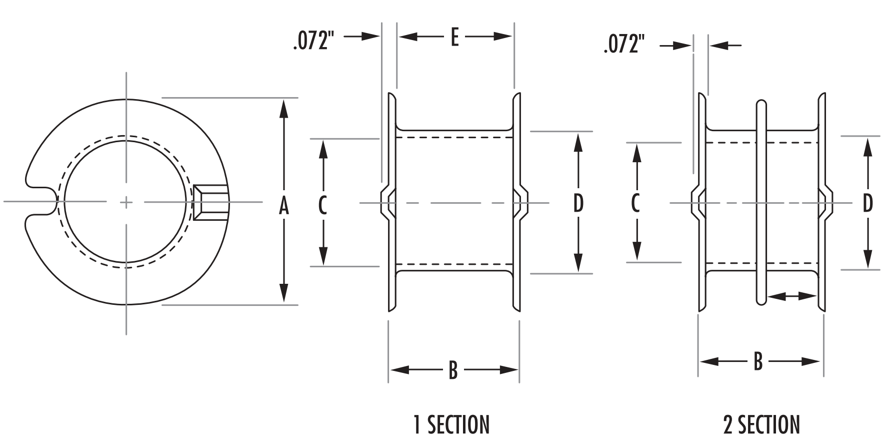


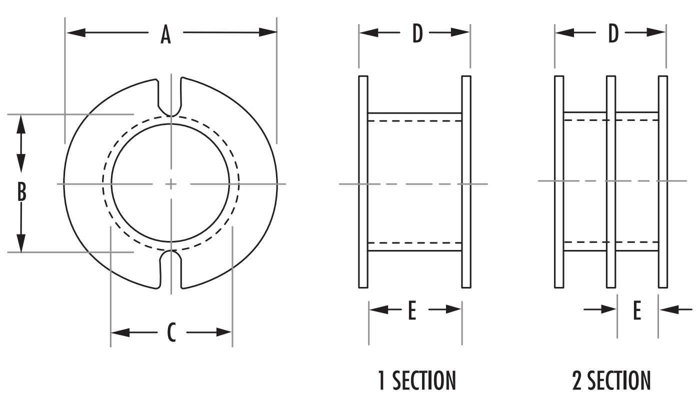
FIGURE 4



Bobbins (con't)

PART	FIG.			MECHANICAL DIMENSIONS A MAX	B MAX	C MIN	D MAX	E NOM	F NOM	NOMINAL WINDING AREA PER SECTION in^2	cm^2	AVERAGE LENGTH OF TURN FT	MATERIAL
00B301901	**3**	**43019**	mm	24.917	12.928	13.563	15.036	11.684	-	0.08400	0.5420	0.204	Delrin
			in	0.981	0.509	0.534	0.592	0.460	-				
00B301902	**3**	**43019**	mm	24.917	12.928	13.563	15.036	5.562	-	0.03940	0.2540	0.204	Delrin
2 Section			in	0.981	0.509	0.534	0.592	0.219	-				
00B301903	**3**	**43019**	mm	24.917	12.928	13.563	15.036	3.505	-	0.02460	0.1590	0.204	Delrin
3 Section			in	0.981	0.509	0.534	0.592	0.138	-				
00B362201	**3**	**43622**	mm	29.768	14.478	16.230	18.059	12.979	-	0.11700	0.7550	0.244	Delrin
			in	1.172	0.570	0.639	0.711	0.511	-				
00B362202	**3**	**43622**	mm	29.768	14.478	16.230	18.059	6.146	-	0.05540	0.3570	0.244	Delrin
2 Section			in	1.172	0.570	0.639	0.711	0.242	-				
00B362203	**3**	**43622**	mm	29.768	14.478	16.230	18.059	3.860	-	0.03480	0.2250	0.244	Delrin
3 Section			in	1.172	0.570	0.639	0.711	0.152	-				
00B422901	**4**	**44229**	mm	35.407	20.015	17.983	19.710	17.805	-	0.21500	1.3900	0.282	Delrin
			in	1.394	0.788	0.708	0.776	0.701	-				
00B422902	**4**	**44229**	mm	35.407	20.015	17.983	19.710	8.407	-	0.09700	0.6300	0.282	Delrin
2 Section			in	1.394	0.788	0.708	0.776	0.331	-				
00B452901	**5**	**44529**	mm	36.068	22.86	20.878	18.592	16.256	-	0.16700	1.0700	0.308	Glass-filled nylon
			in	1.420	0.900	0.822	0.732	0.640	-				
00B452902	**5**	**44529**	mm	36.068	22.86	20.878	18.592	7.620	-	0.07800	0.5000	0.308	Glass-filled nylon
2 Section			in	1.420	0.900	0.822	0.732	0.300	-				

FIGURE 5



Printed Circuit Bobbins

MECHANICAL DIMENSIONS

PART	FIG.	CORE SIZE		A MAX	B MAX	C MAX	D NOM	E MAX	F MAX	G NOM	H	X_1 NOM	X_2 NOM
PCB140811	**1A**	**41408**	mm	11.506	7.112	5.410	4.445	18.999	5.892	16.205	-	4.749	-
			in	0.453	0.280	0.213	0.175	0.748	0.232	0.638	-	0.187	-
PCB140821	**1A**	**41408**	mm	11.506	7.112	5.410	4.445	18.999	5.892	16.205	-	-	7.137
			in	0.453	0.280	0.213	0.175	0.748	0.232	0.638	-	-	0.281
PCB140812	**1A**	**41408**	mm	11.506	7.112	5.410	2.032	18.999	5.892	16.205	-	4.749	-
2 Section			in	0.453	0.280	0.213	0.080	0.748	0.232	0.638	-	0.187	-
PCB140822	**1A**	**41408**	mm	11.506	7.112	5.410	2.032	18.999	5.892	16.205	-	-	7.137
2 Section			in	0.453	0.280	0.213	0.080	0.748	0.232	0.638	-	-	0.281
PCB1408S1	**2A**	**41408**	mm	11.506	7.112	5.410	4.445	18.999	10.668	16.205	-	-	7.137
			in	0.453	0.280	0.213	0.175	0.748	0.420	0.638	-	-	0.281
PCB181111	**2B**	**41811**	mm	14.808	8.813	7.035	6.045	23.799	10.210	21.539	-	4.749	-
			in	0.583	0.347	0.277	0.238	0.937	0.402	0.848	-	0.187	-
PCB181121	**2B**	**41811**	mm	14.808	8.813	7.035	6.045	23.799	10.210	21.539	-	-	7.137
			in	0.583	0.347	0.277	0.238	0.937	0.402	0.848	-	-	0.281
PCB181112	**2B**	**41811**	mm	14.808	8.813	7.035	2.794	23.799	10.210	21.539	-	4.749	-
2 Section			in	0.583	0.347	0.277	0.110	0.937	0.402	0.848	-	0.187	-
PCB181122	**2B**	**41811**	mm	14.808	8.813	7.035	2.794	23.799	10.210	21.539	-	-	7.137
2 Section			in	0.583	0.347	0.277	0.110	0.937	0.402	0.848	-	-	0.281
PCB221311	**2B**	**42213**	mm	17.805	10.693	8.991	7.797	27.203	10.210	25.146	-	4.749	-
			in	0.701	0.421	0.354	0.307	1.071	0.402	0.990	-	0.187	-
PCB221321	**2B**	**42213**	mm	17.805	10.693	8.991	7.797	27.203	10.210	25.146	-	-	7.137
			in	0.701	0.421	0.354	0.307	1.071	0.402	0.990	-	-	0.281
PCB221312	**2B**	**42213**	mm	17.805	10.693	8.991	3.683	27.203	10.210	25.146	-	4.749	-
2 Section			in	0.701	0.421	0.354	0.145	1.071	0.402	0.990	-	0.187	-

FIGURE 1

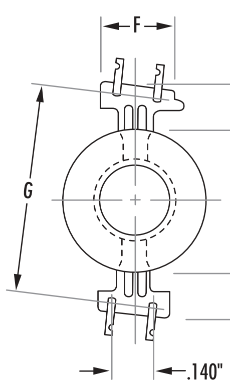


FIGURE 2

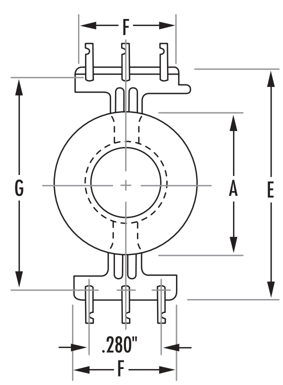


FIGURE A

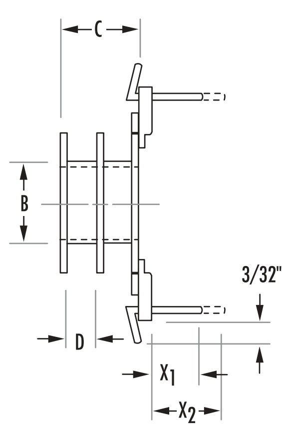
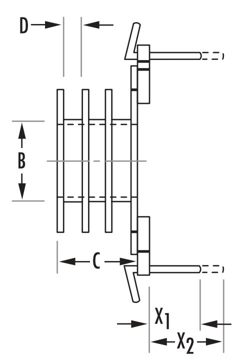


FIGURE B

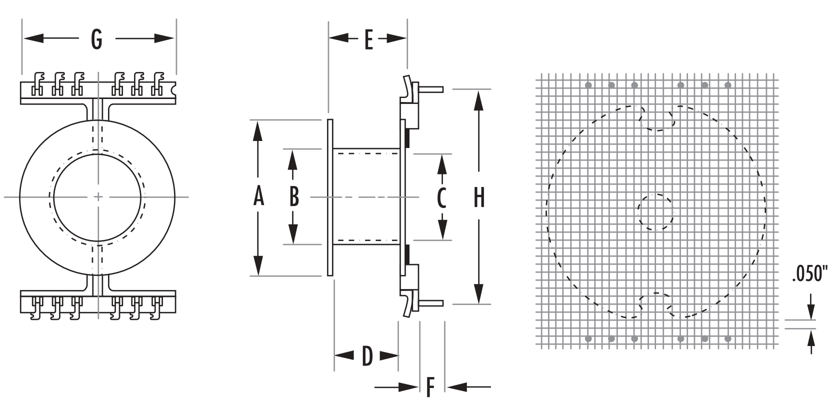


Printed Circuit Bobbins

PART	FIG.	CORE SIZE		MECHANICAL DIMENSIONS Y1 NOM	MECHANICAL DIMENSIONS Y2 NOM	NOMINAL WINDING AREA PER SECTION in^2	NOMINAL WINDING AREA PER SECTION cm^2	AVERAGE LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL
PCB140811	**1A**	**41408**	mm	1.549	3.937	0.013	0.084	0.095	Glass-filled nylon	Tin coated brass
			in	0.061	0.155					
PCB140821	**1A**	**41408**	mm	1.549	3.937	0.013	0.084	0.095	Glass-filled nylon	Tin coated brass
			in	0.061	0.155					
PCB140812	**1A**	**41408**	mm	1.549	3.937	0.006	0.039	0.095	Glass-filled nylon	Tin coated brass
2 Section			in	0.061	0.155					
PCB140822	**1A**	**41408**	mm	1.549	3.937	0.006	0.039	0.095	Glass-filled nylon	Tin coated brass
2 Section			in	0.061	0.155					
PCB1408S1	**2A**	**41408**	mm	1.549	3.937	0.013	0.084	0.095	Glass-filled nylon	Tin coated brass
			in	0.061	0.155					
PCB181111	**2B**	**41811**	mm	1.447	3.835	0.024	0.151	0.121	Glass-filled nylon	Tin coated brass
			in	0.057	0.151					
PCB181121	**2B**	**41811**	mm	1.447	3.835	0.024	0.151	0.121	Glass-filled nylon	Tin coated brass
			in	0.057	0.151					
PCB181112	**2B**	**41811**	mm	1.447	3.835	0.010	0.064	0.121	Glass-filled nylon	Tin coated brass
2 Section			in	0.057	0.151					
PCB181122	**2B**	**41811**	mm	1.447	3.835	0.010	0.064	0.121	Glass-filled nylon	Tin coated brass
2 Section			in	0.057	0.151					
PCB221311	**2B**	**42213**	mm	0.584	2.971	0.043	0.280	0.144	Glass-filled nylon	Tin coated brass
			in	0.023	0.117					
PCB221321	**2B**	**42213**	mm	0.584	2.971	0.043	0.280	0.144	Glass-filled nylon	Tin coated brass
			in	0.023	0.117					
PCB221312	**2B**	**42213**	mm	0.584	2.971	0.020	0.130	0.144	Glass-filled nylon	Tin coated brass
2 Section			in	0.023	0.117					

NOTES: If short pin (X_1) is desired, part number is -11 or -12. If long pin (X_2) is desired, part number is -21 or -22. Y-Pin length available under board for soldering, using spring clip mounting (on 1/16” board).

FIGURE 3



Printed Circuit Bobbins (con't)

MECHANICAL DIMENSIONS

PART	FIG.	CORE SIZE		A MAX	B MAX	C MAX	D NOM	E MAX	F MAX	G NOM	H	X_1 NOM	X_2 NOM
PCB221322	**2B**	**42213**	mm	17.805	10.693	8.991	3.683	27.203	10.210	25.146	-	-	7.137
2 Section			in	0.701	0.421	0.354	0.145	1.071	0.402	0.990	-	-	0.281
PCB221313	**2B**	**42213**	mm	17.805	10.693	8.991	2.311	27.203	10.210	25.146	-	4.749	-
3 Section			in	0.701	0.421	0.354	0.091	1.071	0.402	0.990	-	0.187	-
PCB221323	**2B**	**42213**	mm	17.805	10.693	8.991	2.311	27.203	10.210	25.146	-	-	7.137
3 Section			in	0.701	0.421	0.354	0.091	1.071	0.402	0.990	-	-	0.281
PCB261611	**2B**	**42616**	mm	20.904	12.801	10.795	9.601	30.683	10.210	28.727	-	4.749	-
			in	0.823	0.504	0.425	0.378	1.208	0.402	1.131	-	0.187	-
PCB261621	**2B**	**42616**	mm	20.904	12.801	10.795	9.601	30.683	10.210	28.727	-	-	7.137
			in	0.823	0.504	0.425	0.378	1.208	0.402	1.131	-	-	0.281
PCB261612	**2B**	**42616**	mm	20.904	12.801	10.795	4.572	30.683	10.210	28.727	-	4.749	-
2 Section			in	0.823	0.504	0.425	0.180	1.208	0.402	1.131	-	0.187	-
PCB261622	**2B**	**42616**	mm	20.904	12.801	10.795	4.572	30.683	10.210	28.727	-	-	7.137
2 Section			in	0.823	0.504	0.425	0.180	1.208	0.402	1.131	-	-	0.281
PCB261613	**2B**	**42616**	mm	20.904	12.801	10.795	2.895	30.683	10.210	28.727	-	4.749	-
3 Section			in	0.823	0.504	0.425	0.114	1.208	0.402	1.131	-	0.187	-
PCB261623	**2B**	**42616**	mm	20.904	12.801	10.795	2.895	30.683	10.210	28.727	-	-	7.137
3 Section			in	0.823	0.504	0.425	0.114	1.208	0.402	1.131	-	-	0.281
PCB301911	**2B**	**43019**	mm	24.942	14.884	12.877	11.684	38.150	10.210	35.915	-	4.749	-
			in	0.982	0.586	0.507	0.460	1.502	0.402	1.414	-	0.187	-
PCB301921	**2A**	**43019**	mm	24.942	14.884	12.877	11.684	38.150	10.210	35.915	-	-	7.137
			in	0.982	0.586	0.507	0.460	1.502	0.402	1.414	-	-	0.281
PCB362211	**3**	**43622**	mm	29.845	18.034	16.179	12.852	14.478	5.588	29.210	40.64	-	-
			in	1.175	0.710	0.637	0.506	0.570	0.220	1.150	1.600	-	-

FIGURE 2

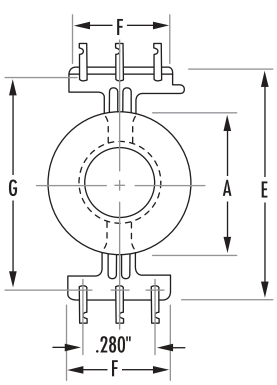


FIGURE A

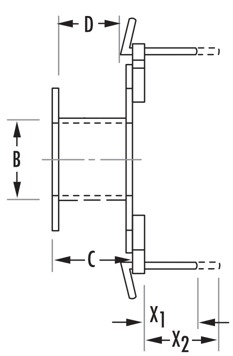
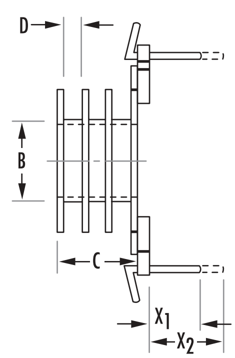


FIGURE B

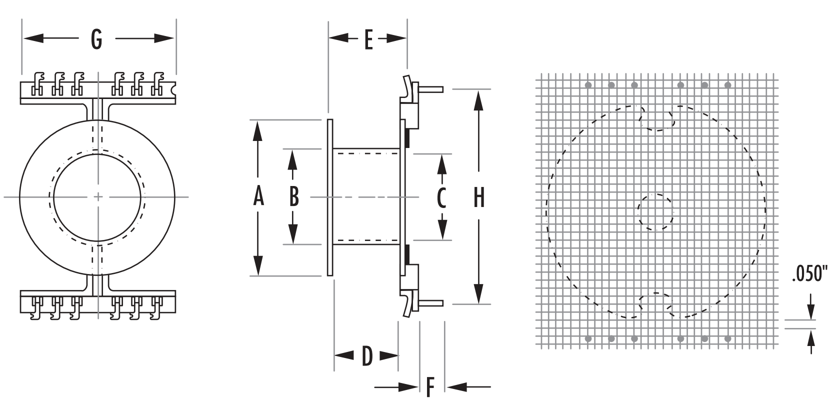


Printed Circuit Bobbins (con't)

PART	FIG.	CORE SIZE		MECHANICAL DIMENSIONS Y1 NOM	Y2 NOM	NOMINAL WINDING AREA PER SECTION in^2	cm^2	AVERAGE LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL
PCB221322	**2B**	**42213**	mm	0.584	2.971	0.020	0.130	0.144	Glass-filled nylon	Tin coated brass
2 Section			in	0.023	0.117					
PCB221313	**2B**	**42213**	mm	0.584	2.971	0.013	0.080	0.144	Glass-filled nylon	Tin coated brass
3 Section			in	0.023	0.117					
PCB221323	**2B**	**42213**	mm	0.584	2.971	0.013	0.080	0.144	Glass-filled nylon	Tin coated brass
3 Section			in	0.023	0.117					
PCB261611	**2B**	**42616**	mm	1.066	3.454	0.060	0.390	0.174	Glass-filled nylon	Tin coated brass
			in	0.042	0.136					
PCB261621	**2B**	**42616**	mm	1.066	3.454	0.060	0.390	0.174	Glass-filled nylon	Tin coated brass
			in	0.042	0.136					
PCB261612	**2B**	**42616**	mm	1.066	3.454	0.028	0.190	0.174	Glass-filled nylon	Tin coated brass
2 Section			in	0.042	0.136					
PCB261622	**2B**	**42616**	mm	1.066	3.454	0.028	0.190	0.174	Glass-filled nylon	Tin coated brass
2 Section			in	0.042	0.136					
PCB261613	**2B**	**42616**	mm	1.066	3.454	0.018	0.120	0.174	Glass-filled nylon	Tin coated brass
3 Section			in	0.042	0.136					
PCB261623	**2B**	**42616**	mm	1.066	3.454	0.018	0.120	0.174	Glass-filled nylon	Tin coated brass
3 Section			in	0.042	0.136					
PCB301911	**2B**	**43019**	mm	0.431	2.819	0.090	0.580	1.970	Glass-filled nylon	Tin coated brass
			in	0.017	0.111					
PCB301921	**2B**	**43019**	mm	0.431	2.819	0.090	0.580	1.970	Glass-filled nylon	Tin coated brass
2 Section			in	0.017	0.111					
PCB362211	**3**	**43622**	mm	-	-	0.117	0.755	0.244	Glass-filled nylon	Tin coated
			in	-	-				Phosphor Bronze	

NOTES: If short pin (X_1) is desired, part number is -11 or -12. If long pin (X_2) is desired, part number is -21 or -22. Y-Pin length available under board for soldering, using spring clip mounting (on 1/16" board).

FIGURE 3



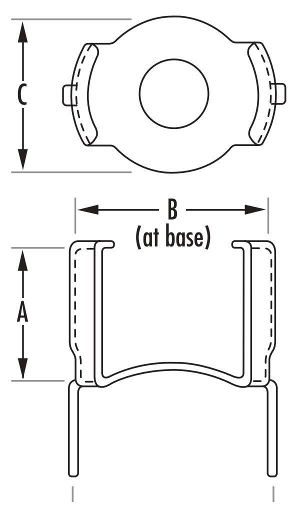
Mounting Clamps

PART	FIG.	CORE SIZE		MECHANICAL DIMENSIONS: A NOM	B NOM	C NOM	D±.020"*	F NOM	TAB DIMENSIONS: LENGTH	WIDTH	MATERIAL	MATERIAL THICKNESS	MACHINE SCREW IMPRESSIONS	WASHER**	WASHER DIMENSIONS	WASHER THICKNESS
00C090511	**1**	**40905**	mm	5.689	9.499	8.001	10.008	-	4.394	1.016	Phosphor	.009"	-	-	-	
			in	0.224	0.374	0.315	0.394	-	0.173	0.040	Bronze		-			
00C110711	**1**	**41107**	mm	6.985	11.480	9.194	12.497	-	5.003	1.193	Phosphor	.010"	-	-	-	
			in	0.275	0.452	0.362	0.492	-	0.197	0.047	Bronze		-			
00C140811	**2**	**41408**	mm	9.652	14.478	13.208	13.208	-	3.962	2.159	Spring	0.011"	-	00W140815	.540 ± .008"	.015"
			in	0.380	0.570	0.520	0.520	-	0.156	0.085	Steel		-			
00C1408RS	**3**	**41408**	mm	8.89	13.97	8.001	-	-	-	-	Stainless		-	00W140815	.540 ± .008"	.015"
			in	0.35	0.55	0.315	-	-	-	-	Steel		-			
00C181111	**3**	**41811**	mm	11.684	18.542	16.764	16.510	-	3.962	2.032	Spring	.020"	-	00W181118	.700 ± .008"	.020"
	2		in	0.460	0.730	0.660	0.650	-	0.156	0.080	Steel		-			
00C221314	**4**	**42213**	mm	14.859	22.250	20.828	27.940	33.020	-	-	Spring	.014"	#4-40	00W221324	.840 ± .008"	.025"
			in	0.585	0.876	0.820	1.100	1.300	-	-	Steel		-			
0PC221314	**5**	**42213**	mm	14.859	22.250	20.828	21.488	3.581	-	-	Spring	.014"		00W221324	.840 ± .008"	.025"
			in	0.585	0.876	0.820	0.846	0.141	-	-	Steel					
00C261614	**4**	**42616**	mm	16.637	26.289	21.082	32.817	38.405	-	-	Spring	.014"	#4-40	-	-	-
			in	0.655	1.035	0.830	1.292	1.512	-	-	Steel					
0PC261614	**7**	**42616**	mm	16.637	26.289	21.082	24.638	5.080	-	-	Spring	.014"	#4-40	-	-	-
			in	0.655	1.035	0.830	0.970	0.200	-	-	Steel					
00C301917	**4**	**43019**	mm	20.320	30.734	28.575	38.608	44.196	-	-	Spring	.017"	#6-32	-	-	-
			in	0.800	1.210	1.125	1.520	1.740	-	-	Steel					
00C362217	**6**	**43622**	mm	23.241	36.322	21.590	44.450	50.038	-	-	Spring		#6-32	-	-	-
			in	0.915	1.430	0.850	1.750	1.970	-	-	Steel					
00C422917	**6**	**44229**	mm	56.388	50.800	43.180	25.400	6.604	-	-	Spring		#6-32	-	-	-
			in	1.233	1.700	1.000	2.000	2.220	-	-	Steel					

* The C090511, C110711, C140811and C1408RS have a D dimension tolerance of ± .010"

** Mounting Clamps are made to allow for tuning adjusters. If these adjusters are not used a polypropylene washer must be inserted to take up extra space. The part number and dimension of available washers are detailed above.

FIGURE 1



Mounting Clamps

FIGURE 2

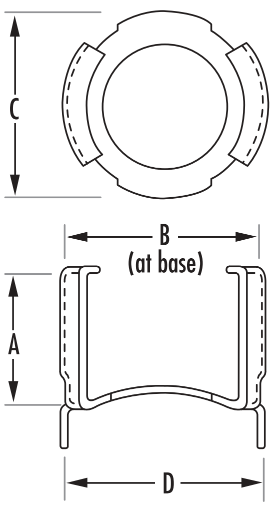


FIGURE 3

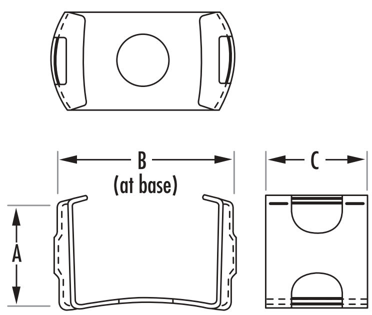


FIGURE 4

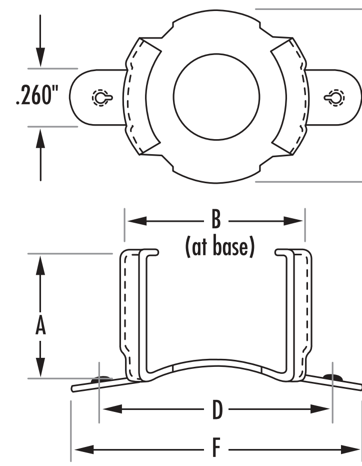


FIGURE 5

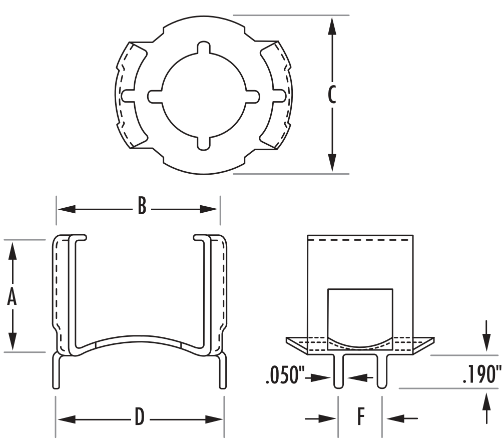


FIGURE 6

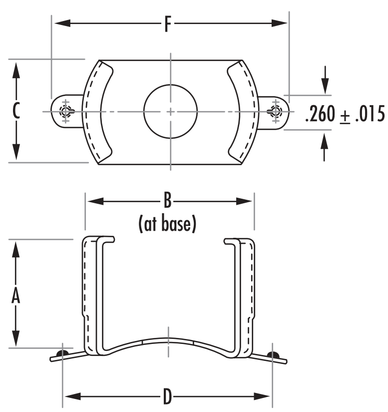
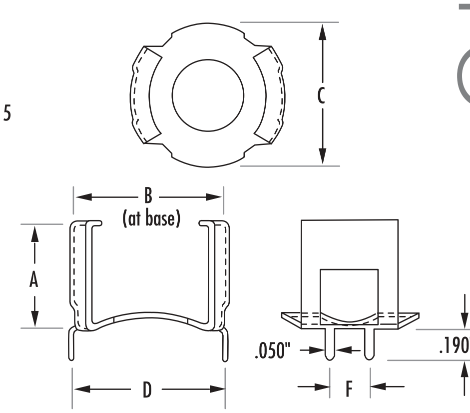


FIGURE 7



Surface Mount Headers

PART	FIG.	CORE SIZE		MECHANICAL DIMENSIONS A MAX	B MAX	C TYP	D TYP	E NOM	F MAX	G MIN	K MAX	L NOM	M MIN	BOBBIN MATERIAL	PIN MATERIAL
SMH11078A	**1**	**41107**	mm	16.967	12.751	8.992	3.988	0.483	15.240	11.354	2.134	0.991	1.270	Thermoset	Tin coated
			in	0.668	0.502	0.354	0.157	0.019	0.600	0.465	0.084	0.039	0.050	plastic	phosphor bronze
SMH1408TA	**2**	**41408**	mm	19.990	15.748	11.989	-	0.483	18.263	14.351	2.134	0.991	1.270	Thermoset	Tin coated
			in	0.787	0.620	0.472	-	0.019	0.719	0.565	0.084	0.039	0.050	plastic	phosphor bronze
SMH1811LA	**3**	**41811**	mm	24.181	19.761	14.732	-	0.483	22.454	18.339	2.134	0.991	1.270	Thermoset	Tin coated
			in	0.952	0.778	0.580	-	0.019	0.884	0.722	0.084	0.039	0.050	plastic	phosphor bronze

FIGURE 1

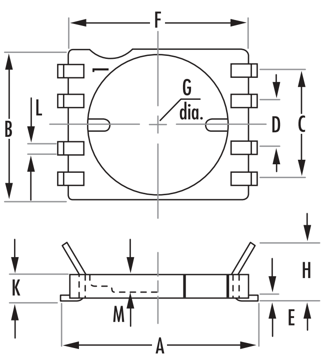


FIGURE 2

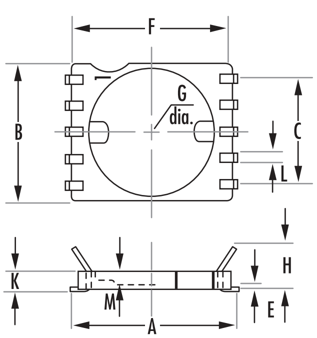
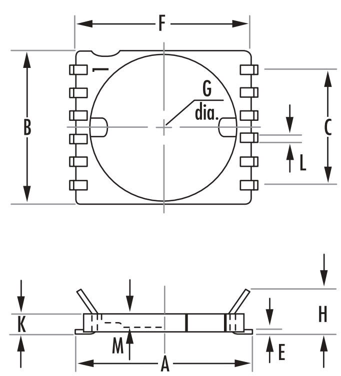


FIGURE 3



RS/DS Cores

RS/DS CORES

Slab cores are modified pot cores with the sides removed. The slabs can be paired with one round half of a standard pot core (RS combination) or two slabs can be paired together for a double slab (DS combination).

Available in seven sizes, the RS geometry offers all the advantages of pot cores for filter applications, plus many additional features for power applications.

DS cores, available in six sizes, accommodate large size wire and assist in removing heat from the assembly.

Both plain and printed circuit bobbins are available for both types of cores.

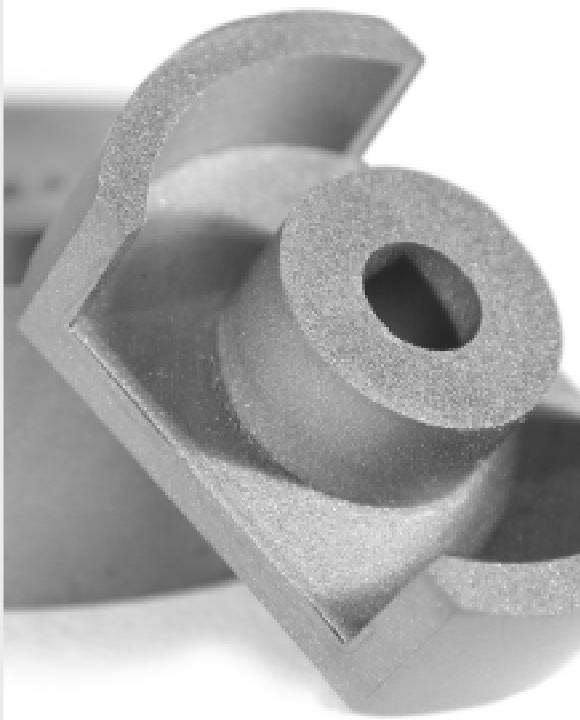
Typical applications for RS/DS combinations include; low and medium power transformers, switched-mode power supplies, and converter and inverter transformers.

HOW TO ORDER

S P 4 30 19 UG XX

- S — SHAPE CODE*
- P — FERRITE CORE MATERIAL
- 4 — USED FOR ALL FERRITE TYPES
- 30 — APPROXIMATE DIAMETER IN MM
- 19 — APPROXIMATE HEIGHT IN MM
- UG — GEOMETRY CODE/GAP CODE (SEE PAGE 1.5 - 1.6)
- XX — SPECIAL SPECIFICATION CODE

**SHAPE CODES*
D – DS Core with solid centerpost
H – DS Core with center hole
S – RS Core



RS/DS
Core Data (ungapped)

Any practical gap available. See page 1.8 - 1.11

				MECHANICAL DIMENSIONS			
PART	**FIG.**	**COMBINATION**		**A**	**B**	**2B**	**C**
H_41408UG	**1**	DS	mm	14 ± .250	4.24 + .000, -.130	8.48 + .000, -.280	9.4 ± .150
		with center hole	in	.553 ± .010	.167 + .000, -.005	.334 + .000, -.011	.370 ± .006
S_41408UG	**1**	RS	mm	14 ± .250	4.24 + .000, -.130	8.48 + .000, -.280	9.4 ± .150
			in	.553 ± .010	.167 + .000, -.005	.334 + .000, -.011	.370 ± .006
D_42311UG	**3**	DS	mm	22.86 ± .460	5.54 ± .130	11.080 ± .260	15.24 ± .250
			in	.900 ± .018	.218 ± .005	.436 ± .010	.600 ± .010
H_42311UG	**4**	DS	mm	22.86 ± .460	5.54 ± .130	11.080 ± .260	15.24 ± .250
		with center hole	in	.900 ± .018	.218 ± .005	.436 ± .010	.600 ± .010
S_42311UG	**2**	RS	mm	22.9 ± .460	5.54 ± .130	11.08 ± .250	15.2 ± .250
			in	.900 ± .018	.218 ± .005	.436 ± .010	.600 ± .010
D_42318UG	**3**	DS	mm	22.860 ± .460	9.00 ± .180	18.00 ± .360	15.24 ± .250
			in	.900 ± .018	.355 ± .007	.710 ± .014	.600 ± .010
H_42318UG	**4**	DS	mm	22.860 ± .460	9.00 ± .180	18.00 ± .360	15.24 ± .250
		with center hole	in	.900 ± .018	.355 ± .007	.710 ± .014	.600 ± .010
S_42318UG	**2**	RS	mm	22.900 ± .460	9.00 ± .180	18.00 ± .360	15.20 ± .250
			in	.900 ± .018	.355 ± .007	.710 ± .014	.600 ± .010
D_42616UG	**3**	DS	mm	25.500 ± .510	8.05 ± .100	16.10 ± .200	17.09 nom
			in	1.004 ± .020	.317 ± .004	.634 ± .008	.673 nom
H_42616UG	**4**	DS	mm	25.500 ± .510	8.05 ± .100	16.10 ± .200	17.09 nom
		with center hole	in	1.004 ± .020	.317 ± .004	.634 ± .008	.673 nom
S_42616UG	**1**	RS	mm	25.500 ± .510	8.05 ± .100	16.10 ± .200	17.09 nom
			in	1.004 ± .020	.317 ± .004	.634 ± .008	.673 nom

To order, add material code to part number.

FIGURE 1

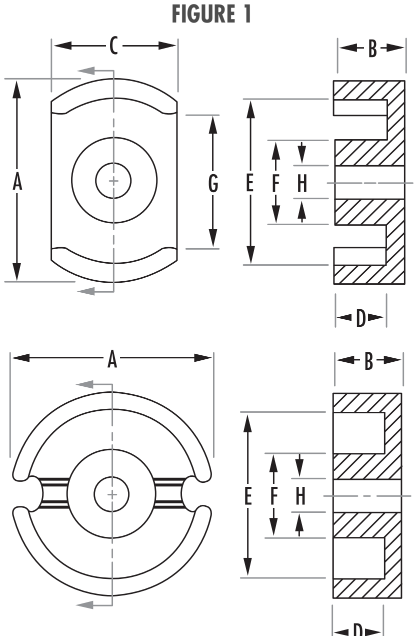
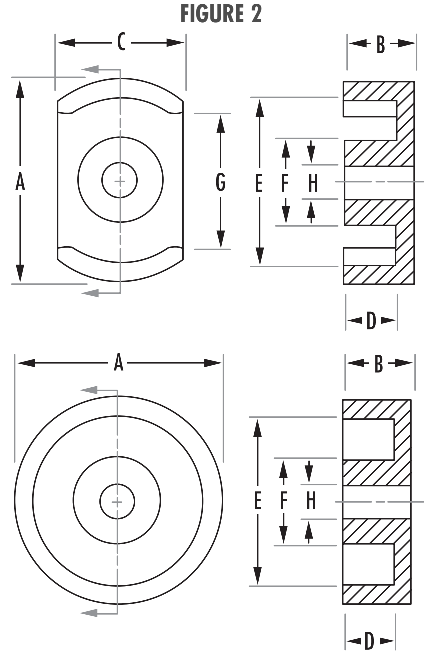


FIGURE 2



RS/DS
Core Data (ungapped)

MECHANICAL DIMENSIONS					
D MIN	2D MIN	E MIN	F MAX	G MIN	H
2.800	5.580	11.600	5.990	7.600	3.10 ± .076
0.110	0.220	0.457	0.236	0.300	.122 ± .003
2.800	5.580	11.600	5.990	7.600	3.10 ± .076
0.110	0.220	0.457	0.236	0.300	.122 ± .003
3.630	7.260	17.930	9.900	13.210	-
0.143	0.286	0.706	0.390	0.520	-
3.630	7.260	17.930	9.900	13.210	-
0.143	0.286	0.706	0.390	0.520	-
3.630	7.260	17.940	9.900	13.200	5.08 ± .10
0.143	0.286	0.706	0.390	0.520	.200 ± .004
6.930	13.860	17.93	9.900	13.200	-
0.273	0.546	0.706	0.390	0.520	-
6.930	13.860	17.93	9.900	13.200	-
0.273	0.546	0.706	0.390	0.520	-
6.930	13.870	17.94	9.900	13.200	5.08 ± .100
0.273	0.546	0.706	0.390	0.520	.200 ± .004
5.510	11.020	21.21	11.480	15.500	-
0.217	0.434	0.835	0.452	0.610	-
5.510	11.020	21.21	11.480	15.500	-
.217	0.434	0.835	0.452	0.610	-
5.510	11.020	21.21	11.480	15.500	5.56 ± .100
.217	.434	.835	.452	.610	.219 ± .004

FIGURE 3

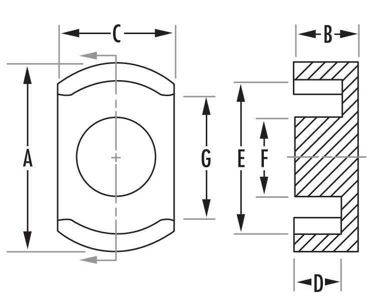
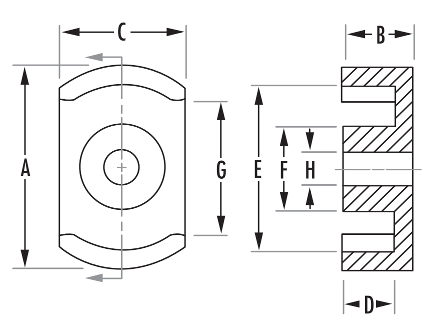


FIGURE 4



RS/DS
Core Data (ungapped)

Any practical gap available. See page 1.8 - 1.11

				MECHANICAL DIMENSIONS			
PART	**FIG.**	**COMBINATION**		**A**	**B**	**2B**	**C**
D_43019UG	**3**	DS	mm	30.00 ± .051	9.4 ± .100	18.800 ± .200	20.32 ± .250
			in	1.181 ± .020	.370 ± .004	.740 ± .008	.800 ± .010
H_43019UG	**4**	DS	mm	30.00 ± .510	9.4 ± .100	18.800 ± .200	20.32 ± .250
		with center hole	in	1.181 ± .020	.370 ± .004	.740 ± .008	.800 ± .010
S_43019UG	**1**	RS	mm	30.00 ± .510	9.400 ± .100	18.70 ± .200	20.32 ± .250
			in	1.181 ± .020	.370 ± .004	.740 ± .008	.800 ± .010
D_43622UG	**3**	DS	mm	35.61 ± .510	10.87 ± .130	21.7 ± .250	23.85 nom
			in	1.402 ± .020	.428 ± .005	.856 ± .010	.939 nom
H_43622UG	**4**	DS	mm	35.61 ± .510	10.87 ± .130	21.7 ± .250	23.85 nom
		with center hole	in	1.402 ± .020	.428 ± .005	.856 ± .010	.939 nom
S_43622UG	**1**	RS	mm	35.61 ± .510	10.87 ± .130	21.7 ± .250	23.85 nom
			in	1.402 ± .020	.428 ± .005	.856 ± .010	.939 nom
***D_44229UG**	**3**	DS	mm	42.4 ± .710	14.8 ± .200	29.6 ± .400	28.40 nom
			in	1.669 ± .028	.582 ± .008	1.164 ± .016	1.118 nom
H_44229UG	**4**	DS	mm	42.4 ± .710	14.8 ± .200	29.6 ± .400	28.40 nom
		with center hole	in	1.669 ± .028	.582 ± .008	1.164 ± .016	1.118 nom
S_44229UG	**1**	RS	mm	42.4 ± .710	14.8 ± .200	29.6 ± .400	28.40 nom
			in	1.669 ± .028	.582 ± .008	1.164 ± .016	1.118 nom

To order, add material code to part number.

*This core has a .198” x .043 wire slot (not shown in figure)

FIGURE 1

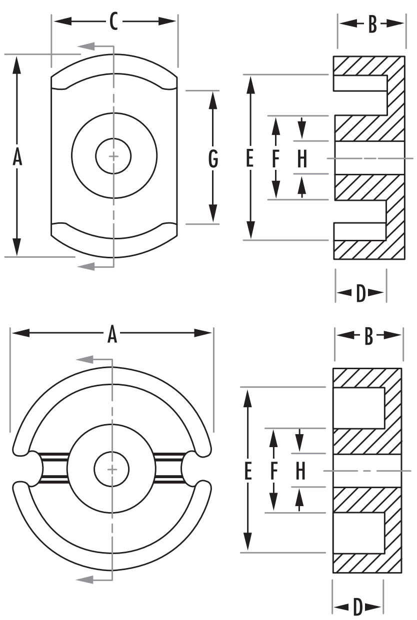
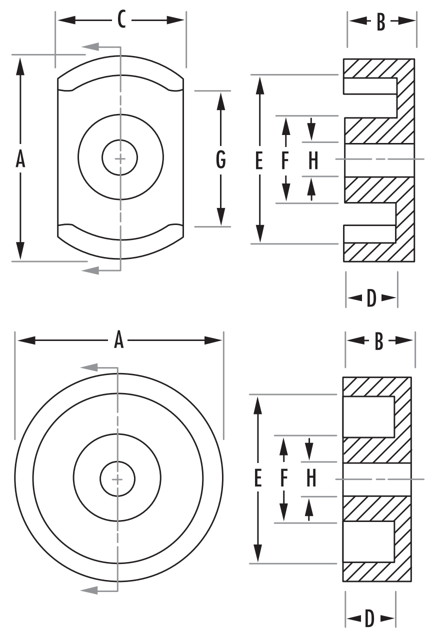


FIGURE 2



RS/DS
Core Data (ungapped)

MECHANICAL DIMENSIONS					
D MIN	**2D MIN**	**E MIN**	**F MAX**	**G MIN**	**H**
6.500	13.000	25.000	13.510	15.490	-
.256	.512	.984	.532	.610	-
6.500	13.000	25.000	13.510	15.490	5.56 ± .10
.256	.512	.984	.532	.610	.219 ± .004
6.500	13.000	25.000	13.500	15.500	-
.256	.512	.984	.532	.610	-
7.29	14.580	29.85	16.100	20.300	-
.287	.574	1.177	.634	.800	-
7.29	14.580	29.85	16.100	20.300	5.56 ± .10
.287	.574	1.177	.634	.800	.219 ± .004
7.29	14.580	29.85	16.100	20.300	-
.287	.574	1.177	.634	.800	-
10.21	20.420	35.61	17.700	25.000	-
.402	.804	1.402	.697	.985	-
10.21	20.420	35.61	17.700	25.000	5.56 ± .10
.402	.804	1.402	.697	.985	.219 ± .004
10.21	20.420	35.61	17.700	25.000	-
.402	.804	1.402	.697	.985	-

FIGURE 3

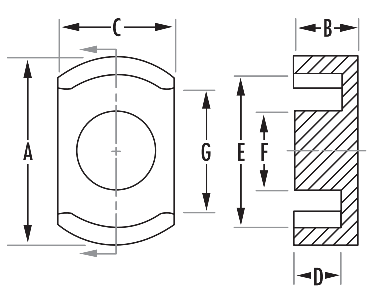
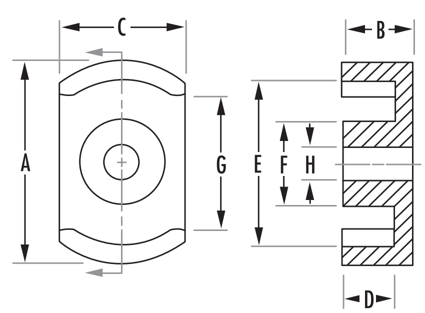


FIGURE 4



RS/DS
Core Data (ungapped)

Any practical gap available. See page 1.8 - 1.11

A_L (mH/1000T)

			POWER MATERIALS			HIGH PERMEABILITY MATERIALS		
PART	COMBINATION		R	P	F*	J	W	H
H_41408UG	DS with center hole	Min	1,150	1,250	1,990	3,080	4,930	-
S_41408UG	RS	Min	1,320	1,435	2,274	3,375	5,350	-
D_42311UG	DS	Min	2,580	2,810	4,460	6,300	11,245	16,800
H_42311UG	DS with center hole	Min	2,400	2,595	4,170	5,890	9,815	-
S_42311UG	RS	Min	2,950	3,210	5,200	6,300	11,250	-
D_42318UG	DS	Min	2,180	2,370	3,800	4,760	7,000	10,500
H_42318UG	DS with center hole	Min	1,950	2,115	3,350	4,000	7,000	-
S_42318UG	RS	Min	2,300	2,500	4,000	4,800	8,400	-
D_42616UG	DS	Min	2,870	3,120	5,000	6,070	9,100	-
H_42616UG	DS with center hole	Min	-	2,880	4,600	6,080	9,100	-
S_42616UG	RS	Min	3,270	3,550	5,300	6,700	11,000	-
D_43019UG	DS	Min	3,330	3,620	5,800	7,120	10,500	-
H_43019UG	DS with center hole	Min	3,170	3,450	5,525	7,130	10,500	-
S_43019UG	RS	Min	4,150	4,520	6,700	8,360	13,000	-
D_43622UG	DS	Min	4,020	4,370	7,000	8,700	12,600	-
H_43622UG	DS with center hole	Min	-	4,050	6,520	8,700	12,600	-
S_43622UG	RS	Min	5,230	5,685	8,600	11,200	18,600	-
D_44229UG	DS	Min	4,830	5,250	8,400	9,220	13,300	-
H_44229UG	DS with center hole	Min	-	5,000	8,100	9,220	13,300	-
S_44229UG	RS	Min	5,440	5,910	10,200	12,200	-	-

To order, add material code to part number.
* F material nominal ±25%

RS/DS
Core Data (ungapped)

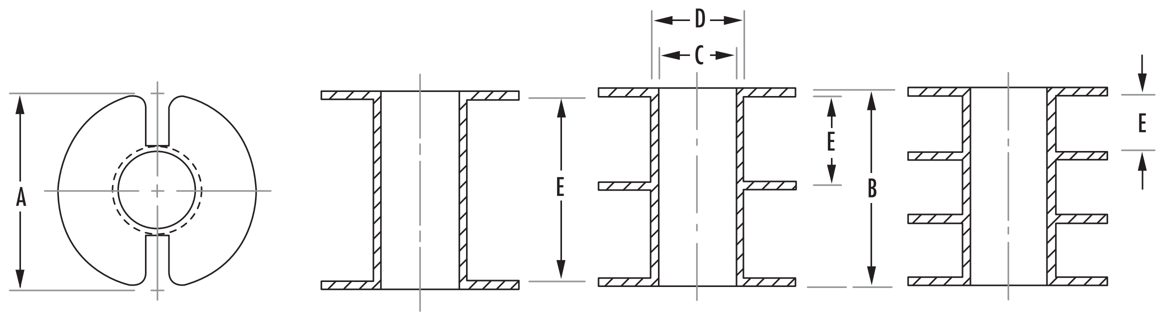
MAGNETIC DATA						AVAILABLE HARDWARE		
l_e (mm)	A_e (mm^2)	A MIN (mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	WaAc	STANDARD BOBBIN	PRINTED CIRCUIT BOBBIN	MOUNTING CLAMP
20.6	21.0	019.2	433.0	-	-			
20.2	23.0	19.2	460.0	2.85	0.019		✓	✓
26.8	51.2	37.8	1,370.0	10.00	0.081		✓	
27.0	48.2	37.8	1,300.0	-	-		✓	
26.5	58.0	37.8	1,540.0	11.65	0.092		✓	
39.9	58.0	40.7	2,310.0	13.0	0.213		✓	
40.1	53.4	40.7	2,130.0	-	-		✓	
38.6	60.0	40.7	2,320.0	17.40	0.221		✓	
38.9	77.0	62.7	3,000.0	15.00	0.283	✓	✓	
39.0	72.1	62.7	2,810.0	-	-			
38.3	82.6	62.7	3,180.0	20.00	.392			
46.2	117.0	96.0	5,410.0	22.00	0.601	✓	✓	
46.1	111.0	96.0	5,110.0	-	-	✓	✓	
45.6	123.0	96.0	5,610.0	30.95	0.632		✓	
52.8	149.0	125.0	7,870.0	37.00	1.15		✓	✓
53.1	146.0	125.0	7,750.0	-	-		✓	✓
53.0	174.0	125.0	9,220.0	57.00	1.53			
71.7	209.0	178.0	14,990.0	78.00	2.91		✓	✓
71.7	203.0	178.0	14,560.0	-	-		✓	✓
70.1	234.5	178.0	16,400.0	104.00	3.69			

Bobbins

PART	CORE SIZE	FIG.		MECHANICAL DIMENSIONS A MAX	B MAX	C MIN	D MIN	E NOM	NOMINAL WINDING AREA PER SECTION in²	cm²	AVERAGE LENGTH OF TURN FT	MATERIAL
00B261601	**42616**	**1**	mm	21.132	10.922	11.557	12.776	9.931	0.06530	0.4210	0.173	Delrin
			in	0.832	0.430	0.455	0.503	0.391				
00B261601FR	**42616**	**1**	mm	21.132	10.922	11.557	12.776	9.931	0.06530	0.4210	0.173	Crastin S660FR
2 Section			in	0.832	0.430	0.455	0.503	0.391				
00B261602	**42616**	**1**	mm	21.132	10.922	11.557	12.776	4.749	0.03140	0.2020	0.173	Delrin
3 Section			in	0.832	0.430	0.455	0.503	0.187				
00B261603	**42616**	**1**	mm	21.132	10.922	11.557	12.776	3.022	0.01990	0.1280	0.173	Delrin
3 Section			in	0.832	0.430	0.455	0.503	0.119				
00B261603FR	**42616**	**1**	mm	21.132	10.922	11.557	12.776	3.022	0.01990	0.1280	0.173	Crastin S660FR
3 Section			in	0.832	0.430	0.455	0.503	0.119				
00B301901	**43019**	**1**	mm	24.917	12.928	13.563	15.036	11.684	0.0840	0.542	0.204	Delrin
			in	0.981	0.509	0.534	0.592	0.460				
00B301902	**43019**	**1**	mm	24.917	12.928	13.563	15.036	5.562	0.0394	0.254	0.204	Delrin
2 Section			in	0.981	0.509	0.534	0.592	0.219				
00B301903	**43019**	**1**	mm	24.917	12.928	13.563	15.036	3.505	0.02460	0.159	0.204	Delrin
3 Section			in	0.981	0.509	0.534	0.592	0.138				
00B362201	**43622**	**1**	mm	29.768	14.478	16.230	18.059	12.979	0.11700	0.755	0.244	Delrin 500
			in	1.1721	0.570	0.639	0.711	0.511				
00B362202	**43622**	**1**	mm	29.768	14.478	16.230	18.059	6.146	0.05540	0.357	0.244	Delrin 500
2 Section			in	1.172	0.570	0.639	0.711	0.242				
00B362203	**43622**	**1**	mm	29.768	14.478	16.230	18.059	3.860	0.34800	0.225	0.244	Delrin 500
3 Section			in	1.172	0.570	0.639	0.711	0.152				
00B422901	**44229**	**2**	mm	35.407	20.015	17.983	19.710	17.805	0.21500	1.3900	0.282	Delrin
			in	1.394	0.788	0.708	0.776	0.701				
00B422902	**44229**	**2**	mm	35.407	20.01	17.983	19.710	8.407	0.09700	0.6300	0.282	Delrin
2 Section			in	1.394	0.788	0.708	0.776	0.331				

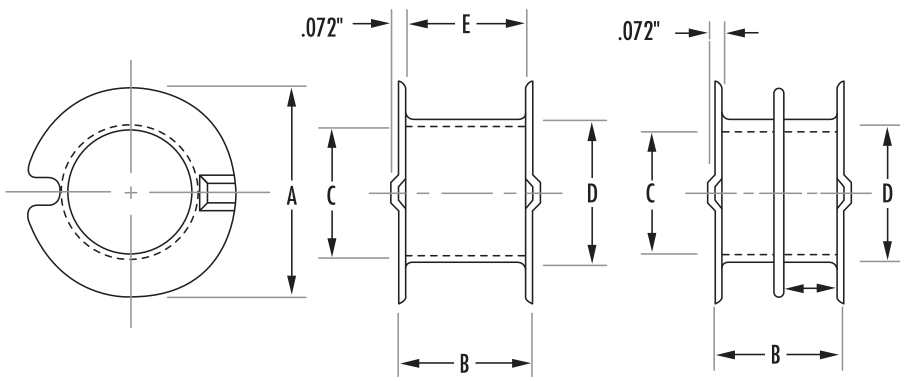
Bobbins

BOBBIN FIGURE 1



1 Section   2 Section   3 Section

BOBBIN FIGURE 2

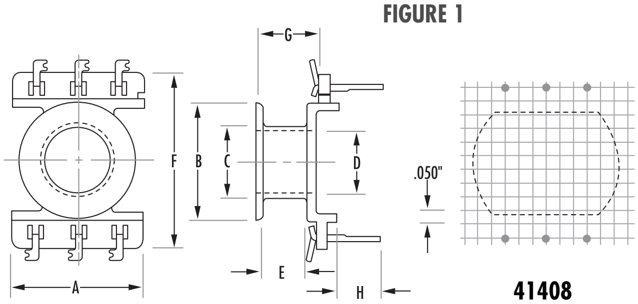


1 Section   2 Section

Printed Circuit Bobbins

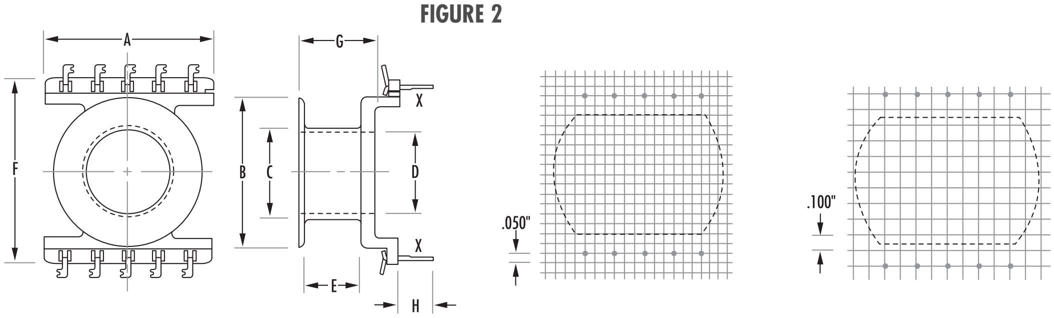
				MECHANICAL DIMENSIONS							
PART	CORE SIZE	FIG.		A MAX	B MAX	C MAX	D MIN	E NOM	F MAX	G MAX	H NOM
PCB4140861	41408	1	mm	12.776 ref	11.532	7.290	6.071	4.064	16.586 ref	5.486	4.775
			in	0.503 ref	0.454	0.287	0.239	0.160	.653 ref	0.216	0.188
PCB2311T1	42311	2	mm	19.812	17.780	11.430	10.033	5.156	23.241	6.858	5.588
			in	0.780	0.700	0.450	0.395	0.203	0.915	0.270	0.220
PCB2318T1	42318	2	mm	23.114	17.78	11.404	10.033	11.887	22.86	13.665	5.537
			in	0.910	0.700	0.449	0.395	0.468	0.900	0.538	0.218
PCB2616TA	42616	3	mm	25.527	28.194	12.878	11.557	8.890	21.133	10.922	5.588
			in	1.005	1.110	0.507	0.455	0.350	0.832	0.430	0.220
PCB3019T1	43019	2	mm	28.194	24.765	14.935	13.563	10.744	30.099	12.776	4.775
			in	1.110	0.975	0.588	0.534	0.423	1.185	0.503	0.188
PCB3622L1	43622	4	mm	35.687	38.862	19.558	16.231	12.446	29.769	14.478	4.953
			in	1.405	1.530	0.770	0.639	0.490	1.172	0.570	0.195
PCB4229L1	44229	5	mm	43.307	43.688	19.710	17.831	17.907	35.484	20.320	4.826
			in	1.705	1.720	0.776	0.702	0.705	1.397	0.800	0.190

FIGURE 1



41408

FIGURE 2



42311 & 42318

43019

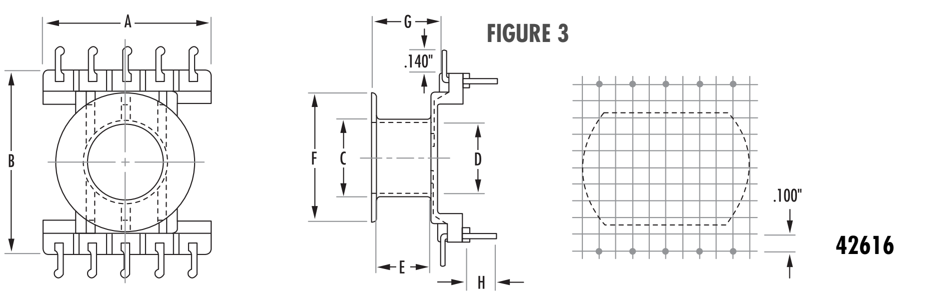
PCB2311T1 and PCB2318T1 have no standoff at X

Printed Circuit Bobbins

NOMINAL WINDING AREA PER SECTION		AVERAGE LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL	PIN DIMENSIONS	BOARD CLEARANCE (in.)*		
in^2	cm^2					Length	Width	Height
0.013	0.086	0.095	Glass-filled nylon	Tin coated Phosphor bronze	.042" x .015"	.565	.850	.375
0.025	0.159	0.143	Glass-filled nylon	Tin coated Phosphor bronze	.042" x .015"	.925	1.030	.450
0.057	0.368	0.143	Glass-filled Nylon	Tin coated Phosphor bronze	.042" x .015"	.925	1.030	.735
0.057	0.368	0.174	Rynite FR530	Tin-lead plated brass	.045" x .015"	1.030	1.500	.740
0.080	0.514	0.206	Glass-filled nylon	Tin coated Phosphor bronze	.042" x .015"	1.215	1.330	.775
0.120	0.774	0.246	Rynite FR530	Tin-lead plated brass	.060" x .020"	1.425	1.950	.975
0.217	1.390	0.284	Rynite FR530	Tin-lead plated brass	.060" x .020"	1.715	2.150	1.275

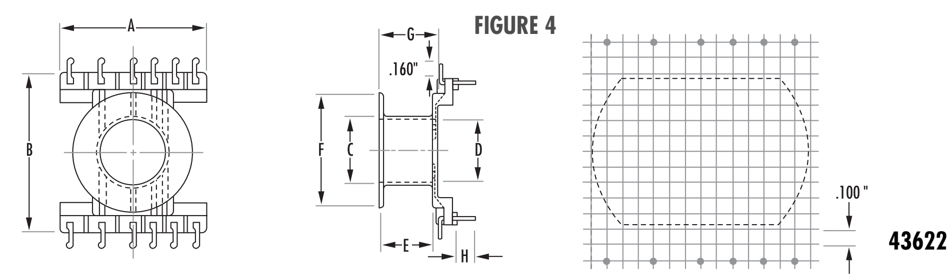
*reference figure 6 for board clearance

FIGURE 3



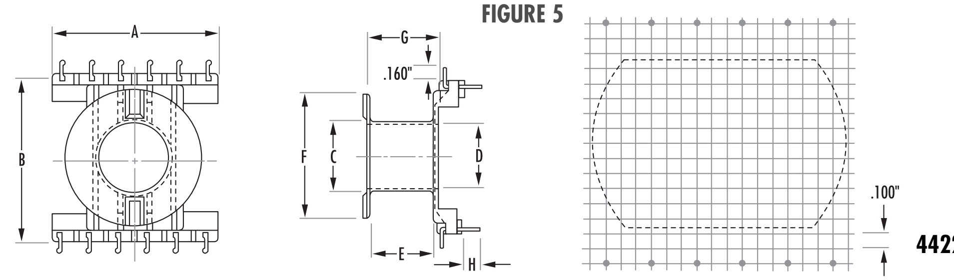
42616

FIGURE 4



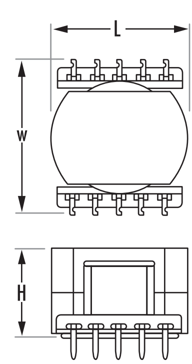
43622

FIGURE 5



44229

FIGURE 6



Mounting Clamps

MECHANICAL DIMENSIONS										
PART	**CORE SIZE**	**FIG.**		**A NOM**	**B NOM**	**C NOM**	**D ± .020"**	**F NOM**	**MATERIAL**	**MACHINE SCREW IMPRESSIONS**
00C1408RS	**41408**	**1**	mm	8.89	13.97	8.001	-	-	Stainless Steel	-
			in	0.35	0.55	0.315	-	-		-
00C362217	**43622**	**2**	mm	23.241	36.322	21.590	44.450	50.038	Spring Steel	#6-32
			in	0.915	1.430	0.850	1.750	1.970		
00C422917	**44229**	**2**	mm	31.064	43.180	25.40	50.80	56.388	Spring Steel	#6-32
			in	1.223	1.700	1.00	2.000	2.220		

Clamps are not available for the PCB2311T1 ot PCB2318T1.
Cores may be cemented or bolted (with non-magnetic materials) to mounting surface.

FIGURE 1

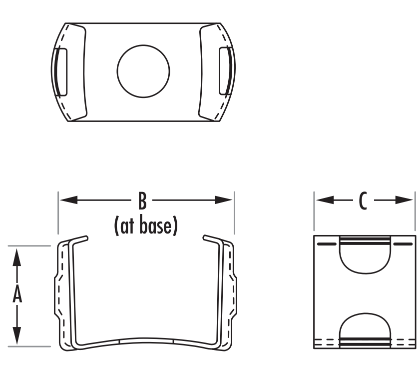
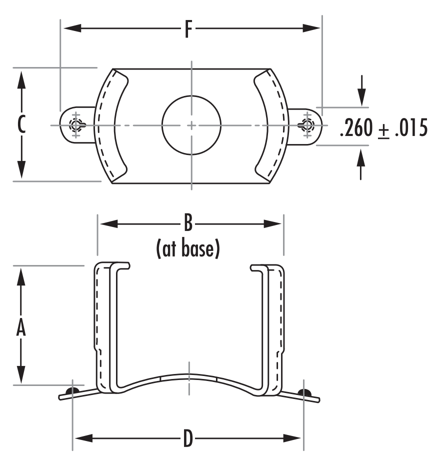


FIGURE 2



RM CORES

RM Cores are square-designed cores that offer all the magnetic and mechanical advantages of pot cores, plus the added feature of maximizing magnetic performance while minimizing PC board space.

Easy to assemble and adaptable to automation, completed units provide at least 40% savings in mounting area compared to a similar size pot core assembly.

RM cores are available in seven standard sizes. Three of the sizes are also available as low profile cores.

Printed circuit bobbins or plain bobbins are available.

Typical applications include differential inductors, power inductors, filter inductors, telecom inductors and broadband transformers.

HOW TO ORDER

R P 4 15 10 UG XX

- R — SHAPE CODE*
- P — FERRITE CORE MATERIAL
- 4 — USED FOR ALL FERRITE TYPES
- 15 — APPROXIMATE DIAMETER IN MM
- 10 — APPROXIMATE HEIGHT IN MM
- UG — GEOMETRY CODE/GAP CODE (SEE PAGE 1.5)
- XX — SPECIAL SPECIFICATION CODE

**SHAPE CODES*
N – RM Core with solid centerpost
R – RM Core with center hole

RM
Core Data (ungapped)

Any practical gap available. See page 1.8 - 1.11

PART	CORE TYPE	FIG.		A MAX	B	2B	C	D
				MECHANICAL DIMENSIONS				
R_41110UG	RM4	**1**	mm	11.8	5.20 ± .050	10.400	4.45 nom	3.61 ± .100
			in	0.465	.205 ± .002	.410 ± .004	0.175 nom	.142 ± .004
R_41500UG	RM5/low profile	**2**	mm	14.9	2.160 ± .050	4.320 ± .100	6.6 nom	.760 ± .100
			in	0.587	.085 ± .002	.170 ± .004	0.260 nom	.030 ± .004
R_41505UG	RM5/low profile	**2**	mm	14.9	2.490 ± .050	4.980 ± .100	6.6 nom	.585 ± .100
			in	0.587	.098 ± .002	.196 ± .004	0.260 nom	.023 ± .004
R_41510UG	RM5	**2**	mm	14.9	5.200 ± .050	10.400 ± .100	6.6 nom	3.250 ± .100
			in	0.587	.205 ± .002	.410 ± .004	0.260 nom	.128 ± .004
N_41510UG	RM5	**2**	mm	14.9	5.200 ± .050	10.400 ± .100	6.6 nom	3.250 ± .100
	No center hole		in	0.587	.205 ± .002	.410 ± .004	0.260 nom	.128 ± .004
R_41812UG	RM6-R	**3**	mm	18.3	6.200 ± .050	12.400 ± .100	7.400 nom	4.100 ± .100
			in	0.720	.244 ± .002	.488 ± .004	0.292 nom	.161 ± .004
N_41812UG	RM6-R	**3**	mm	18.3	6.200 ± .050	12.400 ± .100	7.400 nom	4.100 ± .100
	no center hole		in	0.720	.244 ± .002	.488 ± .004	0.292 nom	.161 ± .004
R_41912UG	RM6-S	**4**	mm	18.3	6.200 ± .050	12.400 ± .100	8.200 nom	4.100 ± .100
			in	0.720	.244 ± .002	.488 ± .004	0.323 nom	.161 ± .004

To order, add material code to part number.

FIGURE 1

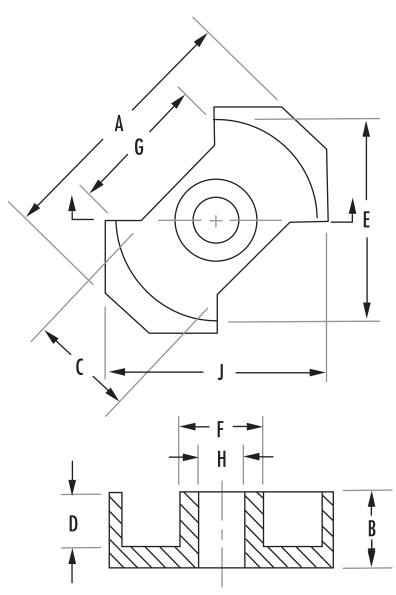
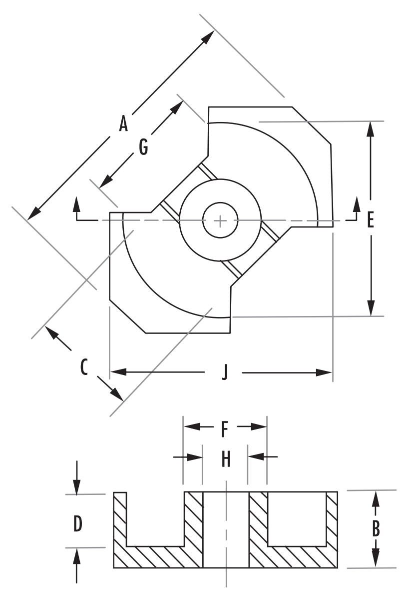


FIGURE 2



RM
Core Data (ungapped)

MECHANICAL DIMENSIONS					
2D	E	F	G	H	J
7.21 ± .200 .284 ± .008	8.15 ± .200 .321 ± .008	3.800 ± .10 .150 ± .004	5.79 ref 0.228 ref	2.05 ± .05 0.081 ± .002	9.600 ± .200 .378 ± .008
1.520 ± .200 .060 ± .008	10.400 ± .200 0.409 ± .008	4.800 ± .100 .189 ± .004	6.71 nom 0.264 nom	2.050 ± .050 .081 ± .002	12.050 ± .250 .474 ± .010
1.170 ± .200 .046 ± .008	10.400 ± .200 0.409 ± .008	4.800 ± .100 .189 ± .004	6.71 nom 0.264 nom	2.050 ± .050 .081 ± .002	12.050 ± .250 .474 ± .010
6.520 ± .200 .256 ± .008	10.400 ± .200 0.409 ± .008	4.800 ± .100 .189 ± .004	6.71 nom 0.264 nom	2.050 ± .050 .081 ± .002	12.050 ± .250 .474 ± .010
6.520 ± .200 .256 ± .008	10.400 ± .200 0.409 ± .008	4.800 ± .100 .189 ± .004	6.71 nom 0.264 nom	- -	12.050 ± .250 .474 ± .010
8.200 ± .200 0.323 ± .008	12.650 ± .250 .498 ± .010	6.250 ± .150 .246 ± .006	5.850 nom 0.250 nom	3.050 ± .050 .120 ± .002	14.400 ± .300 .567 ± .012
8.200 ± .200 0.323 ± .008	12.650 ± .250 .498 ± .010	6.250 ± .150 .246 ± .006	5.850 nom 0.230 nom	- -	14.400 ± .300 .567 ± .012
8.200 ± .200 0.323 ± .008	12.650 ± .250 .498 ± .010	6.250 ± .150 .246 ± .006	9.000 nom 0.355 nom	3.050 ± .050 .120 ± .002	14.400 ± .300 .567 ± .012

FIGURE 3

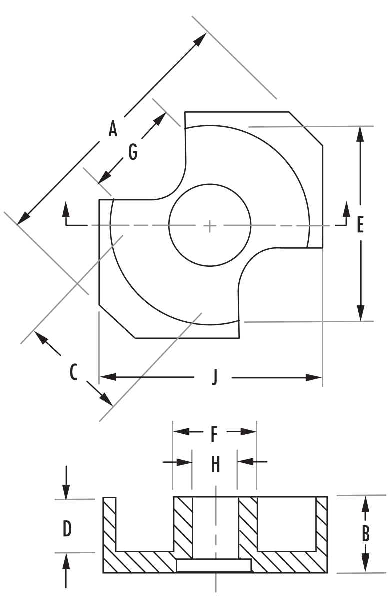
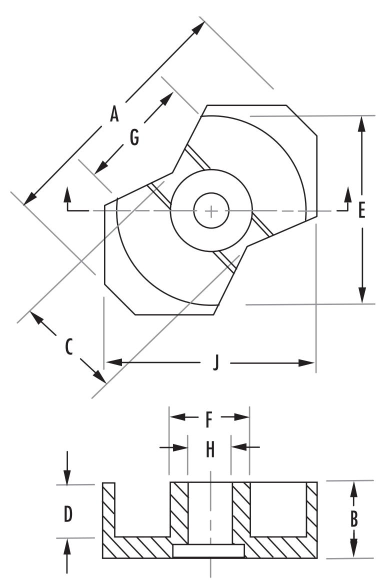


FIGURE 4



RM
Core Data (ungapped)

Any practical gap available. See page 1.8 - 1.11

				MECHANICAL DIMENSIONS				
PART	**CORE TYPE**	**FIG.**		**A MAX**	**B**	**2B**	**C**	**D**
N_41912UG	RM6-S	**4**	**mm**	18.30	6.200 ± .050	12.400 ± .100	8.200 nom	4.100 ± .100
	no center hole		**in**	0.720	.244 ± .002	.488 ± .004	.323 nom	.161 ± .004
N_42309UG	RM8/low profile	**2**	**mm**	23.20	7.87 ± .050	15.74 ± .100	10.800	1.270 ± .130
	no center hole		**in**	0.913	.155 ± .002	.310 ± .004	0.425	.050 ± .005
R_42316UG	RM8	**2**	**mm**	23.20	8.200 ± .050	16.400 ± .100	10.800	5.530 ± .130
			in	0.913	.323 ± .002	.646 ± .004	0.425	.218 ± .005
N_42316UG	RM8	**2**	**mm**	23.2	8.2 ± .05	16.4 ± .1	11.0+0 -.5	5.5 ± .1
	no center hole							
N_42809UG	RM10/low profile	**2**	**mm**	28.50	4.750 ± .050	9.500 ± .100	13.200 ± .250	1.900 ± .150
	no center hole		**in**	1.122	.187 ± .002	.374 ± .004	.520 ± .010	.074 ± .006
R_42819UG	RM10	**2**	**mm**	28.50	9.300 ± .050	18.600 ± .100	13.200 ± .250	6.400 ± .150
			in	1.122	.366 ± .002	.732 ± .004	.520 ± .010	.250 ± .006
N_42819UG	RM10	**2**	**mm**	28.50	9.300 ± .050	18.600 ± .100	13.200 ± .250	6.400 ± .150
	no center hole		**in**	1.122	.366 ± .002	.732 ± .004	.520 ± .010	.250 ± .006
N_43723UG	RM12	**4**	**mm**	37.40	11.700 ± .050	23.500 ± .100	16 nom	8.55 ± .150
			in	1.472	.462 ± .002	.924 ± .004	.626 nom	.337 ± .006

To order, add material code to part number.

FIGURE 2

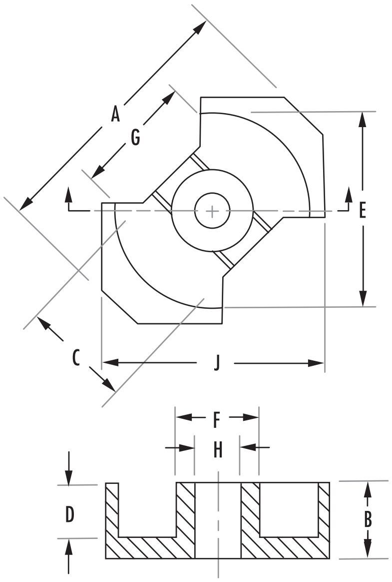
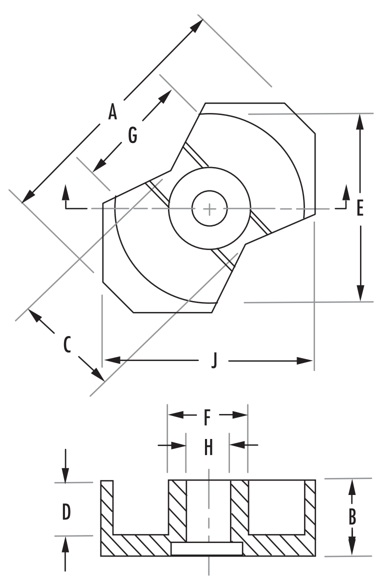


FIGURE 4



RM
Core Data (ungapped)

MECHANICAL DIMENSIONS					
2D	E	F	G	H	J
8.200 ± .200	12.650 ± .250	6.250 ± .150	9.000 nom	-	14.400 ± .300
0.323 ± .008	.498 ± .010	.246 ± .006	0.355 nom	-	.567 ± .012
2.54 ± .250	17.350 ± .350	8.400 ± .150	11.700 nom	-	19.300 ± .400
.100 ± .010	.683 ± .014	.331 ± .006	0.460 nom	-	.760 ±.016
11.050 ± .250	17.350 ± .350	8.400 ± .150	11.700 nom	4.500 ± .100	19.300 ± .400
.435 ± .010	.683 ± .014	.331 ± .006	0.415 nom	0.177 ± .004	.760 ±.016
11.0	17.0 +.6 - 0	8.55+0 - .3	-	-	19.7+0 - .8
3.800 ± .300	21.650 ± .450	10.700 ± .200	11.400 nom	-	24.15 ± .550
.148 ± .012	.852 ± .018	.421 ± .008	0.450 nom	-	.951 ± .022
12.700 ± .300	21.650 ± .450	10.700 ± .200	11.400 nom	5.563 ± .100	24.15 ± .550
.500 ± .012	.852 ± .018	.421 ± .008	0.450 nom	0.219 ± .005	.951 ± .022
12.700 ± .300	21.650 ± .450	10.700 ± .200	11.400 nom	-	24.15 ± .550
.500 ± .012	.852 ± .018	.421 ± .008	0.450 nom	-	.951 ± .022
17.100 ± .300	25.500 ± .500	12.55 ± .250	15.200 nom	-	29.25 ± .550
.673 ± .012	1.004 ± .020	.494 ± .010	0.600 nom	-	1.152 ± .022

RM
Core Data (ungapped)

Any practical gap available. **See page 1.8 - 1.11**

				A_L (mH/1000T)				
				POWER MATERIALS			**HIGH PERMEABILITY MATERIALS**	
PART	**CORE TYPE**	**FIG.**		**R**	**P**	**F***	**J**	**W**
R_41110UG	RM4	**1**	Min	690	750	1,200	1,480	2,100
R_41500UG	RM5/low profile	**2**	Min	1,950	2,030	3,380	5,250	-
R_41505UG	RM5/low profile	**2**	Min	2,290	2,390	3,980	6,180	-
R_41510UG	RM5	**2**	Min	1,290	1,400	2,100	3,100	4,200
N_41510UG	RM5	**2**	Min	1,290	1,400	2,100	3,100	4,200
R_41812UG	RM6-R	**3**	Min	1,640	1,750	2,800	4,480	5,400
N_41812UG	RM6-R no center hole	**3**	Min	1,790	1,950	3,080	5,030	6,020
R_41912UG	RM6-S	**4**	Min	1,490	1,620	2,600	4,040	5,400

To order, add material code to part number.
* F material nominal ±25%

FIGURE 1

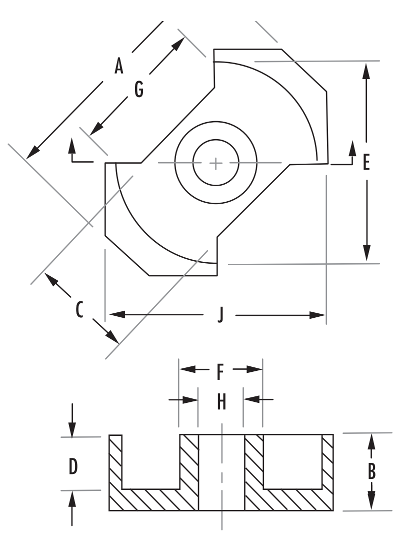
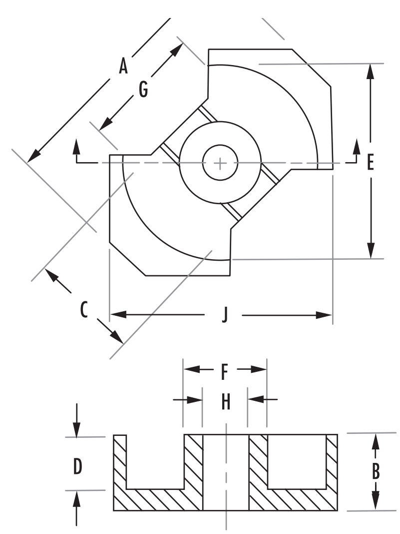


FIGURE 2



RM
Core Data (ungapped)

MAGNETIC DATA						AVAILABLE HARDWARE	
l_e (mm)	A_e (mm^2)	A MIN (mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	WaAc	PRINTED CIRCUIT BOBBIN	MOUNTING CLAMP
20.60	10.8	7.9	222.0	1.600	0.0080	✓	✓
11.8	18.3	15.0	217.0	1.052	-		
12.0	21.9	14.8	262.0	1.271	-		
21.40	21.0	13.9	449.0	3.000	0.2030	✓	✓
22.40	22.8	18.1	510.0	3.300	0.0219	✓	✓
25.60	32.0	22.6	819.0	5.100	0.0507	✓	✓
27.10	38.0	31.0	1,030.0	5.400	0.0507	✓	✓
27.00	31.0	22.6	837.0	4.800	0.0507	✓	✓

FIGURE 3

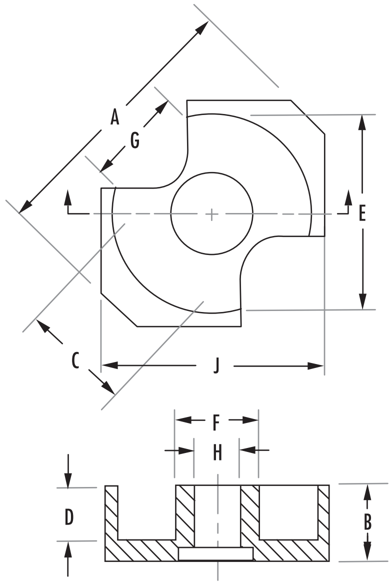
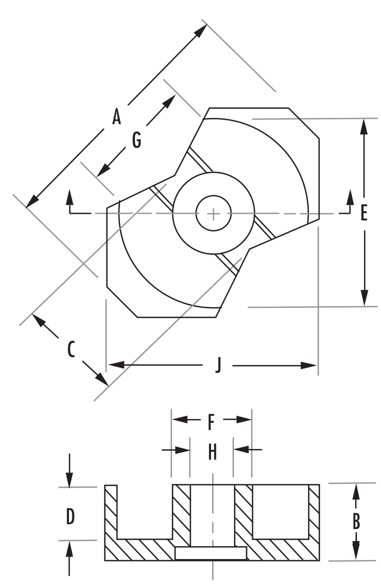


FIGURE 4



RM
Core Data (ungapped)

Any practical gap available. **See page 1.8 - 1.11**

A_L (mH/1000T)

				POWER MATERIALS			HIGH PERMEABILITY MATERIALS	
PART	**CORE TYPE**	**FIG.**		**R**	**P**	**F***	**J**	**W**
N_41912UG	RM6-S no center hole	**4**	Min	1,660	1,800	2,880	4,500	6,020
N_42309UG	RM8/low profile no center hole	**5**	Min	3,490	3,790	6,400	10,300	14,700
R_42316UG	RM8	**5**	Min	1,760	1,920	3,500	5,220	7,420
N_42316UG	RM8 no center hole	**5**	Min	2,025	2,200	3,700	6,000	8,540
N_42809UG	RM10/low profile no center hole	**2**	Min	4,710	5,120	8,520	11,600	17,400
R_42819UG	RM10	**2**	Min	2,700	2,950	5,210	6,690	10,000
N_42819UG	RM10 no center hole	**2**	Min	3,035	3,300	5,500	7,490	11,200
N_43723UG	RM12	**4**	Min	3,450	3,750	6,000	8,850	15,820

To order, add material code to part number.
* F material nominal ±25%

FIGURE 2

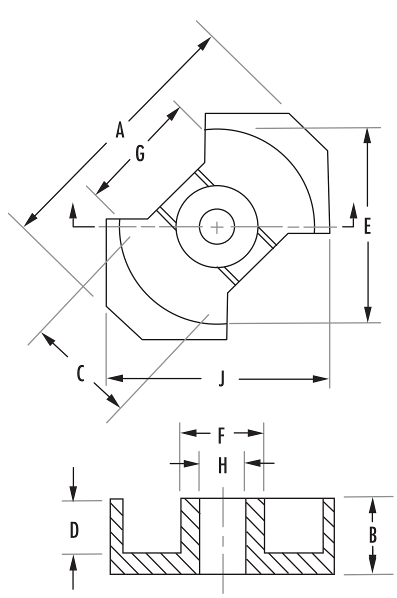
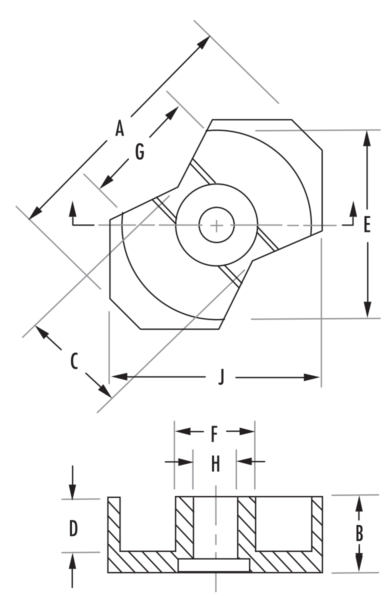


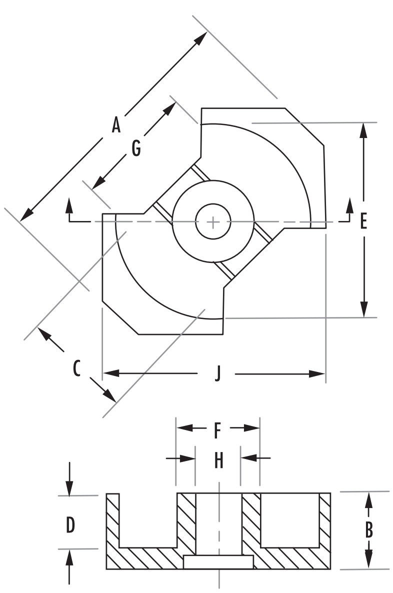
FIGURE 4



RM
Core Data (ungapped)

MAGNETIC DATA						AVAILABLE HARDWARE	
l_e (mm)	A_e (mm^2)	A MIN (mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	WaAc	PRINTED CIRCUIT BOBBIN	MOUNTING CLAMP
28.60	36.6	31.0	1,050	5.1	0.0507	✓	✓
20.8	60.5	55.5	1,260	6.111	-		
35.50	52.0	36.9	1,850	10.4	0.1520	✓	✓
38.4	63.0	55.4	2,440	13.0	0.1520	✓	✓
26.1	90.1	82.9	2,360	11.446	-		
41.70	8.3	61.8	3,460	20.0	0.4410	✓	✓
44.00	98.0	90.0	4,310	23.0	0.4410	✓	✓
56.60	146.0	125.0	8,340	42.0	1.0240	✓	

FIGURE 5



Printed Circuit Bobbins

MECHANICAL DIMENSIONS											
PART	**CORE SIZE**	**FIG.**		**A MAX**	**B MAX**	**C MIN**	**D NOM**	**E MAX**	**F NOM**	**G NOM**	**H NOM**
PCB11104A	**41110**	**1**	mm	7.899	4.902	3.937	5.740	6.807	4.496	5.740	5.258
			in	0.311	0.193	0.155	0.226	0.268	0.177	0.226	0.207
PCB115104A	**41510**	**2**	mm	10.109	5.944	4.978	5.080	6.096	5.004	-	-
			in	0.398	0.234	0.196	0.200	0.240	0.197	-	-
PCB115104B	**41510**	**2**	mm	10.109	5.944	4.978	5.080	6.096	5.004	-	-
2 section			in	0.398	0.234	0.196	0.200	0.240	0.197	-	-
PCB151061	**41510**	**3**	mm	10.109	6.045	4.978	4.928	6.147	4.572	-	-
			in	0.398	0.238	0.196	0.194	0.242	0.180	-	-
PCB151081	**41510**	**4**	mm	10.109	6.045	4.978	4.928	6.147	4.572	-	-
			in	0.398	0.238	0.196	0.194	0.242	0.180	-	-
PCB181241	**41812/41912**	**5**	mm	12.294	7.391	6.502	6.706	7.899	4.496	0.762	-
			in	0.484	0.291	0.256	0.264	0.311	0.177	0.030	-

FIGURE 1

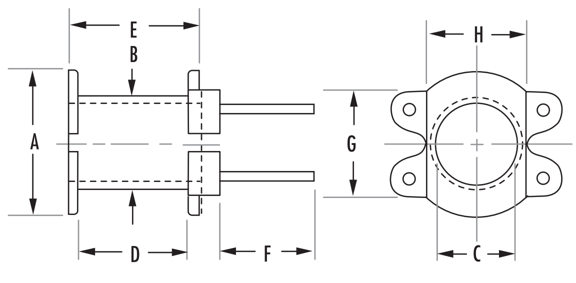


FIGURE 2

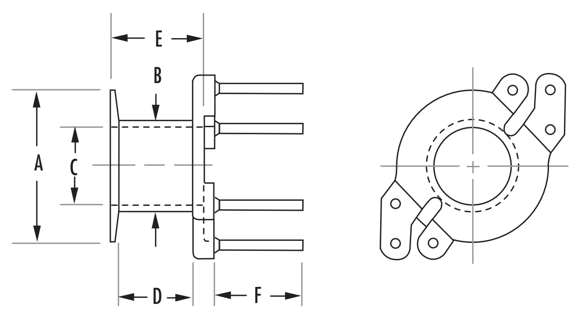
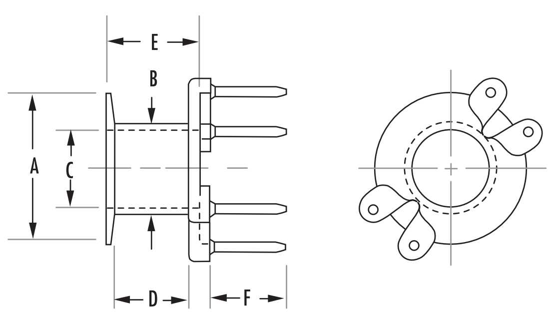


FIGURE 3



Printed Circuit Bobbins

NOMINAL WINDING AREA PER SECTION in^2	NOMINAL WINDING AREA PER SECTION cm^2	AVERAGE LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL	PIN DIAMETER
0.012	0.077	0.065	Glass-filled nylon	Tin coated Phosphor bronze	0.021"
0.015	0.096	0.082	Thermoset Phenolic	Tin coated Phosphor bronze	.022"
0.015	0.096	0.082	Thermoset Phenolic	Tin coated Phosphor bronze	0.022"
0.015	0.096	0.082	Thermoset Phenolic	Tin coated Phosphor Bronze	0.021"
0.015	0.096	0.082	Thermoset Phenolic	Tin coated Phosphor Bronze	0.019"
0.025	0.160	0.098	Thermoset Phenolic	Tin coated Phosphor Bronze	.020" square/round

FIGURE 4

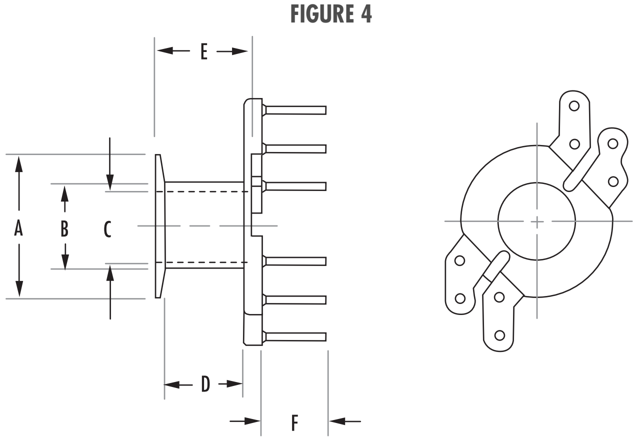
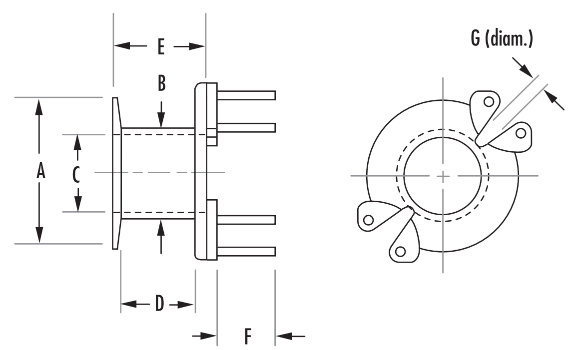
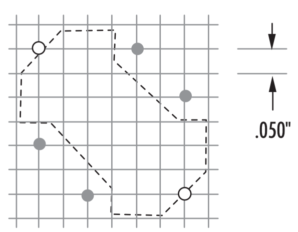


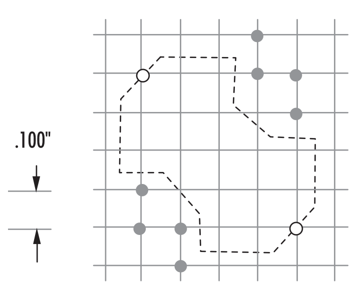
FIGURE 5



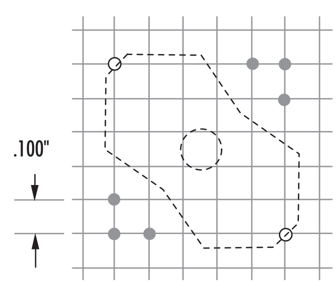
PIN LAYOUTS



41110



41510



41812
41912

- ● Holes for bobbin pins
- ○ Holes for clip pins

Printed Circuit Bobbins

MECHANICAL DIMENSIONS											
PART	CORE SIZE	FIG.		A MAX	B MAX	C MIN	D NOM	E MAX	F NOM	G NOM	H NOM
PCB181261	**41812/41912**	**6**	mm	12.294	7.391	6.502	6.706	7.899	4.496	0.762	-
			in	0.484	0.291	0.256	0.264	0.311	0.177	0.028	-
PCB231651	**42316**	**7**	mm	16.891	9.957	8.687	9.042	10.592	5.486	-	-
			in	0.665	0.392	0.342	0.356	0.417	0.216	-	-
PCB231652	**42316**	**7**	mm	16.891	9.957	8.687	4.242	10.592	5.486	-	-
2 section			in	0.665	0.392	0.342	0.167	0.417	0.216	-	-
PCB231681	**42316**	**7**	mm	16.891	9.957	8.687	9.042	10.592	5.486	-	-
			in	0.665	0.392	0.342	0.356	0.417	0.216	-	-
PCB231682	**42316**	**7**	mm	16.891	9.957	8.687	4.242	10.592	5.486	-	-
2 section			in	0.665	0.392	0.342	0.167	0.417	0.216	-	-
PCB2819L1	**42819**	**8**	mm	21.006	12.243	11.100	10.592	12.192	5.207	1.295	-
			in	0.827	0.492	0.437	0.417	0.480	0.205	0.051	-
PCB3723L1	**43723**	**9**	mm	24.790	14.503	13.005	14.681	16.459	6.096	1.219	-
			in	0.976	0.571	0.512	0.578	0.648	0.240 min	0.048	-

FIGURE 6

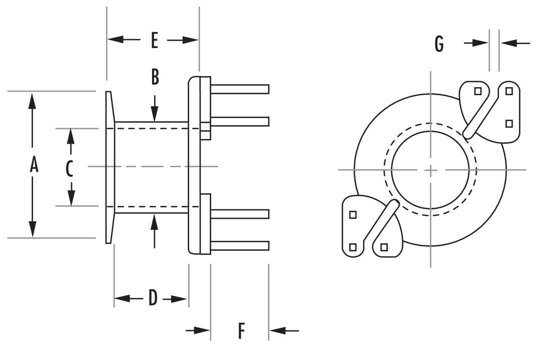


FIGURE 8

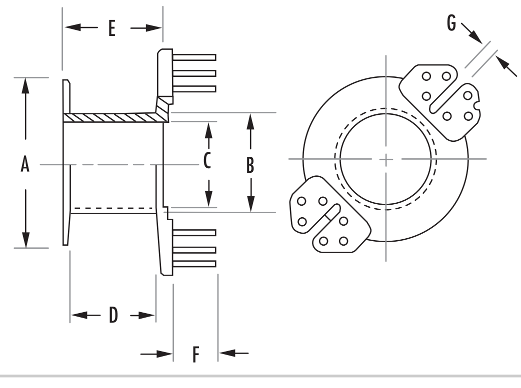
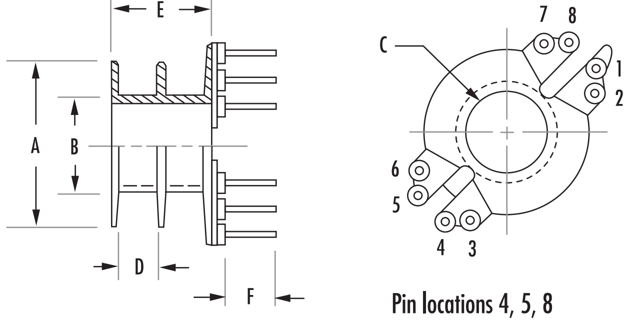


FIGURE 7

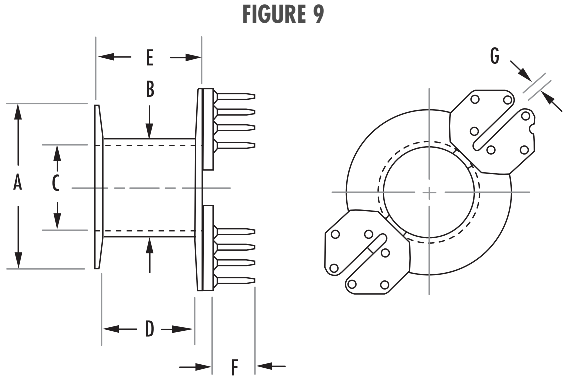


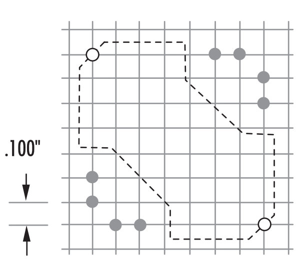
Pin locations 4, 5, 8
blank on 5 pin bobbin

Printed Circuit Bobbins

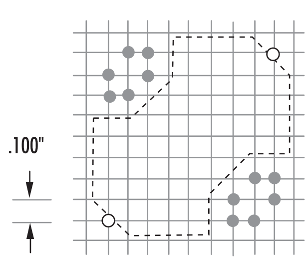
NOMINAL WINDING AREA PER SECTION		AVERAGE LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL	PIN DIAMETER
in^2	cm^2				
0.025	0.160	0.098	Thermoset Phenolic	Tin coated Phosphor Bronze	.020" square/round
0.046	0.300	0.138	Thermoset Phenolic	Tin coated Phosphor Bronze	.026"
0.022	0.142	0.138	Thermoset Phenolic	Tin coated Phosphor Bronze	.026"
0.046	0.300	0.138	Thermoset Phenolic	Tin coated Phosphor Bronze	.026"
0.022	0.142	0.138	Thermoset Phenolic	Tin coated Phosphor Bronze	.026"
0.070	0.452	0.172	Thermoset Phenolic	Tin coated Phosphor Bronze	.024"
0.113	0.730	0.200	Thermoset Phenolic	Tin coated Phosphor Bronze	.033"

FIGURE 9

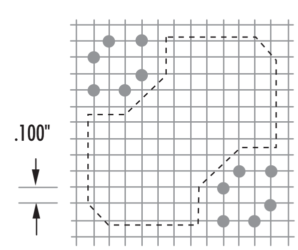




42316



42819



43723

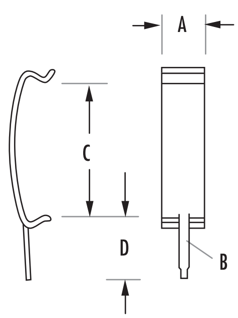
- ● Holes for bobbin pins
- ○ Holes for clip pins

RM
Mounting Clamps

				MECHANICAL DIMENSIONS				MATERIAL	MATERIAL THICKNESS
PART	CORE SIZE	FIG.		A NOM	B NOM				
00C111012	**41110/41510**	**1**	mm	2.083	.686 x .305	8.382	4.343	Spring Steel	0.012"
			in	0.082	.027 x .012	0.330	0.171		
00C181211	**41812/41912**	**1**	mm	2.591	.711 x .381	9.855	4.343	Spring Steel	0.015"
			in	0.102	.028 x .015	0.388	0.171		
00C231615	**42316**	**1**	mm	4.496	.711 x .356	13.589	4.597	Spring Steel	0.014"
			in	0.177	.028 x .014	0.535	0.181		
00C281916	**42819**	**1**	mm	4.496	.711 x .406	15.545	5.055	Spring Steel	0.016"
			in	0.177	.028 x .016	0.612	0.199		

Two mounting clamps are required per core set.

FIGURE 1



EP Cores

EP CORES

EP cores are round center-post cubical shapes which enclose the coil completely except for the printed circuit board terminals. This particular shape minimizes the effect of air gaps formed at mating surfaces in the magnetic path and provides a larger volume ratio to total space used. EP cores provide excellent shielding.

Typical applications for EP cores include differential and telecom inductors and power transformers.

HOW TO ORDER

P W 4 10 10 UG XX

- SHAPE CODE* — P
- FERRITE CORE MATERIAL — W
- USED FOR ALL FERRITE TYPES — 4
- APPROXIMATE DIAMETER IN MM — 10
- APPROXIMATE HEIGHT IN MM — 10
- GEOMETRY CODE/GAP CODE (SEE PAGE 1.5) — UG
- SPECIAL SPECIFICATION CODE — XX

**SHAPE CODES: P – EP core*

EP
Core Data (ungapped)

Any practical gap is available. See page 1.8-1.11

				MECHANICAL DIMENSIONS			
PART	CORE TYPE	FIG.		A MAX	B	2B	C
P_40707UG	**EP7**	**1**	mm	9.20 ± .200	3.700 ± .050	7.400 ± .100	6.35 ± .150
			in	.362 ± .008	.146 ± .002	.292 ± .004	.250 ± .006
P_41010UG	**EP10**	**2**	mm	11.500 ± .300	5.150 ± .100	10.300 ± .008	7.60 ± .200
			in	.453 ± .012	.202 ± .004	.404 ± .008	.301 ± .008
P_41313UG	**EP13**	**3**	mm	12.500 ± .280	6.450 ± .076	12.900 ± .150	8.800 ± .200
			in	4.92 ± .011	.253 ± .003	.506 ± .006	.346 ± .008
P_41717UG	**EP17**	**1**	mm	17.980 ± .510	8.40 ± .100	16.80 ± .200	11.00 ± .250
			in	.708 ± .020	.331 ± .004	.662 ± .008	.433 ± .010
P_42120UG	**EP20**	**2**	mm	24.0 ± .5	10.7 ± .1	21.4 ± .2	15 ± .35

To order, add material code to part number.

A_L (mH/1,000T)

				POWER MATERIALS			HIGH PERMEABILITY MATERIALS	
PART	CORE TYPE	FIG.		R	P	F*	J	W
P_40707UG	**EP7**	**1**	Min	810	880	1,240	1,930	3,600
P_41010UG	**EP10**	**2**	Min	780	850	1,200	1,850	3,360
P_41313UG	**EP13**	**3**	Min	1,150	1,250	2,000	2,800	5,000
P_41717UG	**EP17**	**1**	Min	1,790	1,950	3,100	4,400	8,000
P_42120UG	**EP20**	**2**	Min	3,170	3,450	5,000	7,200	13,500

* F material nominal ±25%

FIGURE 1

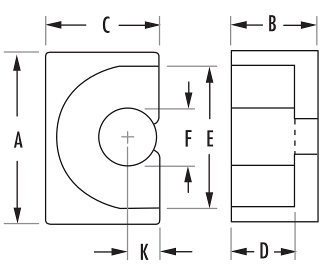


FIGURE 2

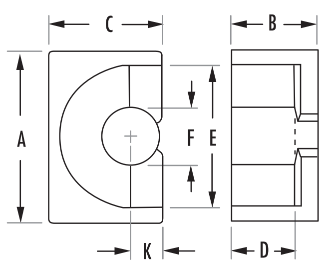
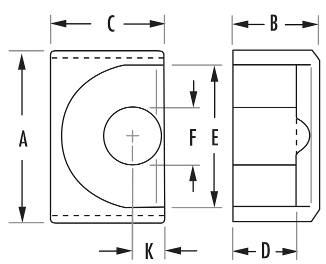


FIGURE 3



EP
Core Data (ungapped)

MECHANICAL DIMENSIONS				
D MIN	2D MIN	E MIN	F MAX	K
2.500	5.000	7.200	3.400	1.70 ± .100
0.098	0.196	0.283	0.134	.067 ± .004
3.600	7.200	9.2	3.450	1.850 ± .100
0.142	0.284	0.362	0.136	.073 ± .004
4.500	8.990	9.72	4.520	2.36 ± .130
0.177	0.354	0.383	0.178	.093 ± .005
5.55	11.10	11.6	5.88	3.30 ± .200
0.22	0.440	0.457	0.230	.128 ± .007
7.05	14.1	16.1	9.05	4.5 ± .2

MAGNETIC DATA						AVAILABLE HARDWARE		
l_e (mm)	A_e (mm^2)	A MIN (mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	WaAc (cm^4)	SURFACE MOUNT BOBBIN	PRINTED CIRCUIT BOBBIN	MOUNTING CLAMP
15.70	10.3	7.8	162	1.4	0.0039	✓	✓	✓
19.2	11.3	78.0	217	2.8	0.0100	✓	✓	✓
24.2	19.5	14.0	472	5.1	0.0300	✓	✓	✓
29.50	33.7	25.5	999	11.6	0.0810		✓	✓
41.1	78.7	60.8	3,230	27.6	0.2480		✓	✓

Printed Circuit Bobbins

MECHANICAL DIMENSIONS														
PART	CORE SIZE	FIG.		A REF	B REF	C MAX	D MIN	E NOM	F NOM	G NOM	H REF	J MAX	K REF	L REF
PCB07076B	**40707**	**1**	mm	9.144	7.391	7.112	3.429	3.505	4.496	3.734	4.572	4.724	2.515	5.055
			in	0.360	0.291	0.280	0.135	0.138	0.175	0.147	0.180	0.186	0.099	0.199
PCB10108A	**41010**	**2**	mm	10.998	10.998	8.992	3.556	5.588	4.902	3.404	5.385	7.112	2.489	7.493
			in	0.433	0.433	0.354	0.140	0.220	0.193	0.134	0.212	0.280	0.098	0.295
PCB1313TA	**41313**	**3**	mm	13.157	13.411	9.703	4.572	7.772	5.791	5.334	6.147	8.941	2.489	10.084
			in	0.518	0.528	0.382	0.180	0.306	0.228	0.210	0.242	0.352	0.098	0.397
PCB17178A	**41717**	**4**	mm	18.999	18.999	11.455	5.994	9.474	7.112	4.699	7.493	11.100	-	-
			in	0.748	0.748	0.451	0.236	0.373	0.280	0.185	0.295	0.437		
PCB2120TA	**42120**	**5**	mm	24.689	21.514	16.078	9.093	12.344	10.211	5.004	8.306	13.894	-	-
			in	0.972	0.847	0.633	0.358	0.486	0.402	0.197	0.327	0.547		

FIGURE 1

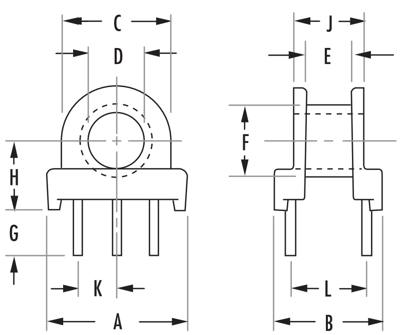


FIGURE 2

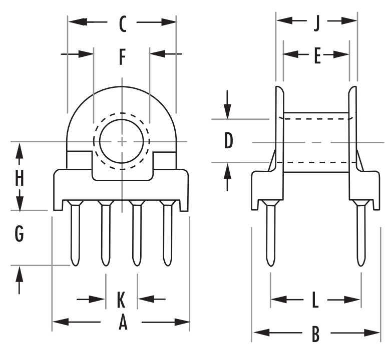


FIGURE 3

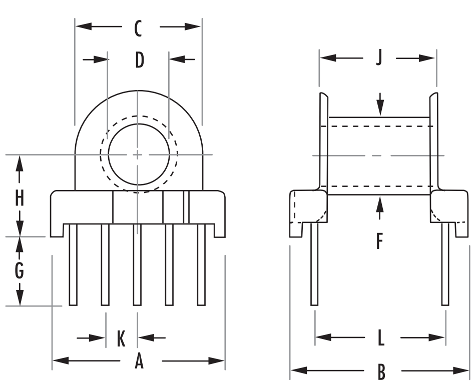
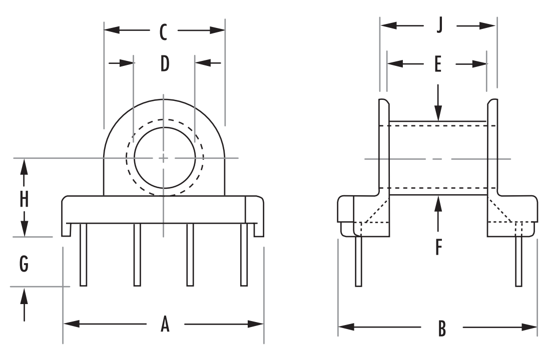


FIGURE 4



Printed Circuit Bobbins

NOMINAL WINDING AREA PER SECTION in²	NOMINAL WINDING AREA PER SECTION cm²	AVERAGE LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL	PIN DIAMETER	BOARD CLEARANCE (in.)*	Length	Width	Height
0.007	0.044	0.059	Phenolic	Tin coated Phosphor Bronze	0.016" square	with clamp	0.4850	0.3850	0.4100
						no clamp	0.375	0.300	0.390
0.018	0.114	0.070	Phenolic	Tin coated Phosphor Bronze	.026"	with clamp	0.5500	0.5100	0.4700
						no clamp	0.470	0.440	0.450
0.021	0.138	0.078	Phenolic	Tin coated Phosphor Bronze	0.020" square	with clamp	0.6250	0.6250	0.5450
						no clamp	0.535	0.545	0.515
0.029	0.188	0.094	Phenolic	Tin coated Phosphor Bronze	0.026"	with clamp	0.8400	0.8000	0.6400
						no clamp	0.760	0.760	0.625
0.051	0.332	0.134	Thermoset Phenolic	Tin coated Phosphor Bronze	0.026"	with clamp	1.0800	1.0000	0.8150
						no clamp	.995	.875	.755

*reference figure 6 for board clearance

FIGURE 5

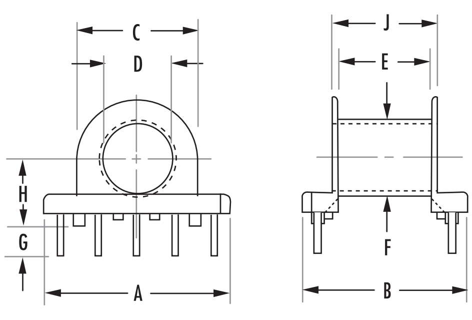
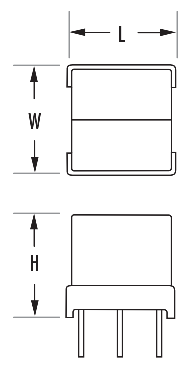
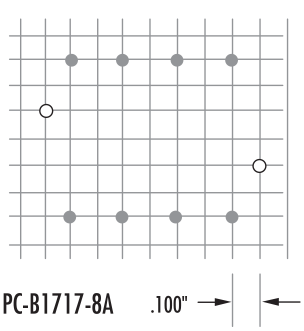


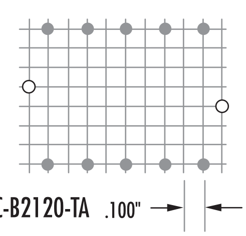
FIGURE 6



PIN LAYOUTS



PC-B1717-8A



PC-B2120-TA

- ● Holes for bobbin pins
- ○ Holes for clip pins

Surface Mount Bobbins

MECHANICAL DIMENSIONS													
PART	CORE SIZE	FIG.		A REF	B REF	C MAX	D MIN	E NOM	F NOM	H REF	J MAX	K REF	L REF
SMB07076A	**40707**	**1**	mm	9.195	8.585	7.112	3.404	3.607	4.496	3.505	4.902	10.592	12.700
			in	0.362	0.338	0.280	0.134	0.142	0.177	0.138	0.193	0.417	0.500
SMB10108A	**41010**	**2**	mm	11.506	10.490	9.093	3.505	5.791	4.801	4.496	7.112	12.497	14.605
			in	0.453	0.413	0.358	0.138	0.228	0.189	0.177	0.280	0.492	0.575
SMB1313TA	**41313**	**3**	mm	12.802	13.005	9.601	4.496	7.595	5.791	5.258	8.788	15.392	16.993
			in	0.504	0.512	0.378	0.177	0.299	0.228	0.207	0.346	0.606	0.669

FIGURE 1

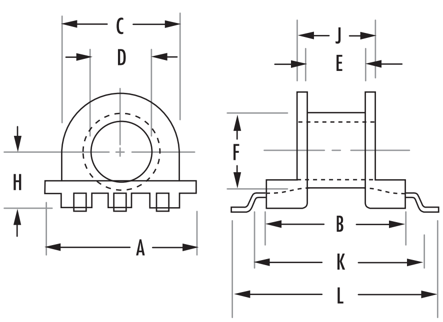


FIGURE 2

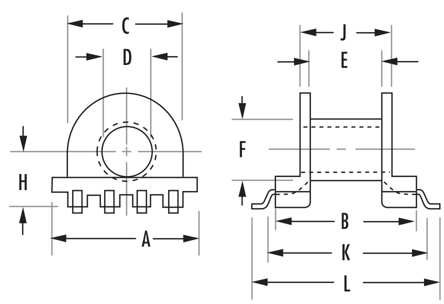
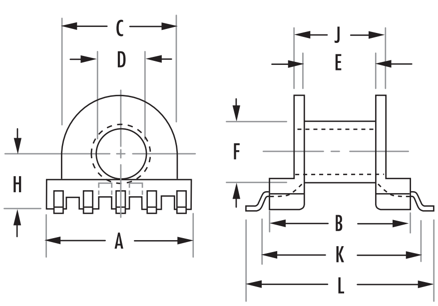


FIGURE 3



Surface Mount Bobbins

NOMINAL WINDING AREA PER SECTION		AVERAGE LENGTH OF TURN FT	BOBBIN MATERIAL	PIN THICKNESS
in^2	cm^2			
0.007	0.044	0.059	L.C.P.	0.012"
0.019	0.120	0.070	L.C.P.	0.012"
0.021	0.138	0.078	L.C.P.	0.012"

Mounting Clamps

PART	CORE SIZE	FIG.		A	B	C	D	E	F	G	H	MATERIAL	MATERIAL THICKNESS
				MECHANICAL DIMENSIONS (NOMINAL)									
0AC070716	**40707**	**2**	mm	9.601	12.167	4.978	3.988	2.083	5.893	0.406	-	Nickel Silver	0.016"
YOKE			in	0.378	0.4790	0.196	0.157	0.082	0.232	0.016	-		
0BC070712	**40707**	**1**	mm	10.389	7.188	4.978	-	-	-	-	-	Nickel Silver	0.012"
CLAMP			in	0.409	0.2830	0.196	-	-	-	-	-		
00C10102A	**41010**	**3**	mm	16.510	12.141	6.401	4.953	2.591	9.525	2.489	1.016	Phosphor Bronze	0.015"
			in	0.650	0.4780	0.252	0.195	0.102	0.375	0.098	0.040		
YOKE/	**41010**	**1**	mm	13.005	8.590	6.502	-	-	-	-	-	Phosphor Bronze	0.012"
CLAMP			in	0.512	0.3382	0.256	-	-	-	-	-		
0AC131316	**41313**	**4**	mm	16.510	13.0048	7.518	3.988	2.591	11.684	2.997	1.219	Nickel Silver	0.016"
YOKE			in	0.650	0.5120	0.296	0.157	0.102	0.460	0.118	0.048		
0BC131314	**41313**	**1**	mm	14.072	12.649	7.518	-	-	-	-	-	Nickel Silver	0.014"
CLAMP			in	0.554	0.4980	0.296	-	-	-	-	-		
00C17172A	**41717**	**5**	mm	19.990	18.593	8.992	5.004	5.004	15.596	5.004	0.991	Phosphor Bronze	0.016"
			in	0.787	0.7320	0.354	0.197	0.197	0.614	0.197	0.039		
YOKE/	**41717**	**1**	mm	19.177	16.586	8.992	-	-	-	-	-	Phosphor Bronze	0.012"
CLAMP			in	0.755	0.6530	0.354	-	-	-	-	-		
0AC212016	**42120**	**6**	mm	22.276	24.613	11.989	3.505	4.572	17.602	2.540	0.991	Nickel Silver	0.016"
YOKE			in	0.877	0.9690	0.472	0.138	0.180	0.693	0.100	0.039		
0BC212016	**42120**	**1**	mm	24.994	21.488	11.989	-	-	-	-	-	Nickel Silver	0.016"
CLAMP			in	0.984	0.8460	0.472	-	-	-	-	-		

Yoke and Clamp are required for assembly.

Part numbers 00C10102A & 00C17172A are for yoke/clamp set.

Mounting Clamps

FIGURE 1

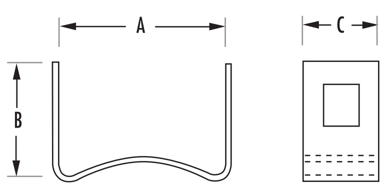


FIGURE 2

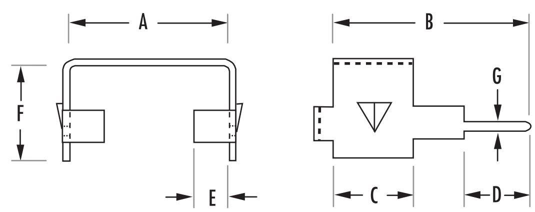


FIGURE 3

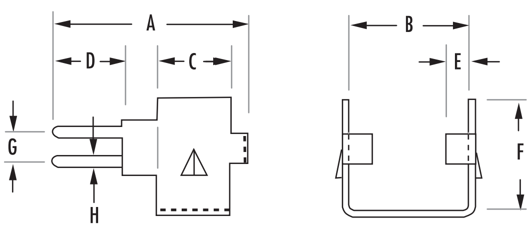


FIGURE 4

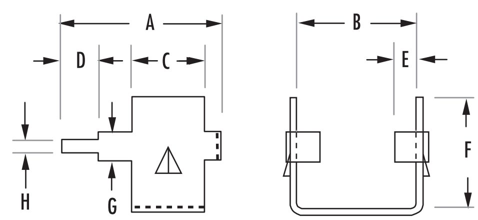


FIGURE 5

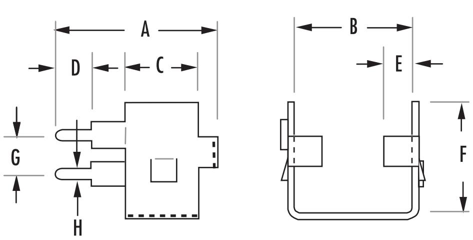
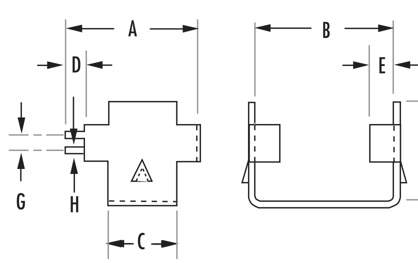


FIGURE 6



Notes

PQ CORES

PQ cores are designed specifically for switched mode power supplies. This design provides an optimized ratio of volume to winding area and surface area. As a result, both maximum inductance and winding area are possible with a minimum core size. The cores provide maximum power output with minimum assembled transformer weight and volume, in addition to taking up a minimum amount of area on the printed circuit board.

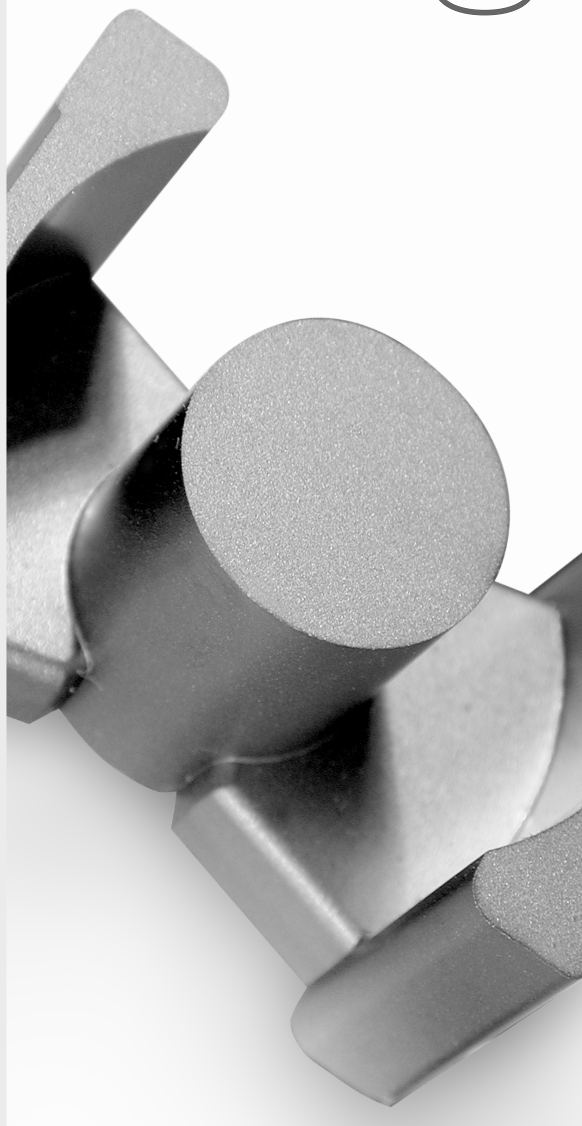
Assembly with printed circuit bobbins and one piece clamps is simplified. This efficient design provides a more uniform cross-sectional area; thus cores tend to operate with fewer hot spots than with other designs.

Typical applications include power transformers and power inductors.

HOW TO ORDER

O P 4 20 16 UG XX

- O — STANDARD CORE
- P — FERRITE CORE MATERIAL
- 4 — USED FOR ALL FERRITE TYPES
- 20 — APPROXIMATE DIAMETER IN MM
- 16 — APPROXIMATE HEIGHT IN MM
- UG — GEOMETRY CODE/GAP CODE (SEE PAGE 1.5)
- XX — SPECIAL SPECIFICATION CODE



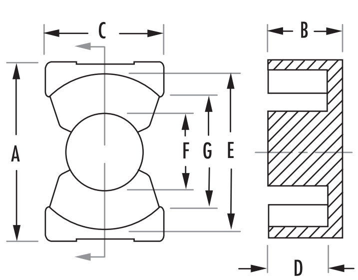
PQ
Core Data (ungapped)

Any practical gap is available. See page 1.8-1.11

MECHANICAL DIMENSIONS												
PART	CORE TYPE	FIG.		A	B	2B	C	D MIN	2D MIN	E MIN	F MAX	G MIN
0_42016UG	**PQ 20/16**	**1**	mm	21.3 ± .400	8.100 ± .100	16.200 ± .200	14.00 ± .400	5.000	10.000	17.600	9.000	12
			in	0.837 ± .016	.319 ± .004	.638 ± .008	.551 ± .016	0.197	0.394	0.693	0.356	0.472
0_42020UG	**PQ 20/20**	**1**	mm	21.3 ± .4	10.1 ± .1	20.2 ± .2	14. ± .4	7.0	14.0	17.6	9.0	12
0_42610UG		**1**	mm	27.2 ± .450	5.100 ± .100	10.200 ± .200	19.00 ± .450	1.200	2.390	22.05	12.200	15.50
			in	1.073 ± .018	.200 ± .004	.400 ± .008	.748 ± .018	0.047	0.094	0.868	0.480	0.610
0_42614UG		**1**	mm	27.200 ± .450	5.94 ± .100	11.90 ± .200	19.00 ± .450	3.400	6.700	22.05	12.200	15.50
			in	1.073 ± .018	.234 ± .004	.468 ± .008	.748 ± .018	0.132	0.264	0.868	0.480	0.610
0_42620UG	**PQ 26/20**	**1**	mm	27.300 ± .460	10.100 ± .130	20.200 ± .250	19.00 ± .450	5.600	11.200	22.05	12.200	15.50
			in	1.073 ± .018	.397 ± .005	.794 ± .010	.748 ± .018	0.220	0.440	0.868	0.480	0.610
0_42625UG	**PQ 26/25**	**1**	mm	27.3 ± .46	12.35 ± .125	24.7 ± .25	19.0 ± .45	7.9	15.8	22.04	12.2	15.5
0_43214UG		**1**	mm	33.00 ± .500	5.940 ± .100	11.900 ± .200	22.00 ± .500	3.4	6.700	27	13.750	19
			in	1.300 ± .020	.234 ± .004	.468 ± .008	.866 ± .020	0.132	0.264	1.063	0.540	0.748
0_43220UG	**PQ 32/20**	**1**	mm	33.00 ± .500	10.300 ± .130	20.500 ± .250	22.0 ± .500	5.6	11.200	27	13.750	19
			in	1.300 ± .020	.405 ± .005	.810 ± .010	.866 ± .020	0.22	0.440	1.063	0.540	0.748
0_43230UG	**PQ 32/30**	**1**	mm	33.0 ± .5	15.15 ± .125	30.3 ± .25	22.0 ± .5	10.5	21.0	27.0	13.75	19.0
0_43535UG	**PQ 35/35**	**1**	mm	36.1 ± .6	17.4 ± .13	34.7 ± .25	26.0 ± .5	12.2	24.7	31.5	14.65	23.5
0_44040UG	**PQ 40/40**	**1**	mm	41.5 ± .9	19.9 ± .15	39.8 ± .3	28.0 ± .6	14.35	29.1	36.4	15.2	28

To order, add material code to part number.

FIGURE 1



PQ
Core Data (ungapped)

PQ Cores

	POWER MATERIALS			HIGH PERMEABILITY MATERIALS		MAGNETIC DATA						AVAILABLE HARDWARE	
	R	P	F*	J	W	l_e (mm)	A_e (mm^2)	A MIN (mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	WaAc (cm^4)	PRINTED CIRCUIT BOBBIN	MOUNTING CLAMP
Min	2,690	2,930	4,690	4,100	7,630	37.6	61.9	59.1	2,330.0	13.000	0.1570	✓	✓
Min	2,210	2,410	3,860	3,380	6,320	45.7	62.6	59.1	2,850.0	15.000	0.2380	✓	✓
Min	5,800	6,310	—	—	—	29.40	105.0	93.8	3,090.0	15.000	0.0960		
Min	4,210	4,585	7,335	6,420	12,000	33.30	86.4	70.9	2,880.0	14.000	0.1720		
Min	4,170	4,540	7,270	6,350	11,800	45.00	121.0	109.0	5,470.0	31.000	0.3950	✓	✓
Min	3,450	3,750	6,010	5,250	9,800	54.3	120.0	108.0	6,530.0	36.000	0.5930	✓	✓
Min	5,150	5,600	8,960	8,000	14,000	34.40	109.0	092.0	3,750.0	21.000	0.3000		
Min	4,980	5,410	8,660	7,580	14,100	55.9	169.0	142.0	9,440.0	42.000	0.8010	✓	✓
Min	3,500	3,810	6,100	5,360	9,940	74.7	167.0	142.0	12,500.0	55.000	1.6000	✓	✓
Min	3,610	3,930	6,300	5,510	10,300	86.1	190.0	162.0	16,300.0	73.000	3.1200	✓	✓
Min	3,200	3,480	5,580	4,880	9,100	102.0	201.0	175.0	20,500.0	95.000	5.0000	✓	✓

*F material nominal ±25%

Printed Circuit Bobbins

MECHANICAL DIMENSIONS (NOMINAL UNLESS NOTED)														
PART	CORE SIZE	FIG.		A	B	C MAX	D	E	F	G	H	J	K	L
PCB2016FB	**42016**	**1**	mm	22.885	22.936	9.881	10.871	7.976	4.496	20.320	3.810	2.540	17.221	16.332
			in	0.901	0.903	0.389	0.428	0.314	0.290	0.800	0.150	0.100	0.678	0.643
PCB2020FB	**42020**	**1**	mm	22.885	22.936	13.843	10.871	11.938	7.366	20.320	3.810	2.540	17.221	20.295
			in	0.901	0.903	0.545	0.428	0.470	0.290	0.800	0.150	0.100	0.678	0.799
PCB2620LA	**42620**	**2**	mm	26.492	29.312	10.998	14.199	8.992	7.366	25.400	3.810	7.620	21.590	21.641
			in	1.043	1.154	0.433	0.559	0.354	0.290	1.000	0.150	0.300	0.850	0.852
PCB2625LA	**42625**	**2**	mm	26.492	29.312	15.748	14.199	13.589	7.366	25.400	3.810	7.620	21.590	26.238
			in	1.043	1.154	0.620	0.559	0.535	0.290	1.000	0.150	0.300	0.850	1.033
PCB3220LA	**43220**	**2**	mm	32.004	33.985	10.998	15.900	8.788	6.350	30.480	5.080	7.620	26.594	22.835
			in	1.260	1.338	0.433	0.626	0.346	0.250	1.200	0.200	0.300	1.047	0.899
PCB3230LA	**43230**	**2**	mm	32.004	33.985	20.701	15.900	18.593	6.350	30.480	5.080	7.620	26.594	32.639
			in	1.260	1.338	0.815	0.626	0.732	0.250	1.200	0.200	0.300	1.047	1.285
PCB3535LA	**43535**	**2**	mm	35.001	38.989	24.460	16.789	22.301	6.350	35.560	5.080	10.160	31.090	37.160
			in	1.378	1.535	0.963	0.661	0.878	0.250	1.400	0.200	0.400	1.224	1.463
PCB404012	**44040**	**3**	mm	40.005	42.012	28.804	17.399	26.797	6.350	38.100	5.080	15.240	35.992	42.164
			in	1.575	1.654	1.134	0.685	1.055	0.25	1.5	0.200	0.600	1.417	1.660

FIGURE 1

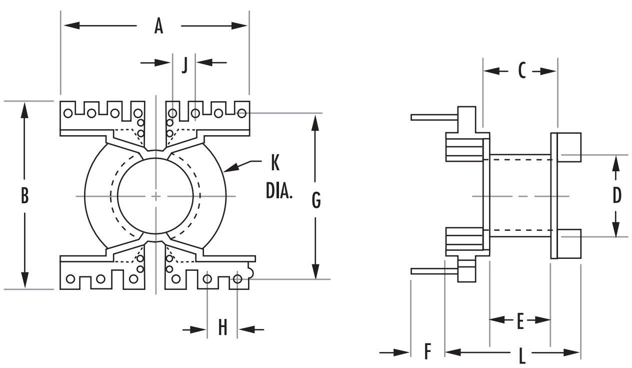


FIGURE 2

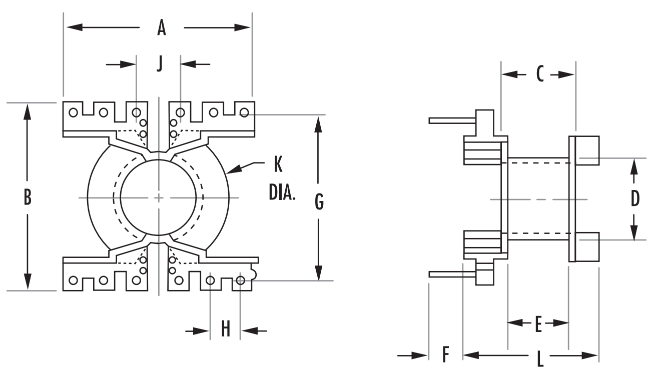
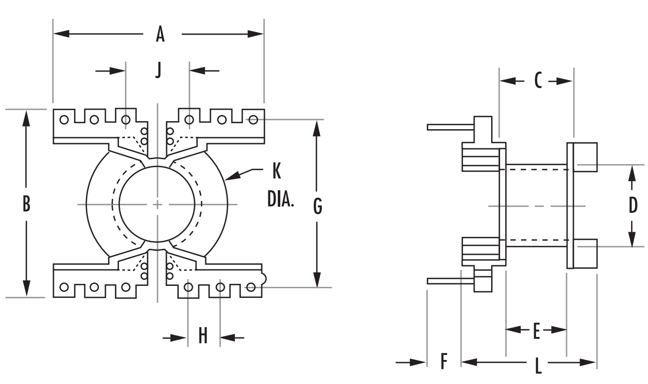


FIGURE 3



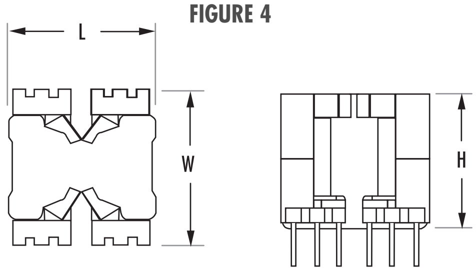
PQ Core Hardware

Printed Circuit Bobbins

NOMINAL WINDING AREA PER SECTION		AVERAGE LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL	PIN DIAMETER	BOARD CLEARANCE (in.)*			
in^2	cm^2						Length	Width	Heighth
0.040	0.256	0.144	Rynite	Tin plated Brass	.024"	no clamp	0.915	0.915	0.700
						with clamp	0.930	0.915	0.830
0.060	0.384	0.144	Rynite	Tin plated Brass	.024"	no clamp	0.915	0.915	0.850
						with clamp	0.930	0.915	0.985
0.050	0.332	0.184	Rynite	Tin plated Brass	.036"	no clamp	1.100	1.170	0.910
						with clamp	1.115	1.170	1.000
0.078	0.502	0.184	Rynite	Tin plated Brass	.036"	no clamp	1.100	1.170	1.015
						with clamp	1.115	1.170	1.180
0.073	0.470	0.220	Rynite	Tin plated Brass	.036"	no clamp	1.340	1.350	0.950
						with clamp	1.355	1.350	1.030
0.154	0.994	0.220	Rynite	Tin plated Brass	.036"	no clamp	1.340	1.350	1.335
						with clamp	1.355	1.350	1.415
0.247	1.590	0.247	Rynite	Tin plated Brass	.036"	no clamp	1.470	1.550	1.515
						with clamp	1.470	1.550	1.585
0.386	2.490	0.275	Rynite	Tin plated Brass	.036"	no clamp	1.700	1.675	1.725
						with clamp	1.700	1.675	1.775

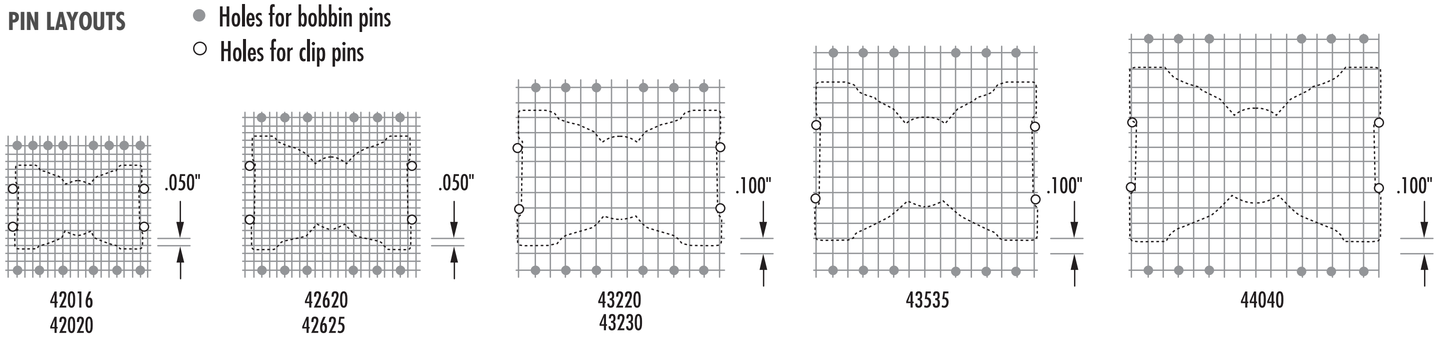
*reference figure 4 for board clearance

FIGURE 4



PIN LAYOUTS

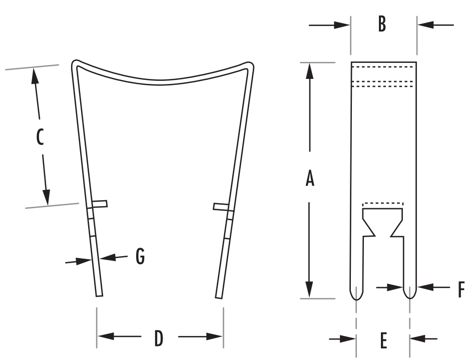
- ● Holes for bobbin pins
- ○ Holes for clip pins



Mounting Clamps

PART	CORE SIZE	FIG.		MECHANICAL DIMENSIONS A±.020	B±.003	C±.010	D REF	E NOM	F NOM	MATERIAL	MATERIAL THICKNESS
00C201612	**42016**	**1**	mm	29.007	7.899	17.501	14.986	6.401	1.499	Nickel Silver	0.012"
			in	1.142	0.3110	0.689	0.590	0.252	0.059		
00C202012	**42020**	**1**	mm	32.995	7.899	21.488	14.986	6.401	1.499	Nickel Silver	0.012"
			in	1.299	0.3110	0.846	0.590	0.252	0.059		
00C262012	**42620**	**1**	mm	32.995	10.490	21.488	21.006	8.992	1.499	Nickel Silver	0.012"
			in	1.299	0.4130	0.846	0.827	0.354	0.059		
00C262512	**42625**	**1**	mm	37.490	10.490	26.111	21.006	8.992	1.499	Nickel Silver	0.012"
			in	1.476	0.4130	1.028	0.827	0.354	0.059		
00C322017	**43220**	**1**	mm	36.500	12.2936	21.996	27.000	10.592	1.702	Nickel Silver	0.017"
			in	1.437	0.4840	0.866	1.063	0.417	0.067		
00C323017	**43230**	**1**	mm	46.507	12.294	31.801	27.000	10.592	1.702	Nickel Silver	0.017"
			in	1.831	0.4840	1.252	1.063	0.417	0.067		
00C353517	**43535**	**1**	mm	50.495	12.700	36.195	29.997	11.303	1.702	Nickel Silver	0.017"
			in	1.988	0.5000	1.425	1.181	0.445	0.067		
00C404017	**44040**	**1**	mm	55.499	13.487	41.199	35.001	11.786	1.702	Nickel Silver	0.017"
			in	2.185	0.5310	1.622	1.378	0.464	0.067		

FIGURE 1



E, I, U Cores

E, I, U CORES

E cores are less expensive than pot cores, and have the advantage of simple bobbin winding plus easy assembly. E cores do not, however, offer self-shielding. Lamination size E cores are available to fit commercially offered bobbins previously designed to fit the strip stampings of standard lamination sizes. Metric and DIN sizes are also available. E cores can be pressed to different thicknesses, providing a selection of cross-sectional areas. Bobbins for these different cross sections are often available commercially.

E cores can be mounted in different directions and, if desired, provide a low profile. Printed circuit bobbins are available for low profile mounting. Typical applications for E cores include differential, power and telecom inductors, as well as, broadband, power, converter and inverter transformers.

U cores, which offer a larger window/cross-sectional area, provide more power handling capability than E cores of the same size. Typical applications are similar to E cores.

HOW TO ORDER

C R 4 14 34 EC XX

- C — SHAPE CODE
- R — FERRITE CORE MATERIAL
- 4 — USED FOR ALL FERRITE TYPES
- 14 — APPROXIMATE DIAMETER IN MM
- 34 — APPROXIMATE HEIGHT IN MM
- EC — GEOMETRY CODE/GAP CODE (SEE PAGE 1.5)
- XX — SPECIAL SPECIFICATION CODE

SHAPE CODE

0 – Standard
C – Planar E core with clip recesses
F – Planar E core option: no clip recesses

GEOMETRY CODE

EC – All E cores including ETD, EC, ER, EER, EEM, EFD, planar and lamination sizes
IC – I cores
UC – U cores

GAP CODE – see page 1.5

Note – Standard gap codes do not apply to U cores, I cores and some EI combinations.

Cores are sold per piece (for sets multiply by 2). Gapped pieces are normally packed separately from ungapped pieces. If desired in sets, this must be specified.

E, I, U Core Data (ungapped)

Any practical gap available. See pages 1.8-1.11

MECHANICAL DIMENSIONS													
PART	**CORE TYPE**	**FIG.**		**A**	**B**	**C**	**D MIN**	**E MIN**	**F**	**L**	**M**	**S**	**T**
0_40904EC	E core	**2**	mm	8.86 ± .38	4.06 ± .25	1.91 ± .12	2.03	4.85	1.91 ± .12	1.91 ± .25	1.57 ± .25	-	-
			in	.349 ± .015	0.160 ± .010	0.075 ± .005	0.08	0.191	.075 ± .005	.075 ± .010	.062 ± .010	-	-
0_41106IC	I core	**3**	mm	10.8 ± .20	1.83 ± .12	6.3 ± .12	-	-	-	-	-	-	-
			in	.427 ± .008	0.072 ± .005	.248 ± .005	-	-	-	-	-	-	-
0_41106UC	U core	**4**	mm	10.8 ± .20	4.19 ± .12	6.3 ± .12	2.11	7.19	-	1.83 ± .12	-	-	-
			in	0.427 ± .008	.165 ± .005	.248 ± .005	0.083	.283 ref	-	.072 ± .005	-	-	-
0_41203EC	Lam E2829	**1**	mm	12.700 ± .25	5.690 ± .18	3.180 ± .12	3.960	9.190	3.180 ± .08	1.570	3.050	-	-
			in	.500 ± .010	.224 ± .007	0.125 ± .005	0.156	0.362	.125 ± .003	0.062 nom	0.120 min	-	-
0_41205EC	Lam E2829	**1**	mm	12.700 ± .25	5.690 ± .18	6.350 ± .12	3.960	9.270	3.180 ± .08	1.570	3.180 ± .12	-	-
	Double stack		in	.500 ± .010	.224 ± .007	.250 ± .005	0.156	0.365	1.25 ± .003	.062 ref	.125 ± .005	-	-
0_41208EC	E core	**1**	mm	12.300 ± .25	7.750 ± .25	4.320 ± .12	5.460	7.850	2.670 ± .08	2.160 ± .13	2.670	-	-
			in	.485 ± .010	.305 ± .010	.170 ± .005	0.215	0.309	.105 ± .003	0.085 ± .005	.105 ref	-	
0_41209EC	EE12.5	**1**	mm	12.400 ± .30	7.390 ± .10	4.850 ± .15	4.800	9.140	2.390 ± .10	1.510 ± .10	3.490 ± .15	-	-
			in	.488 ± .012	.291 ± .004	.191 ± .006	0.189	0.360	.094 ± .004	.0595 ± .004	01375±.006	-	-
0_41707EC	Lam E3233	**2**	mm	16.800 ± .38	7.110 ± .18	3.560 ± .12	3.940	10.400	3.560 ± .12	2.790	3.630	-	-
			in	.660 ± .015	0.280 ± .007	.140 ± .005	0.155	0.411	0.140 ± .005	0.110 nom	0.143 min	-	-
0_41808EC	Lam EI187	**1**	mm	19.1 ± .4	8.1 ± .13	4.7 ± .13	5.54	13.92	4.57 min	2.39	4.82 ref	-	-
0_41810EC	Lam EI187	**1**	mm	19.300 ± .30	8.100 ± .18	9.530 ± .12	5.590	14.000	4.760 ± .08	2.380	4.890	-	-
	Double stack		in	.760 ± .012	.3188 ± .007	.375 ± .005	0.220	0.552	.1875 ± .003	.09375 ref	.1925±.005	-	-
0_42211EC	E core	**1**	mm	22.000 ± .41	11.200 ± .13	5.740 ± .25	7.490	17.100	4.290 ± .20	2.300	6.550	-	-
			in	0.866 ± .016	0.442 ± .005	.226 ± .010	0.295	0.673	.169 ± .008	.0905 nom	.258 nom	-	-
0_42220UC	U core	**4**	mm	22.100 ± .38	20.600 ± .38	6.270 ± .18	13.980	9.500 ± .38	-	6.270 ± .18	-	-	-
			in	0.869 ± .015	.810 ± .015	.247 ± .007	0.550	.375 ± .015	-	.247 ± .007	-	-	-

To order, add material code to part number.

FIGURE 1

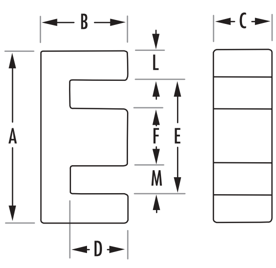
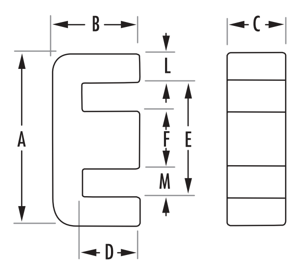


FIGURE 2



E, I, U Core Data (ungapped)

E, I, U Cores

		A_L (mH/1000T)															
		POWER MATERIALS			HIGH PERMEABILITY MATERIALS			MAGNETIC DATA						AVAILABLE HARDWARE			
COMB.		R	P	F*	J	W	H	l_e (mm)	A_e (mm^2)	A MIN (mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	WaAc (cm^4)	STANDARD BOBBIN	SURFACE MOUNT BOBBIN	PRINTED CIRCUIT BOBBIN	MOUNTING CLAMP
E-E								15.4	5.1	3.6	78.0	0.5	0.0020				
	Min	370	405	650	780	-	-										
U-I								24.6	11.5	11.5	283.0	1.5	0.0100				
	Min	710	770	1,150	1,580	-	-										
U-U								29.2	12.0	12.0	350.0	1.8	0.0250				
	Min	770	840	1,010	1,330	-	-										
E-E								27.70	10.1	10.0	279.0	1.300	0.0170	✓	✓		
	Min	440	480	770	1,025	-	-										
E-E								27.70	20.2	20.0	558.0	2.600	0.0330				
	Min	1,100	1,200	1,950	2,475	3,705	-										
E-E								32.10	14.5	11.5	464.0	2.500	0.0280	✓			
	Min	630	685	1,100	1,200	1,820	-										
E-E								30.6	14.4	11.6	440.0	4.200	0.0390				
	Min	660	710	1,150	1,240	1,900	-										
E-E								30.4	16.6	12.6	505.0	3.000	0.0310				
	Min	760	825	1,300	1,425	2,240	-										
E-E								39.9	22.6	22.1	900.0	4.400	0.0760	✓		✓	
	Min	865	940	1,500	1,875	3,220	-										
E-E								40.1	45.5	45.4	1820.0	8.500	0.1560	✓			
	Min	1,725	1,875	3,000	3,750	7,420	-										
E-E								51.10	28.3	24.6	1450.0	8.200	0.2120				
	Min	920	1,000	1,610	1,890	3,500	5,250										
U-U								95.80	39.7	39.7	4130.0	19.000	0.9100				
	Min	670	730	1,360	1,580	2,400	-										

* F material nominal ± 25%

FIGURE 3

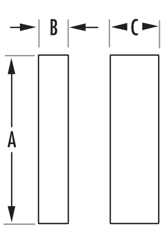
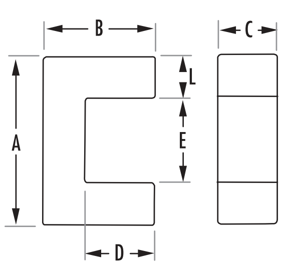


FIGURE 4



E, I, U Core Data (ungapped)

Any practical gap available. See pages 1.8-1.11

							MECHANICAL DIMENSIONS						
PART	CORE TYPE	FIG.		A	B	C	D MIN	E MIN	F	L	M	S	T
0_42510EC	Lam E2425	**1**	mm	25.4 ± .6	9.65 ± .2	6.35 ± .25	6.4	18.8	6.35 ± .25	3.02	6.1 min	-	-
0_42512UC	U core	**4**	mm	25.400 ± .51	12.900 ± .38	12.700 ± .38	6.350	12.800	-	6.300	-	-	-
			in	1.000 ± .020	.510 ± .015	.500 ± .015	0.250	.504 ref	-	.248 ± .005	-	-	-
0_42515EC	Lam EL2425	**1**	mm	25.400 ± .38	15.900 ± .25	6.350 ± .25	12.600	18.800	6.350 ± .12	3.120 ± .12	6.400 ± .25	-	-
			in	1.000 ± .015	.625 ± .010	.250 ± .010	0.495	0.740	.250 ± .005	.123 ± .005	.252 ± .010	-	-
0_42515IC	I core	**3**	mm	26.400 ± .38	3.180 ± .12	7.370 ± .25	-	-	-	-	-	-	-
			in	1.040 ± .015	.125 ± .005	.290 ± .010	-	-	-	-	-	-	-
0_42515UC	U core	**4**	mm	25.400 ± .51	15.900	6.350 ± .12	9.270	12.700	-	6.350 ± .12	-	-	-
			in	1.000 ± .020	.625 ref	.250 ± .005	0.365	.500 ref	-	.250 ± .005	-	-	-
0_42516IC	I core	**3**	mm	25.400 ± .51	6.350 ± .12	6.350 ± .12	-	-	-	-	-	-	-
			in	1.000 ± .020	.250 ± .005	.250 ± .005	-	-	-	-	-	-	-
0_42520EC	Lam E2425	**1**	mm	25.150 ± .38	9.530 ± .18	12.700 ± .25	6.250	18.800	6.100 ± .12	3.020	6.220	-	-
	Double stack		in	.990 ± .015	.375 ± .007	.500 ± .010	0.246	0.741	.240 ± .005	.119 nom	.245 min	-	-
0_42530EC	EL2425	**1**	mm	25.400 ± .38	15.900 ± .25	12.700 ± .25	12.600	18.800	6.350 ± .12	3.120 ± .12	6.400 ± .25	-	-
	Double stack		in	1.000 ± .015	.625 ± .010	.500 ± .010	0.495	0.742	.250 ± .005	.123 ± .005	.252 ± .010	-	-
0_42530UC	U core	**4**	mm	25.400 ± .51	15.900	12.700 ± .25	9.270	12.700	-	6.350 ± .12	-	-	-
			in	1.000 ± .020	.625 ref	.500 ± .010	0.365	.500 ref	-	.250 ± .005	-	-	-
0_42810EC	E core	**1**	mm	28.000 ± .63	10.500 ± .12	11.200 ± .38	5.440	18.500	7.700 ± .25	4.340 ± .25	5.800	-	-
			in	1.102 ± .025	.415 ± .005	0.440 ± .015	0.214	0.730	.303 ± .010	.171 ± .010	.2285 ref	-	-
0_43007EC	DIN 30/7	**1**	mm	30.8 ± 1.4	15.01 ± .2	7.3 + 0, -.5	9.7	19.5	7.2 + 0, -.5	5.01 ref	6.46	-	-
0_43009EC	Lam E2627	**1**	mm	30.480 ± .38	13.4 ± .25	9.400 ± .12	8.830	21.410	9.400 ± .13	4.290	6.000	-	-
			in	1.200 ± .015	.5275 ± .010	.370 ± .005	0.3475	0.843	.370 ± .005	0.169 nom	0.236 min	-	-

To order, add material code to part number.

FIGURE 1

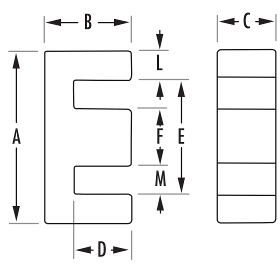
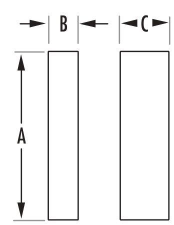


FIGURE 3



E, I, U Core Data (ungapped)

A_L (mH/1000T)

COMB.		POWER MATERIALS R	P	F*	HIGH PERMEABILITY MATERIALS J	W	H	MAGNETIC DATA l_e (mm)	A_e (mm^2)	A MIN (mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	WaAc (cm^4)	AVAILABLE HARDWARE: STANDARD BOBBIN	SURFACE MOUNT BOBBIN	PRINTED CIRCUIT BOBBIN	MOUNTING CLAMP
E-E								49.0	39.5	37.0	1930	9.500	0.1620	✓		✓	
	Min	1325	1440	2300	2775	4635	-										
U-U								68.9	80.0	80.0	4170	29.000	0.6700				
	Min	1430	1550	2480	3300	-	-										
E-E								73.5	40.1	39.7	2950.0	15.000	0.4210	✓			
	Min	865	940	1500	1800	3080	-										
E-I								48.10	40.1	39.7	1930.0	10.000	0.2100				
	Min	1320	1435	2290	2750	4690	-										
U-U								83.40	40.4	40.4	3370.0	17.000	0.6300				
	Min	830	1000	1600	1880	2730	-										
U-I								64.3	40.4	40.4	2600.0	13.000	0.3200				
	Min	1020	1110	1770	2180	-	-										
E-E								48.0	78.4	76.8	3760	19.000	0.4000			✓	
	Min	2650	2880	4600	5500	10360	-										
E-E								73.50	80.2	79.4	5900.0	30.000	0.8420				
	Min	1730	1880	3000	3600	6160	-										
U-U								83.40	80.8	80.8	6740.0	34.000	1.2700				
	Min	1570	1710	2740	3650	-	-										
E-E								47.70	96.7	86.0	4610.0	23.000	0.3470				
	Min	3155	3430	5500	6000	12600	-										
E-E								67.0	60.0	49.0	4000	20.000	0.5000			✓	
	Min	1545	1680	2700	2850	5740	-										
E-E								62.40	83.6	80.7	5220.0	26.000	0.7400	✓		✓	
	Min	2170	2360	3780	4420	8500	-										

* F material nominal ± 25%

FIGURE 4

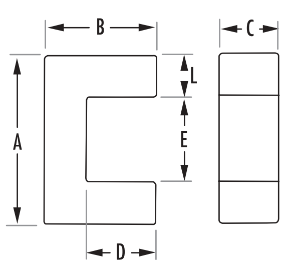
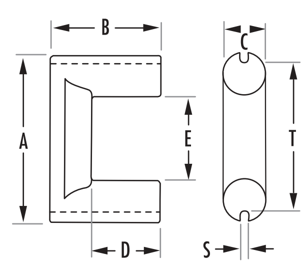


FIGURE 5



E, I, U Core Data (ungapped)

Any practical gap available. See pages 1.8-1.11

MECHANICAL DIMENSIONS													
PART	CORE TYPE	FIG.		A	B	C	D MIN	E MIN	F	L	M	S	T
0_43013EC	Metric E30A	**1**	mm	30.000 ± .51	13.160 ± .15	10.690 ± .30	8.000	19.700	10.690 ± .30	5.000 ± .15	4.650 ± .12	-	-
			in	1.181 ± .020	.518 ± .006	.421 ± .012	0.315	0.776	.421 ± .012	.197 ± .006	.183 ± .005	-	-
0_43515EC	Lam EI375	**2**	mm	34.3 ± .6	14.1 ± .15	9.3 ± .25	9.67	25.5	9.32 ± .2	4.45	7.87	-	-
0_43520EC	E core	**1**	mm	34.900 ± .38	20.620 ± .25	9.530 ± .18	15.600	25.100	9.530 ± .25	4.750 ± .25	7.950	-	-
			in	1.375 ± .015	.812 ± .010	.375 ± .007	0.615	0.990	.375 ± .010	.187 ± .010	.313 nom	-	-
0_43524EC	EL375	**1**	mm	34.540 ± .38	23.800 ± .18	9.350 ± .18	18.740	25.300	9.350 ± .20	4.450 ± .08	7.870	-	-
			in	1.360 ± .015	.9375 ± .007	.368 ± .007	0.738	0.998	.368 ± .008	.175 ± .003	.310 min	-	-
0_44011EC	Metric E40	**1**	mm	40.010 ± .51	17.000 ± .30	10.690 ± .30	10.000	27.600	10.690 ± .30	5.990 ± .25	8.860	-	-
			in	1.575 ± .020	.669 ± .012	.421 ± .012	0.394	1.087	0.421 ± .012	.236 ± .010	.341 nom	-	-
0_44016EC	E core	**1**	mm	42.800 ± .64	21.100 ± .18	9.000 ± .25	15.000	30.400	11.900 ± .25	5.940 ± .13	9.540 ± .25	-	-
			in	1.687 ± .025	.830 ± .007	.354 ± .010	0.587	1.195	.468 ± .010	.234 ± .005	.3755 ± .010	-	-
0_44020EC	DIN 42/15	**1**	mm	43.0 + 0, -1.7	21.0 ± .2	15.2 + 0, -.6	14.8	29.5	12.2 + 0, -.5	6.75 ref	8.65 ref	-	-
0_44020IC	I core	**3**	mm	42.800 ± .64	5.920 ± .12	15.400 ± .25	-	-	-	-	-	-	-
			in	1.687 ± .025	.233 ± .005	.608 ± .010	-	-	-	-	-	-	-
0_44022EC	DIN 42/20	**1**	mm	43.0 + 0, -1.7	21.0 ± .2	20.000 + 0,-.8	14.8	29.5	12.2 + 0, -.5	6.75 ref	8.65 ref	-	-
0_44119UC	U core	**5**	mm	41.960 ± .41	20.900 ± .12	11.700 ± .25	13.400	19.100 ± .64	-	-	-	3.180	35.300
			in	1.652 ± .016	.826 ± .005	.460 ± .010	0.528	.750 ± .025	-	-	-	.125 nom	1.39 ref
0_44121UC	U core	**5**	mm	41.960 ± .41	20.600 ± .12	11.700 ± .25	10.900	19.100 ± .64	-	-	-	3.180	35.300
			in	1.652 ± .016	.812 ± .005	.460 ± .010	0.429	.750 ± .025	-	-	-	.125 nom	1.39 ref
0_44125UC	U core	**5**	mm	41.960 ± .41	25.400 ± .12	11.700 ± .25	15.700	19.100 ± .64	-	-	-	3.180	35.300
			in	1.652 ± .016	1.000 ± .005	.460 ± .010	0.617	.750 ± .025	-	-	-	.125 nom	1.39 ref

To order, add material code to part number.

FIGURE 1

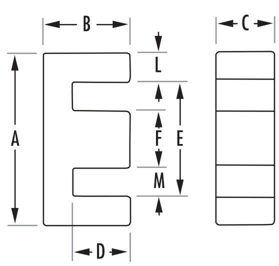
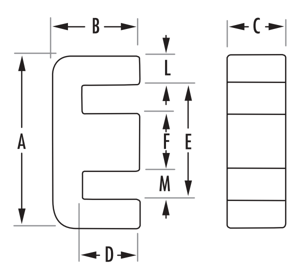


FIGURE 2



E, I, U Core Data (ungapped)

COMB.		R	P	F*	J	W	H	l_e (mm)	A_e (mm^2)	A MIN (mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	WaAc (cm^4)	STANDARD BOBBIN	SURFACE MOUNT BOBBIN	PRINTED CIRCUIT BOBBIN	MOUNTING CLAMP
		A_L (mH/1000T) POWER MATERIALS			HIGH PERMEABILITY MATERIALS			MAGNETIC DATA						AVAILABLE HARDWARE			
E-E								57.80	109.0	107.0	6330.0	32.000	0.6500				
	Min	3070	3340	5340	6200	12000	-										
E-E								69.30	80.7	80.7	5590	33.000	0.8560	✓		✓	
	Min	2000	2180	3500	4360	7990	-										
E-E								94.30	90.6	90.5	8540.0	42.000	1.6800				
	Min	1460	1590	2555	3180	6440	-										
E-E								107.00	85.8	83.1	9180.0	46.000	1.6600				
	Min	1320	1435	2300	2984	4230	-										
E-E								76.70	127.0	114.0	9780.0	49.000	1.3900				
	Min	3000	3260	5200	5470	11550	-										
E-E								98.40	107.0	106.0	10500.0	52.000	2.0800				
	Min	2000	2180	3495	4235	7905	-										
E-E								97.0	178.0	175.0	17300	87.000	3.5500	✓		✓	
	Min	3450	3750	6000	7275	13580	-										
E-I								68.0	183.0	183.0	12400.0	60.000	1.7800				
	Min	4690	5100	8150	9500	15500	-										
E-E								97	233	233	22700	114.000	4.5900			✓	
	Min	4150	4510	7600	7960	18200	-										
U-U								121.20	91.1	80.5	11000.0	54.000	2.8600	✓		✓	✓
	Min	1220	1330	2130	2830	4000	-										
U-U								113.40	98.8	98.8	11100.0	55.000	3.0900				
	Min	1410	1535	2465	3290	4600	-										
U-U								132.80	98.8	98.8	13000.0	64.000	4.4400				
	Min	1200	1310	2105	2800	3920	-										

* F material nominal ±25%

FIGURE 3

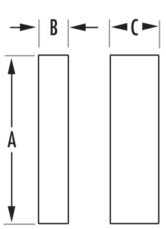
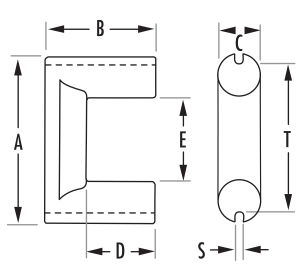


FIGURE 5



E, I, U Core Data (ungapped)

Any practical gap available. See pages 1.8-1.11

MECHANICAL DIMENSIONS													
PART	CORE TYPE	FIG.		A	B	C	D MIN	E MIN	F	L	M	S	T
0_44130UC	U core	**5**	mm	41.960 ± .41	30.500±.30	11.700 ± .25	20.800	19.100 ± .64	-	-	-	3.180	35.300
			in	1.652 ± .016	1.200 ± .012	.460 ± .010	0.817	.750 ± .025	-	-	-	.125 nom	1.39 ref
0_44317EC	Lam EI21	**2**	mm	40.6 ± .65	16.6 ± .20	12.4 ± .3	10.4	28.6	12.45 ± .25	6.05	7.87	-	-
												-	-
0_44721EC	Lam EI625	**2**	mm	46.9 ± .8	19.6 ± .2	15.6 ± .25	12.1	32.4 ± .65	15.6 ± .25	7.54	7.87	-	-
0_44924EC	EL10	**1**	mm	49.070 ± .64	23.8 ± .25	15.620 ± .43	15.100	31.600	15.620 ± .25	9.140 ± .12	7.870	-	-
			in	1.932 ± .025	.936 ± .010	.615 ± .017	0.594	1.246	.615 ± .010	.366 ± .005	.310 min	-	-
0_45021EC	Metric E50	**1**	mm	49.500 ± .64	21.300 ± .30	14.600 ± .38	12.500	34.500	14.600 ± .38	7.370 ± .25	10.1 ± .30	-	-
			in	1.95 ± .025	.839 ± .012	.575 ± .015	0.492	1.359	.575 ± .015	.290 ± .010	.3975 ± .012	-	-
0_45528EC	DIN 55/21	**1**	mm	56.2 + 0, -.21	27.5 ± .3	21 + 0, -.8	18.500	37.500	17.2 + 0, -.5	9.35 ref	10.15 ref	-	-
0_45530EC	DIN 55/25	**1**	mm	54.900 ± .64	27.600± .38	24.610 ± .38	18.500	37.500	15.620 ± .38	8.380 ± .38	10.700±.38	-	-
			in	2.16 ± .025	1.085 ± .015	0.969 ± .015	0.730	1.476	.660 ± .015	.330 ± .015	.420 ± .015	-	-
0_45724EC	Lam EI75	**2**	mm	56.1 ± 1.0	23.6 ± .25	18.8 ± .25	14.6 ± .13	38.1	18.8 ± .25	9.02	9.4	-	-
0_46016EC	Metric E60	**2**	mm	59.990 ± .78	22.300 ± .30	15.620 ± .38	13.800	44.000	15.620 ± .38	7.700 ± .25	14.490 ± .25	-	-
			in	2.362 ± .031	.878 ± .012	.615 ± .015	0.543	1.732	.615 ± .015	.303 ± .010	.5705 ± .010	-	-
0_47228EC	F11	**1**	mm	72.400 ± .76	27.900± .33	19.000 ± .33	17.800	52.600	19.000 ± .38	9.530 ± .38	16.900	-	-
			in	2.85 ± .030	1.100 ± .013	.750 ± .013	0.700	2.072	.750 ± .015	.375 ± .015	.665 min	-	-
0_48020EC	Metric E80	**1**	mm	80.0 ± 1.6	38.1± .30	19.8 ± .4	27.9	59.1	19.8 ± .4	9.9	19.45 min	-	-
												-	-
0_49925IC	I100/25/25	**3**	mm	101.6 ± 1.5	25.4 ± .4	25.4 ± .6	-	-	-	-	-	-	-
0_49925UC	U/100/57/25	**4**	mm	101.6 ± 1.5	57.1 ± .4	25.4 ± .6	30.95	50.7	-	25.4 ± .8	-	-	-
0_49928EC	E-100	**2**	mm	100.300 ± 2.03	59.400 ± .51	27.500 ± .51	46.900± .38	72.000	27.500 ± .51	13.700 ± .38	22.700 ± .51	-	-
			in	3.948 ± .080	2.340 ± .020	1.082 ± .02	1.845± .015	2.834 min	1.082 ± .020	.541 ± .015	.892 ± .020	-	-

To order, add material code to part number.

FIGURE 1

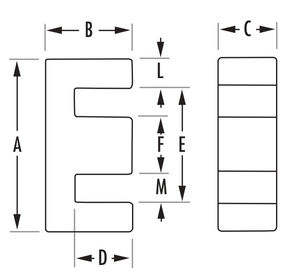
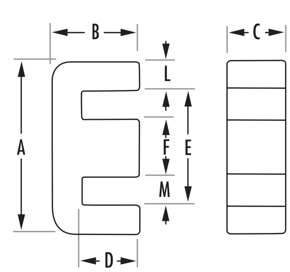


FIGURE 2



E, I, U Core Data (ungapped)

		A_L (mH/1000T) POWER MATERIALS			HIGH PERMEABILITY MATERIALS			MAGNETIC DATA						AVAILABLE HARDWARE			
COMB.		R	P	F*	J	W	H	l_e (mm)	A_e (mm²)	A MIN (mm²)	V_e (mm³)	CORE WEIGHT (grams per set)	WaAc (cm⁴)	STANDARD BOBBIN	SURFACE MOUNT BOBBIN	PRINTED CIRCUIT BOBBIN	MOUNTING CLAMP
U-U								152.80	98.8	98.8	15100	75	5.8800				
	Min	1050	1140	1830	2440	3420	-										
E-E								77.0	149.0	142.0	11500	57	1.4800	✓		✓	
	Min	2925	3180	5900	7350	13720	-										
E-E								88.9	234.0	226.0	20800	103	2.7700	✓		✓	
	Min	4020	4370	8300	10600	19810	-										
E-E								104.00	257.0	244.0	26700	132	3.9600				
	Min	4030	4380	7010	8180	-	-										
E-E								92.90	225.0	213.0	20900	108	4.0000				
	Min	4600	5000	8000	8010	-	-										
E-E								124	353	345	44000	212	9.9100	✓		✓	
	Min	4720	5130	8220	9375	-	-										
E-E								123.00	417.0	413.0	51400	255	11.8000			✓	
	Min	5640	6130	9800	11190	-	-										
E-E								107.00	337.0	337.0	36000	179	6.3400	✓		✓	
	Min	6070	6600	10400	10610	18000	-										
E-E								110.00	248.0	240.0	27200	135	7.1600				
	Min	4300	4680	6590	7445	-	-										
E-E								137.00	368.0	363.0	50300	264	14.8000	✓			
	Min	4470	4860	7780	8885	-	-										
E-E								184	392	392	72300	357	30.8000	✓			
	Min	3505	3810	6000	6940	-	-										
U-I								245.0	645.0	645.0	158000	324	102.0000				
	Min	4280	4650	7440	-	-	-										
U-U								308.00	645.0	645.0	199000	975	168.0000				
	Min	3400	3650	5900	-	-	-										
E-E								274.00	738.0	692.0	202000	-	156.0000				
	Min	4670	5080	8120	-	-	-										

* F material nominal ± 25%

FIGURE 3

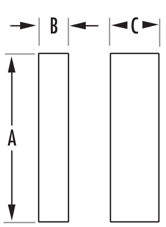


FIGURE 4

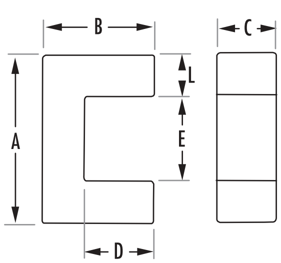
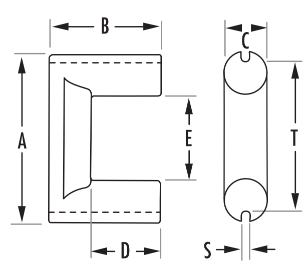


FIGURE 5



Bobbins

				MECHANICAL DIMENSIONS						NOMINAL WINDING AREA PER SECTION		AVERAGE LENGTH OF TURN FT	MATERIAL
PART	CORE SIZE	FIG.		A MAX	B MAX	C MAX	D MAX	E MIN	F NOM	in^2	cm^2		
00B120301	**41203EC**	**1**	mm	9.2964	-	7.874	4.5212	3.302	6.6294	0.02400	0.1580	0.089	Nylon*
			in	0.366	-	0.310	0.178	0.13	0.261				
00B120801	**41208EC**	**3**	mm	7.8232	9.525	10.668	4.50	9.58	2.870	0.02900	0.19	0.09	Glass filled
			in	0.308	0.375	0.420	0.177 min	0.377 nom	0.113 min				Nylon**
00B180801	**41808EC**	**1**	mm	13.843	-	11.049	6.477	4.953	9.525	0.05300	0.3420	0.131	Nylon*
			in	0.545	-	0.435	0.255	0.195	0.375				
00B18100A	**41810EC**	**4**	mm	13.716	18.415	10.922	9.7028	9.1694	4.953	0.04900	0.316	0.164	Glass filled
			in	0.540	0.725	0.43	0.382 min	0.361 nom	0.195 min				Nylon*
00B251001	**42510EC**	**1**	mm	18.4912	-	12.3444	8.4074	6.6294	10.3124	0.07900	0.510	0.184	Nylon*
			in	0.728	-	0.486	0.331	0.261	0.406				
00B251501	**42515EC**	**5**	mm	15.0876	15.0876	22.098	6.35	20.574	6.35	0.111	0.716	0.149	Glass filled
			in	0.594	0.594	0.870	0.250 min	0.810 nom	0.250 min				Nylon
00B300901	**43009EC**	**2**	mm	21.336	24.892	17.526	11.4808	9.6012	15.6464	0.13000	0.8390	0.226	Nylon*
			in	0.840	0.980	0.690	0.452	0.378	0.616				
00B351501	**43515EC**	**1**	mm	24.8412	-	18.923	11.9888	9.906	17.145	0.17500	1.130	0.236	Nylon*
			in	0.978	-	0.745	0.472	0.390	0.675				
00B402001	**44020EC**	**6**	mm	29.845	35.052	16.129	12.319	26.162	29.21	0.321	2.07	0.32	Glass filled
			in	1.175	1.380	0.635 min	0.485 min	1.030 nom	1.150				Nylon*
00B431701	**44317EC**	**1**	mm	28.0162	-	20.4724	14.605	12.827	18.9484	0.19500	1.260	0.277	Nylon*
			in	1.103	-	0.806	0.575	0.505	0.746				
00B472101	**44721EC**	**1**	mm	31.1912	-	23.5712	18.415	16.129	21.3868	0.21800	1.410	0.320	Nylon*
			in	1.228	-	0.928	0.725	0.635	0.842				
00B552801	**45528EC**	**6**	mm	36.576	42.037	21.209	17.399	36.576	33.528	0.438	2.830	0.400	Glass filled
			in	1.440	1.655	0.835 min	0.685 min	1.440	1.320				Nylon
00B572401	**45724EC**	**1**	mm	37.846	-	28.575	21.59	19.1262	26.543	0.332	2.14	0.388	Nylon*
			in	1.49	-	1.125	0.850	0.753	1.045				
00B722801	**47228EC**	**7**	mm	51.0794	51.0794	19.7612	19.7612	34.4678	30.4038	0.632	4.08	0.49	Zytel 50
			in	2.011	2.011	0.778 min	0.778 min	1.357	1.197				
00B802001	**48020EC**	**7**	mm	57.5818	57.5818	20.5486	20.5486	55.118	51.054	1.25	8.06	0.542	Zytel 50
			in	2.267	2.267	0.809 min	0.809 min	2.17	2.01				

* UL 94 HB rated
** UL 94 V-0 rated

Bobbins

FIGURE 1

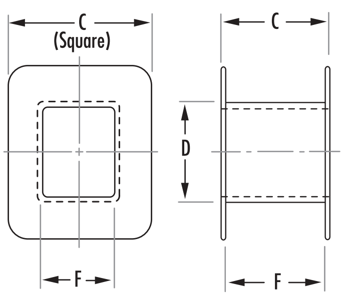


FIGURE 2

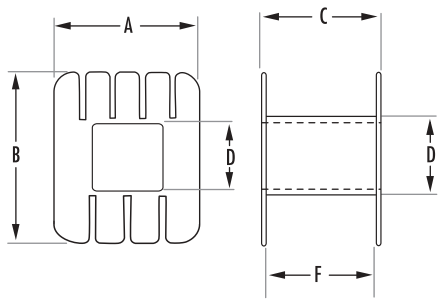


FIGURE 3

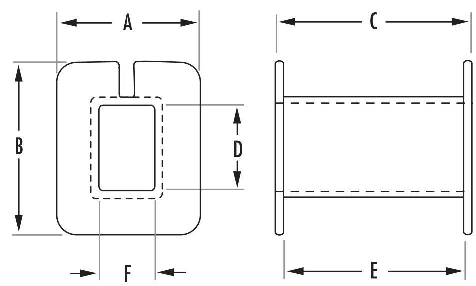


FIGURE 4

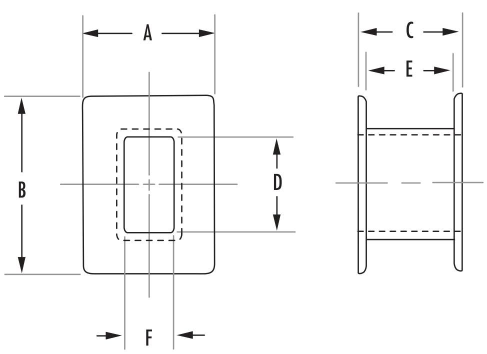


FIGURE 5

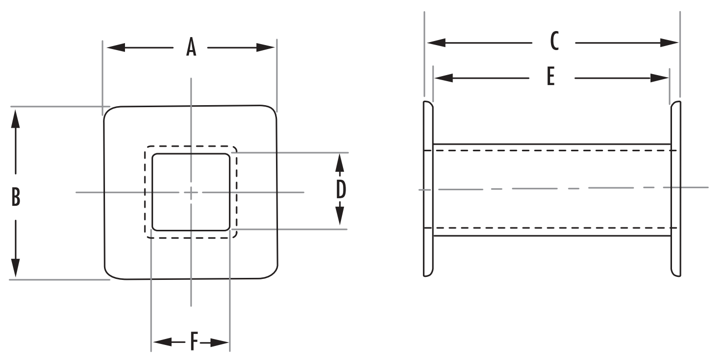


FIGURE 6

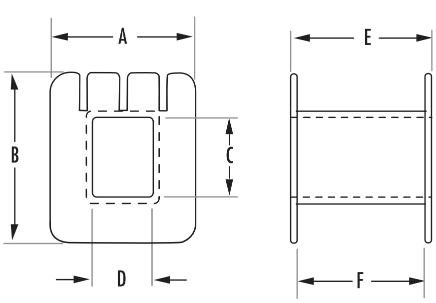
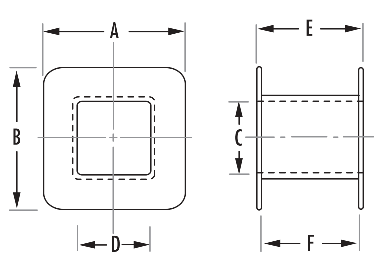


FIGURE 7



Printed Circuit Bobbins

MECHANICAL DIMENSIONS

PART	CORE SIZE	FIG.		A MAX	B MAX	C MAX	D MAX	E MIN	F MAX	G MIN	H NOM	J NOM	K MAX
PCB180881	**41808EC**	**1**	mm	13.843	16.129	17.399	7.315	4.953	19.177	4.191	3.810	5.080	11.049
			in	0.545	0.635	0.685	0.288	0.195	0.755	0.165	0.150	0.200	0.435
PCB180882	**41808EC**	**1**	mm	13.843	16.129	17.399	7.315	4.953	19.177	4.191	3.810	5.080	11.049
2 Section			in	0.545	0.635	0.685	0.288	0.195	0.755	0.165	0.150	0.200	0.435
PCB2510T1	**42510EC**	**2**	mm	18.669	20.371	20.955	8.890	6.629	26.289	4.191	3.810	5.080	12.319
			in	0.735	0.802	0.825	0.350	0.261	1.035	0.165	0.150	0.200	0.485
PCB2510T2	**42510EC**	**2**	mm	18.669	20.371	20.955	8.890	6.629	26.289	4.191	3.810	5.080	12.319
2 Section			in	0.735	0.802	0.825	0.350	0.261	1.035	0.165	0.150	0.200	0.485
PCB2520TA	**42520EC**	**5**	mm	26.289	21.209	13.335	6.680	18.542	27.940	12.369	10.668	15.748	3.429
			in	1.035	0.835	0.525 min	0.263 min	.730 nom	1.100 nom	.487 max	0.420	0.620	.135 nom
PCB3007T1	**43007EC**	**6**	mm	24.003	32.080	7.442	7.442	18.796	18.796	19.050	17.272	25.400	3.048
			in	0.945	1.263	0.293 min	0.293 min	0.740 nom	0.740 nom	0.750 max	0.680	1.000	0.120
PCB3009LA	**43009EC**	**4**	mm	21.387	26.035	30.734	12.192	9.652	33.909	5.080	5.080	-	17.145
			in	0.842	1.025	1.210	0.480	0.380	1.335	0.200	0.200	-	0.675
PCB3515L1	**43515EC**	**3**	mm	25.146	25.527	27.483	12.014	9.677	37.465	4.191	3.810	5.080	18.593
			in	0.990	1.005	1.082	0.473	0.381	1.475	0.165	0.150	0.200	0.732
PCB3515L2	**43515EC**	**3**	mm	25.146	25.527	27.483	12.014	9.677	37.465	4.191	3.810	5.080	18.593
2 Section			in	0.990	1.005	1.082	0.473	0.381	1.475	0.165	0.150	0.200	0.732

FIGURE 1

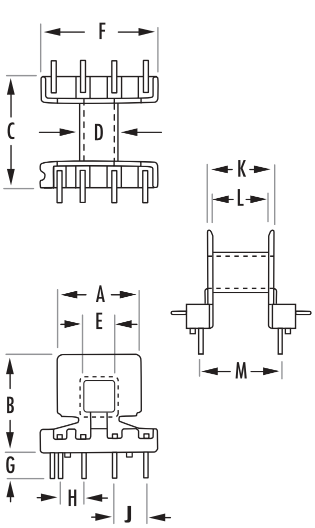


FIGURE 2

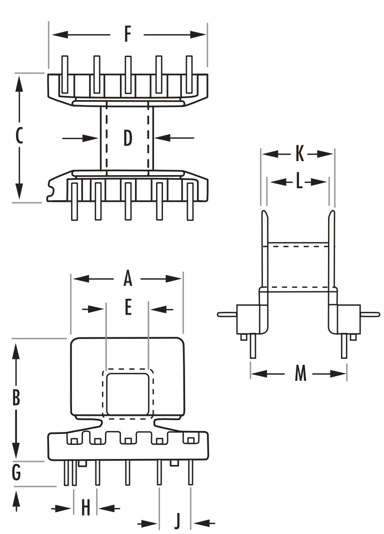
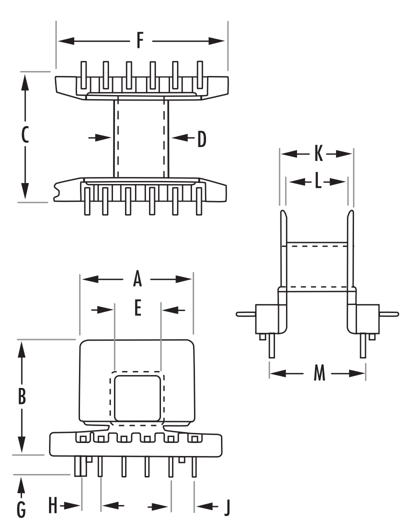


FIGURE 3



Printed Circuit Bobbins

MECHANICAL DIMENSIONS						NOMINAL WINDING AREA PER SECTION		AVERAGE LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL	PIN DIAMETER
PART	CORE SIZE	FIG.		L NOM	M NOM	in^2	cm^2				
PCB180881	**41808EC**	**1**	mm	9.322	13.081	0.049	0.316	0.133	Glass filled Nylon*	Phosphor Bronze	.025" square
			in	0.367	0.515						
PCB180882	**41808EC**	**1**	mm	9.322	13.081	0.049	0.316	0.133	Glass filled Nylon*	Phosphor Bronze	.025" square
2 Section			in	0.367	0.515						
PCB2510T1	**42510EC**	**2**	mm	10.262	15.621	0.063	0.406	0.178	Glass filled Nylon*	Phosphor Bronze	.025" square
			in	0.404	0.615						
PCB2510T2	**42510EC**	**2**	mm	10.262	15.621	0.063	0.406	0.178	Glass filled Nylon*	Phosphor Bronze	.025" square
2 Section			in	0.404	0.615						
PCB2520TA	**42520EC**	**5**	mm	-	-	0.098	0.630	0.225	PET Polyester		.025" square
			in	-	-						
PCB3007T1	**43007EC**	**6**	mm	5.080	-	0.129	0.833	0.180	Thermoset Phenolic		.030"
			in	0.200	-						
PCB3009LA	**43009EC**	**4**	mm	14.732	22.860	0.111	0.714	0.218	DAP**	Alloy 510 tin plated	.036" square
			in	0.580	0.900						
PCB3515L1	**43515EC**	**3**	mm	16.510	21.895	0.147	0.948	0.241	Glass filled Nylon*	Phosphor Bronze	.025" square
			in	0.650	0.862						
PCB3515L2	**43515EC**	**3**	mm	16.510	21.895	0.147	0.948	0.241	Glass filled Nylon	Phosphor Bronze	.025" square
2 Section			in	0.650	0.862						

* UL 94 HB rated
** UL 94 V-0 rated

FIGURE 4

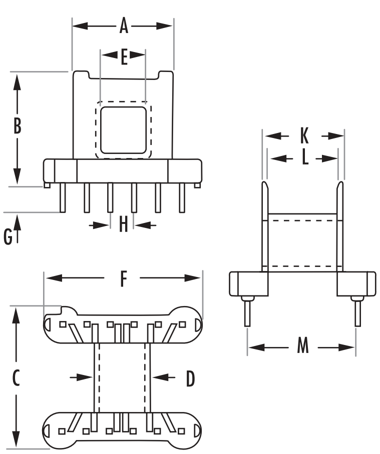


FIGURE 5

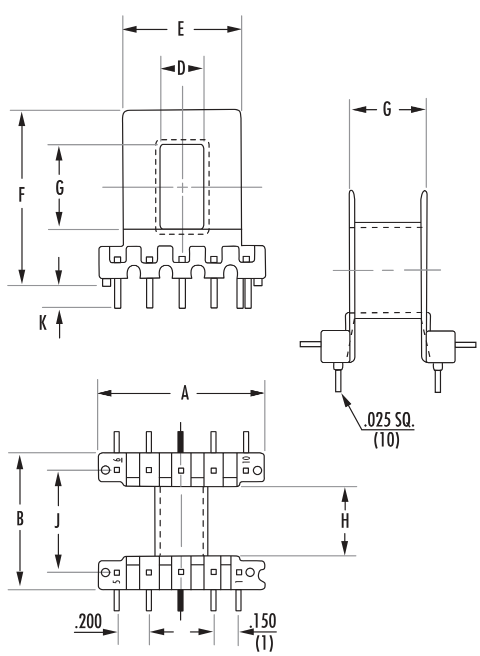
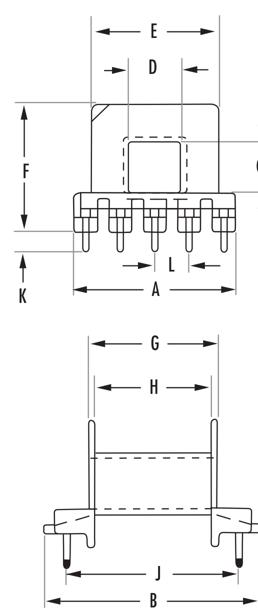


FIGURE 6



Printed Circuit Bobbins (con't)

MECHANICAL DIMENSIONS													
PART	**CORE SIZE**	**FIG.**		**A MAX**	**B MAX**	**C MAX**	**D MAX**	**E MIN**	**F MAX**	**G MIN**	**H NOM**	**J NOM**	**K MAX**
PCB4020L1	**44020EC**	**7**	mm	46.609	37.313	15.748	12.167	28.524	38.735	29.718	27.686	7.620	5.080
			in	1.835	1.469	0.620 min	.479 min	1.123 nom	1.525 nom	1.170 nom	1.090	0.300	0.200nom
PCB4022L1	**44022EC**	**8**	mm	46.609	42.393	20.447	12.167	28.448	42.428	29.718	27.432	7.620	-
			in	1.835	1.669	.805 min	.479 min	1.120 nom	1.670 nom	1.170 nom	1.080	0.300	-
PCB4317L1	**44317EC**	**3**	mm	28.067	28.829	29.210	15.265	12.827	41.402	4.318	5.080	6.350	20.320
			in	1.105	1.135	1.15	0.601	0.505	1.63	0.17	0.200	0.250	0.800
PCB4317L2	**44317EC**	**3**	mm	28.067	28.829	29.210	15.265	12.827	41.402	4.318	5.080	6.350	20.32
2 Section			in	1.105	1.135	1.15	0.601	0.505	1.63	0.17	0.200	0.250	0.800
PCB4721L1	**44721EC**	**3**	mm	31.369	32.131	32.893	18.415	16.129	44.577	4.445	5.080	7.620	23.49
			in	1.235	1.265	1.295	0.725	0.635	1.755	0.175	0.200	0.300	0.925
PCB4721L2	**44721EC**	**3**	mm	31.369	32.131	32.893	18.415	16.129	44.577	4.445	5.080	7.620	23.495
2 Section			in	1.235	1.265	1.295	0.725	0.635	1.755	0.175	0.200	0.300	0.925
PCB5528WA	**45528EC**	**9**	mm	54.991	51.181	21.133	17.120	37.033	50.292	36.068	35.560	45.720	4.064
			in	2.165	2.015	0.832 min	0.674 min	1.458 nom	1.98 nom	1.42 nom	1.400	1.800	0.160
PCB5530FA	**45530EC**	**10**	mm	37.160	40.157	27.737 min	17.551 min	37.008	49.403	35.611	33.401	40.005	4.496
			in	1.463	1.581	1.092	0.691	1.457 nom	1.945 nom	1.402	1.315	1.575	0.177
PCB5724L1†	**45724EC**	**3**	mm	37.719	39.243	38.227	21.514	19.279	44.577	4.394	5.080	7.620	28.321
			in	1.485	1.545	1.505	0.847	0.759	1.755	0.173	0.200	0.300	1.115

† This bobbin has no standoff

FIGURE 3

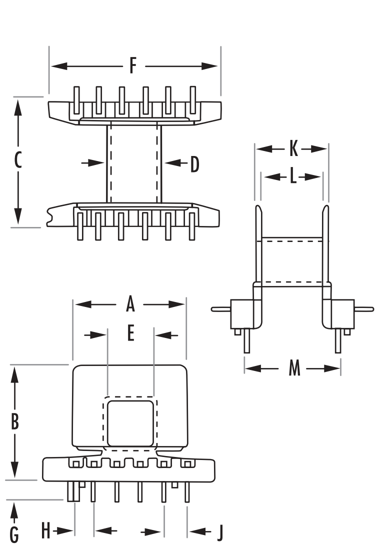


FIGURE 7

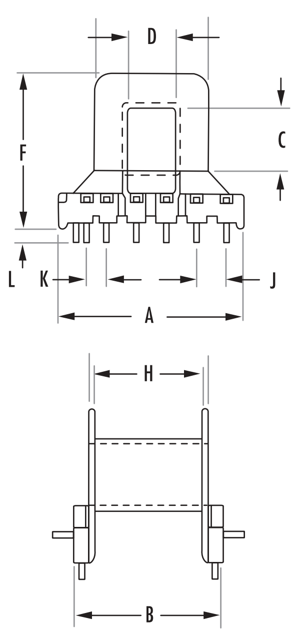
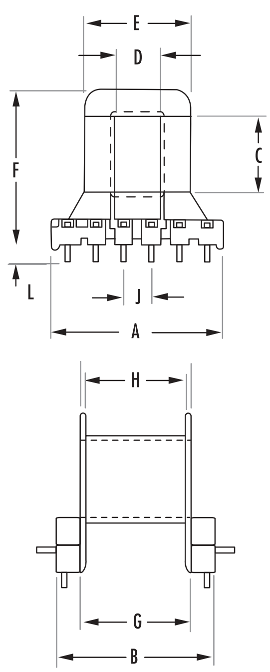


FIGURE 8



Printed Circuit Bobbins (con't)

MECHANICAL DIMENSIONS						NOMINAL WINDING AREA PER SECTION		AVERAGE LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL	PIN DIAMETER
PART	CORE SIZE	FIG.		L NOM	M NOM	in^2	cm^2				
PCB4020L1	**44020EC**	**7**	mm	3.810	-	0.300	1.940	0.300	Rynite FR-530**		.036" square
			in	0.150	-						
PCB4022L1	**44022EC**	**8**	mm	4.572	-	0.300	1.940	0.335	Rynite FR-530**		.036" square
			in	0.180	-						
PCB4317L1	**44317EC**	**3**	mm	18.110	24.130	0.156	1.010	0.281	Rynite	Phosphor Bronze	.025" square
			in	0.713	0.950						
PCB4317L2	**44317EC**	**3**	mm	18.110	24.130	0.156	1.010	0.281	Rynite	Phosphor Bronze	.025" square
2 Section			in	0.713	0.950						
PCB4721L1	**44721EC**	**3**	mm	21.082	27.940	0.185	1.193	0.325	Glass filled Nylon*	Phosphor Bronze	.025 " square
			in	0.830	1.100						
PCB4721L2	**44721EC**	**3**	mm	21.082	27.940	0.185	1.193	0.325	Glass filled Nylon*	Phosphor Bronze	.025 " square
2 Section			in	0.830	1.100						
PCB5528WA	**45528EC**	**9**	mm	52.070	-	0.468	3.020	0.352	Glass filled Nylon**		.036" square
			in	2.050	-						
PCB5530FA	**45530EC**	**10**	mm	37.008	-	0.448	2.890	0.439	Glass filled Nylon**		.035"
			in	1.457	-						
PCB5724L1†	**45724EC**	**3**	mm	26.162	33.020	0.293	1.890	0.386	Glass filled Nylon*		.035" square
			in	1.030	1.300						

† This bobbin has no standoff * UL 94 HB rated ** UL 94 V-O rated.

FIGURE 9

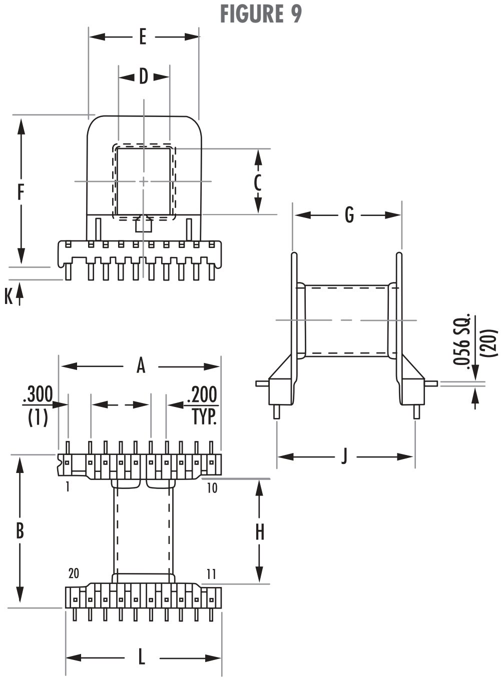
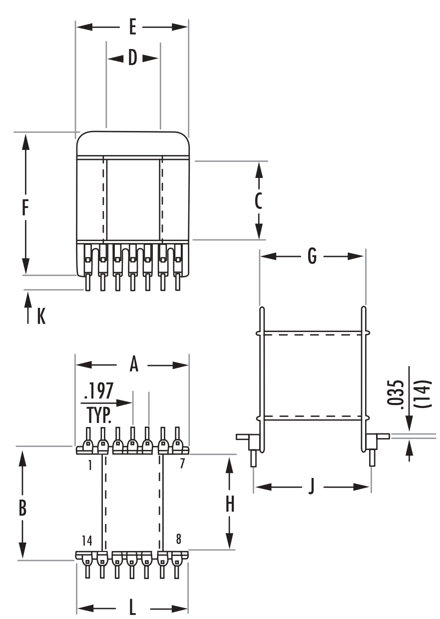


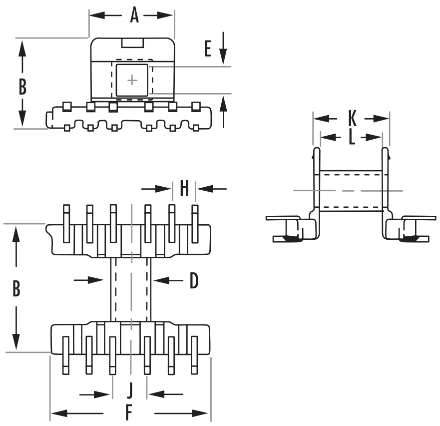
FIGURE 10



Surface Mount Bobbins

MECHANICAL DIMENSIONS												
PART	CORE SIZE	FIG.		A MAX	B MAX	C MAX	D MAX	E MIN	F MAX	G MIN	H NOM	J NOM
SMB1203LA	41203EC	1	mm	9.119	10.490	14.072	4.496	3.302	17.221	-	2.540	3.810
			in	0.359	0.413	0.554	0.177	0.130	0.678	-	0.100	0.150

FIGURE 1



Surface Mount Bobbins

				MECHANICAL DIMENSIONS		NOMINAL WINDING AREA PER SECTION		AVERAGE LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL	PIN DIAMETER
PART	CORE SIZE	FIG.		K MAX	L NOM	in^2	cm^2				
SMB1203LA	41203EC	1	mm	7.925	6.909					Phosphor	
			in	0.312	0.272	0.025	0.162	0.087	LCP**	Bronze	.020” square

** UL 94 V-0 rated

Planar Core Data (ungapped)

Any practical gap available. See pages 1.8-1.11

MECHANICAL DIMENSIONS											
PART	CORE TYPE	FIG.		A	B	C	D MIN	E MIN	F	L	M
0_41425EC		**6**	mm	14 ± .30	2.5 ± .10	5 ± .15	0.9	10.5	3 ± .10	1.5	4
			in	0.551 ± .012	.098 ± .004	.197 ± .006	0.035	0.414	.118 ± .004	.059 ref	.1575 ref
C_41434EC*	E14	**1**	mm	14 ± .30	3.5 ± .10	5 ± .15	1.91	10.5	3 ± .10	1.5	4
			in	.555 ± .012	0.138 ± .004	.197 ± .006	0.075	0.414	.118 ± .004	.059 ref	.1575 ref
C_41434IC	I14	**3**	mm	14 ± .30	1.8 ± .05	5 ± .15					
			in	.551 ± .012	.071 ± .002	.197 ± .006					
C_41805EC*	E18	**1**	mm	18 ± .35	4 ± .1	10 ± .20	2 ± .1	13.7	4 ± .1	2.0 ref	5.0 ref
C_41805IC	I18	**3**	mm	18 ± .41	2.39 ± .10	10 ± .20					
			in	.709 ± .016	.094 ± .004	.394 ± .008					
0_42107EC		**6**	mm	21.8 ± .43	3.91 ± .08	7.8 ± .51	1.52	16.5	5 ± .20	2.5 ± .12	5.89 ± .25
			in	.858 ± .017	.154 ± .003	.307 ± .020	0.06	0.649	.197 ± .008	.0985 ± .005	.232 ± .010
C_42216EC*	E22	**1**	mm	21.8 ± .400	5.72 ± .12	15.8 ± .30	3.05	16.1	5.08 ± .12	2.54 ref	5.7 ref
			in	.850 ± .010	.225 ± .005	.625 ± .010	0.12	0.632	.200 ± .005	.100 ± .005	.225 ± .012
C_42216IC	I22	**3**	mm	21.8 ± .400	2.95 ± .10	15.9 ± .25					
			in	.850 ± .010	.116 ± .004	.625 ± .010					
F_43208EC	E32	**1**	mm	31.75 ± .640	6.35 ± .130	20.32 ± .41	2.98	24.9	6.35 ± .130	3.18	9.27
			in	1.250 ± .020	.250 ± .008	.800 ± .016	0.12	0.98	.250 ± .005	.125 ref	.365 min
F_43208IC	I32	**2**	mm	31.75 ± .64	3.18 ± .13	20.32 ± .41					
			in	1.250 ± .020	.125 ± .005	.800 ± .016					
0_43618EC		**7**	mm	35.56 ± .51	6.35 ± .12	17.8 ± .38	2.41	27.2	7.62 ± .18	3.81 ± .12	10.16 ± .25
			in	1.400 ± .020	.250 ± .005	.700 ± .015	0.095	1.070	.300 ± .007	.150 ± .005	.400 ± .010
0_43618IC		**8**	mm	36.58 ± .51	3.81 ± .25	18.29 ± .38					
			in	1.440 ± .020	.150 ± .010	.720 ± .015					
F_43808EC	E38	**1**	mm	38.1 ± .76	8.26 ± .13	25.4 ± .51	4.32	30.2	7.62 ± .15	3.81	11.43
			in	1.500 ± .030	.325 ± .005	1.000 ± .020	0.170	1.190	.300 ± .008	.150 ref	.450 ref

To order, add material code to part number.
* All E-cores available with clamp recesses are also available without. NOTE: Clamps are available for the EI combination of parts 41434, 41805 and 42216 only.

FIGURE 1

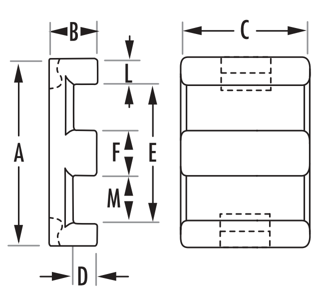


FIGURE 2

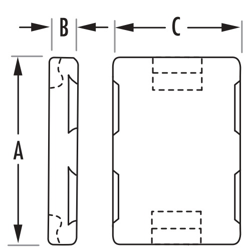
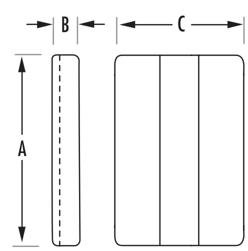


FIGURE 3



Planar Core Data (ungapped)

COMB.		A_L (mH/1000T) POWER MATERIALS R	P	F*	HIGH PERMEABILITY MATERIALS J	W	MAGNETIC DATA l_e (mm)	A_e (mm^2)	A MIN (mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	BOBBIN WINDOW AREA (cm^2)	WaAc (cm^4)	MOUNTING CLAMP AVAILABLE HARDWARE
E-E							16.7	14.7	14.7	244	1.2	0.064	0.0090	
	Min	1240	1350	2150	2650	4260		14.7	14.7	244.0				
E-E							20.7	14.66	14.66	303.9	1.5	0.128	0.019	
	Min	1000	1080	1730	2140	3420	1.47	14.7	30.4					
E-I							16.7	14.7	14.7	245.0	1.2	0.064	0.009	✓
	Min	1330	1450	2320	2880	-								
E-E							24.2	40.1	39.9	972	4.9	0.16	0.064	
	Min	2520	2740	4380	5470	-								
E-I							20.3	39.5	35.9	830	4.1	0.08	0.032	✓
	Min	3000	3260	5210	6450	-								
E-E							25.7	37.1	36.0	960.0	4.2	0.15	0.056	
	Min	2190	2380	3810	4350	8260								
E-E							32.3	76.0	73.n					
	Min	3590	3905	6250	8640	13300								
E-I							26.1	80.4	72.5	2100	10.4	0.15	0.12	✓
	Min	4467	4858	7776	10750	-								
E-E							41.4	130.0	130.0	5380	26	0.51	0.66	
	Min	5025	5465	8744	10930	-								
E-I							35.1	130.0	130.0	4560	22	0.25	0.33	
	Min	5930	6446	10313	12892	-								
E-E							42.4	135.0	135.0	5750.0	28	0.412	0.556	
	Min	5170	5640	9020	-	-								
E-I							37.4	135.0	135.0	5060.0	25	0.206	0.278	
	Min	5870	6400	10250	12760	21600								
E-E							52.4	194.0	194.0	10200	50.9	0.813	1.56	
	Min	5900	6430	10300	-	-								

* F material nominal ± 25%

FIGURE 6

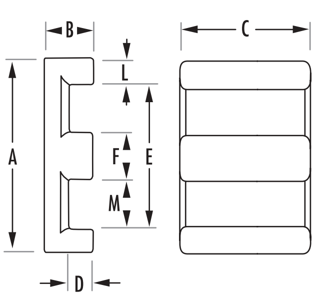


FIGURE 7

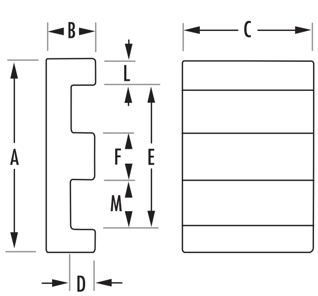
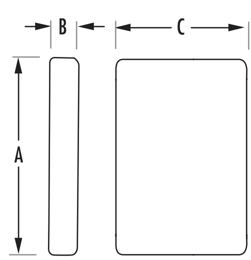


FIGURE 8



Planar Core Data (ungapped)

Any practical gap available. **See pages 1.8-1.11**

MECHANICAL DIMENSIONS											
PART	CORE TYPE	FIG.		A	B	C	D MIN	E MIN	F	L	M
F_43808IC	I38	**2**	mm	38.1 ± .76	3.81 ± .13	25.4 ± .51					
			in	1.500 ± .030	.150 ± .005	1.000 ± .020					
0_44008EC		**7**	mm	40.64 ± .51	8.51 ± .25	10.7 ± .25	3.56	29.8	10.16 ± .12	5.08 ± .12	10.16
			in	1.600 ± .020	.335 ± .010	.421 ± .010	0.140	1.175	.400 ± .005	.200 ± .005	.400 nom
0_44008IC		**8**	mm	40.64 ± .51	4.45 ± .25	10.7 ± .25					
			in	1.600 ± .020	.175 ± .010	.421 ± .010					
0_44308EC		**7**	mm	43.2 ± .9	8.51 ± .25	27.9 ± .6	4.19	34.7	8.1 ± .2	4.06 ref	13.46 ref
0_44308IC		**8**	mm	43.2 ± .9	4.1 ± .13	27.9 ± .6					
F_44310EC	E43	**1**	mm	43.18 ± .51	9.53 ± .12	27.9 ± .38	5.33	34.4	8.13 ± .25	4.06 ± .25	13.46 ± .25
			in	1.700 ± .020	0.375 ± .005	1.100 ± .015	0.21	1.355	.320 ± .010	.160 ± .010	.530 ± .010
F_44310IC	I43	**2**	mm	43.18 ± .51	4.06 ± .12	27.9 ± .38					
			in	1.700 ± .020	.160 ± .005	1.100 ± .015					
C_45810EC*	E58	**4**	mm	58.42 ± 1.17	10.54 ± .20	38.1 ± .78	6.35	50.39	8.1 ± .20	3.66	21.5 ± .25
			in	2.300 ± .046	.415 ± .008	1.500 ± .031	0.25	1.984	.319 ± .008	.144 ref	.8465 ± .010
C_45810IC	I58	**5**	mm	58.42 ± 1.17	4.04 ± .12	38.1 ± .78					
			in	2.300 ± .046	.159 ± .005	1.500 ± .031					
0_46409EC		**7**	mm	64 ± .76	9.65 ± .12	50.8 ± .64	4.45	52.8	10.16 ± .18	5.08 ± .12	21.8 ± .25
			in	2.520 ± .030	.380 ± .005	2.000 ± .025	0.175	2.08	.400 ± .007	.200 ± .005	.860 ± .010
C_46410EC*	E64	**4**	mm	64 ± .76	10.2 ± .10	50.8 ± .81	5.03	53.16	10.16 ± .18	5.08 ± .12	21.8 ± .25
			in	2.520 ± .030	.402 ± .004	2.000 ± .032	0.198	2.093	.400 ± .007	.200 ± .005	.860 ± .010
C_46410IC	I64	**5**	mm	64 ± .76	5.08 ± .12	50.8 ± .81					
			in	2.520 ± .030	.200 ± .005	2.000 ± .032					
0_49938EC	E102	**7**	mm	102 ± 1.52	20.3 ± .25	37.5 ± .56	12.9	85	14 ± .25	8 ± .25	35.9 ± .51
			in	4.016 ± .060	.800 ± .010	1.476 ± .022	0.507	3.346	.551 ± .010	.315 ± .010	1.415 ± .020

To order, add material code to part number.
* All E-cores available with clip recesses are also available without. NOTE: Clips are available for the EI combination of parts 41434, 41805 and 42216 only.

FIGURE 1

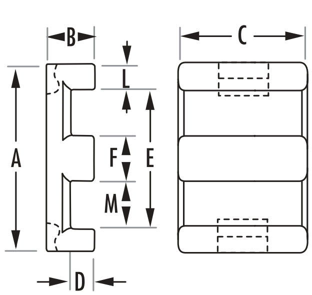


FIGURE 2

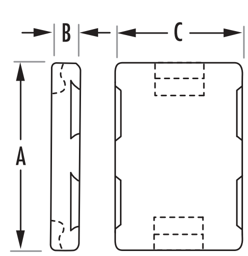
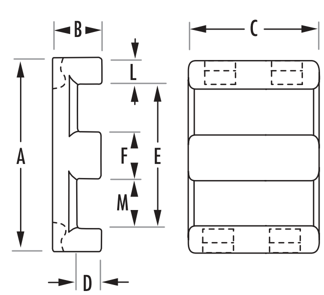


FIGURE 4



Planar Core Data (ungapped)

		A_L (mH/1000T)												
		POWER MATERIALS			HIGH PERMEABILITY MATERIALS		MAGNETIC DATA							MOUNTING CLAMP
COMB.		R	P	F*	J	W	l_e (mm)	A_e (mm^2)	A MIN (mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	BOBBIN WINDOW AREA (cm^2)	WaAc (cm^4)	AVAILABLE HARDWARE
E-I	Min	7100	7730	12400	-	-	43.7	194.0	194.0	8460	42.5	0.406	0.78	
E-E	Min	3150	3430	5488	6860	-	51.9	101.0	95.1	5220.0	26	0.66	0.667	
E-I	Min	3690	4013	6421	8026	-	43.8	99.5	95.1	4360.0	21	0.33	0.328	
E-E	Min	6420	6982	11172	13966	-	57.5	227.0	227.0	13100.0	64	0.96	2.18	
E-I	Min	7600	8261	13200	16400	-	50.4	229.0	229.0	11500	54	0.48	1.09	
E-E	Min	6000	6530	10450	13000	22800	61.5	227.0	227.0	14000.0	70.6	1.18	2.68	
E-I	Min	7350	8000	12800	15900	27900	50.6	227.0	227.0	11500.0	58	0.588	1.34	
E-E	Min	6030	6550	10500	12100	-	81.2	301.0	279.0	24600.0	125	2.5	7.53	✓
E-I	Min	7210	7840	12500	14500	-	68.3	303.0	279.0	20700.0	105	1.25	3.79	✓
E-E	Min	11500	12500	20000	22000	38500	77.4	516.0	516.0	40000.0	200	1.78	9.18	
E-E	Min	11100	12100	19400	21200	37200	80.2	516.0	516.0	41400.0	195	2.02	10.4	✓
E-I	Min	12800	13900	22200	24100	42200	69.9	516.0	516.0	36100.0	170	1.01	5.21	✓
E-E	Min	6330	6880	11000	-	-	148.0	540.0	525.0	79800.0	400	8.5	46	

* F material nominal ± 25%

FIGURE 5

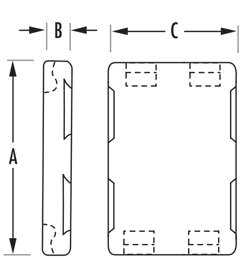


FIGURE 7

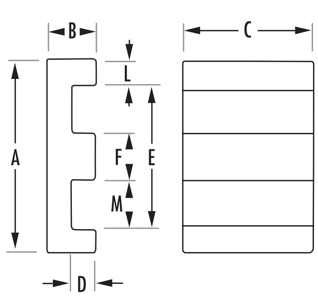
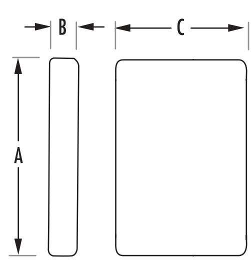


FIGURE 8



Clamps

MECHANICAL DIMENSIONS									
PART	CORE SIZE	FIG.		A	B	C	D	E	MATERIAL
00C143420	41434EC/IC	1	mm	14	5.4	2.21	13.59	0.3048	Stainless Steel
			in	.551 ± .020	.2126 ± .004	0.087	.535 ± .015	0.012	
00C180520	41805EC/IC	1	mm	18.01	6.61	2.2098	17.6	0.4064	Stainless Steel
			in	0.709 ± .008	.260 ± .004	0.087	.693 ± .020	0.016	
00C221620	42216EC/IC	3	mm	22.2	8.74	2.4892	21.4122	0.4064	Stainless Steel
			in	0.874 ± .008	.3425 ± .004	0.098	0.843	0.016	

FIGURE 1

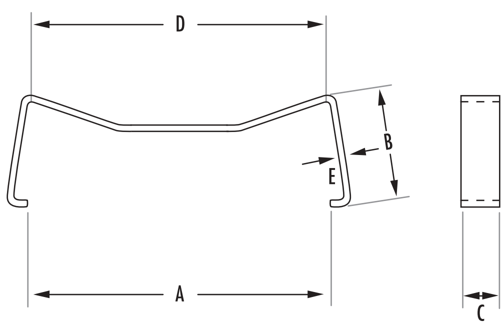
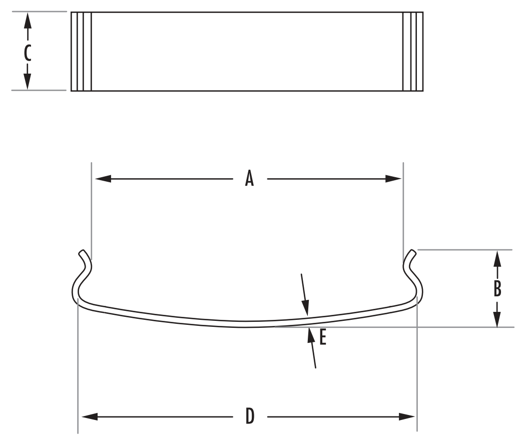


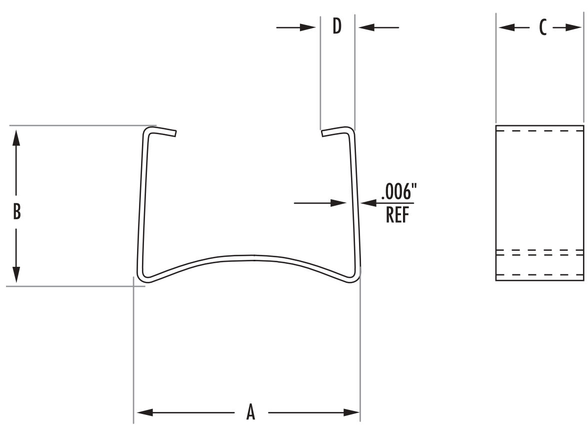
FIGURE 2



Clamps

MECHANICAL DIMENSIONS									
PART	CORE SIZE	FIG.		A	B	C	D	E	MATERIAL
00C581001	45810EC/EC	2	mm	18.24	4.57	4.5	19.87	0.381	Stainless Spring Steel
			in	.718 ± .006	.180 ref	.177 ± .004	.782 ± .006	.015 ± .001	
00C581002	45810EC/IC	2	mm	11.61		4.5	13.23	0.381	Stainless Spring Steel
			in	.457 ± .006		0.177	.521 ± .006	.015 ± .001	
00C641001	46410EC/EC	2	mm	17.58	4.57	4.5	9.2	0.381	Stainless Spring Steel
			in	.692 ± .006	.180 ref	.177 ± .004	.756 ± .006	.015 ± .001	
00C641002	46410EC/IC	2	mm	11.86	4.57	4.5	13.72	0.381	Stainless Spring Steel
			in	.467 ± .006	.180 ref	.177 ± .004	.540 ± .006	.015 ± .001	

FIGURE 3



EEM/EFD Core Data (ungapped)

Any practical gap available. See pages 1.8-1.11

				MECHANICAL DIMENSIONS								
PART	CORE TYPE	FIG.		A	B	C	D MIN	E MIN	F	K	L	M
0_41309EC	EEM 12.7	2	mm	12.8 ± .25	6.86 ± .15	3.3 ± .15	4.42	9.22	6 ± .10	1.85 ± .10	1.68 ± .08	1.7 ± .15
			in	.502 ± .010	.270 ± .006	.130 ± .006	0.174	0.363	.236 ± .004	.073 ± .004	.066 ± .003	.067 ± .006
0_41515EC	EFD 15	3	mm	15.5 ± .4	7.5 ± .15	4.65 ± .15	5.25	10.65	5.3 ± .15	2.4 ± .10		
0_41709EC		1	mm	17.8 ± .30	9.4 ± .12	4.32 ± .25	6.73	12.3	7.11 ± .18	2.54 ± .18	2.54 ± .18	2.79 ± .18
			in	.700 ± .012	.370 ± .005	.170 ± .010	0.265	0.485	.280 ± .007	.100 ± .007	0.100 ± .007	.110 ± .007
0_42523EC	EFD 25	4	mm	25 ± .66	12.5 ± .15	9.1 ± .20	9.1	18.1	11.4 ± .20	5.2 ± .15	3.15 ± .20	3.65 ± .20
			in	.984 ± .026	.492 ± .006	.358 ± .008	0.358	0.712	.448 ± .008	.205 ± .006	.124 ± .008	.144 ± .008

To order, add material code to part number.

EEM/EFD Core Data (ungapped)

A_L (mH/1000T)

	POWER MATERIALS			HIGH PERMEABILITY MATERIALS		MAGNETIC DATA							AVAILABLE HARDWARE		
	R	P	F*	J	W	l_e (mm)	A_e (mm^2)	AMIN(mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	BOBBIN WINDOW AREA (cm^2)	WaAc (cm^4)	SURFACE MOUNT BOBBIN	PRINTED CIRCUIT BOBBIN	MOUNTING CLAMP
Nom						28.5	11.7	11.1	330.0	1.6	0.124	0.015			
Min	600	650	1000	1080	-										
Nom						34.0	15.0	12.2	510.0	2.8	0.167	0.025	✓	✓	✓
Min	670	730	1170	1450	2150										
Nom						41.5	20.1	18.1	834.0	4.1	0.27	0.054			
Min	740	800	1280	1600	-										
Nom						57.0	58.0	55.0	3300.0	16.2	0.402	0.233		✓	✓
Min	1570	1710	2730	3380	5820										

* F material nominal ± 25%

FIGURE 1

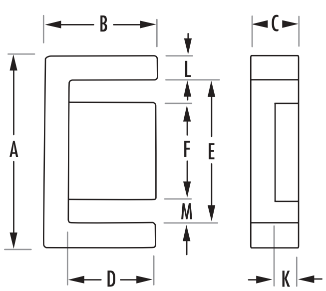


FIGURE 2

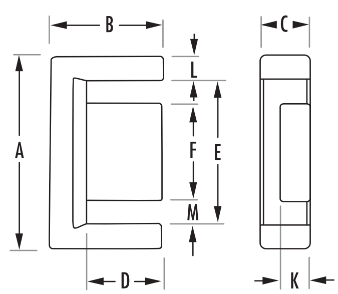


FIGURE 3

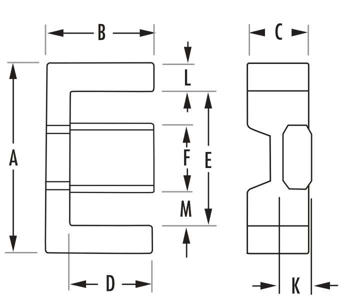
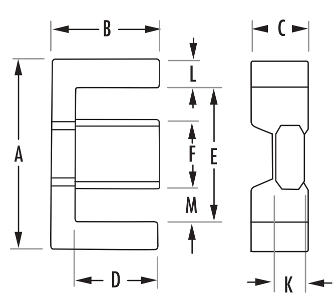


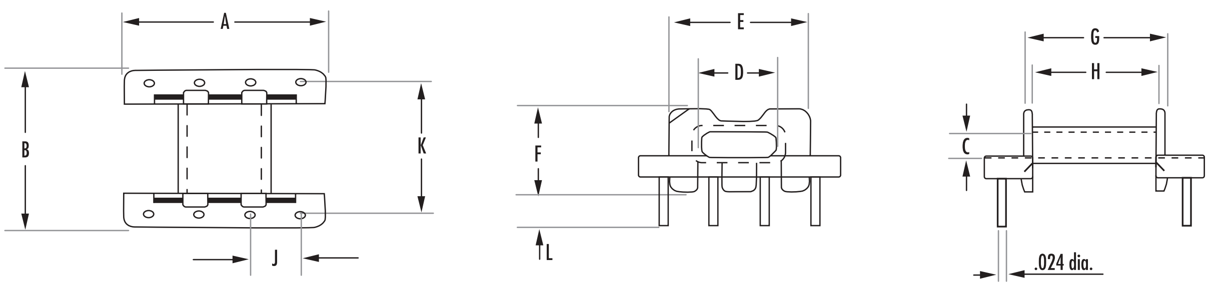
FIGURE 4



Printed Circuit Bobbins

MECHANICAL DIMENSIONS												
PART	CORE SIZE	FIG.		A NOM	B NOM	C MIN	D MIN	E MAX	F NOM	G MAX	H NOM	J TYP
PCB15158A	**41515EC**	**1**	mm	14.986	16.3068	2.4892	5.4356	10.5918	8.509	10.5918	9.1948	3.7592
			in	0.590	0.642	0.098	0.214	0.417	0.335	0.417	0.358	0.148
PCB2523TA	**42523EC**	**2**	mm	24.9936	25.8572	5.3848	11.6078	18.1102	13.208	18.0086	16.6878	5.0038
			in	0.984	1.018	0.212	0.457	0.713	0.520	0.709	0.657	0.197

FIGURE 1

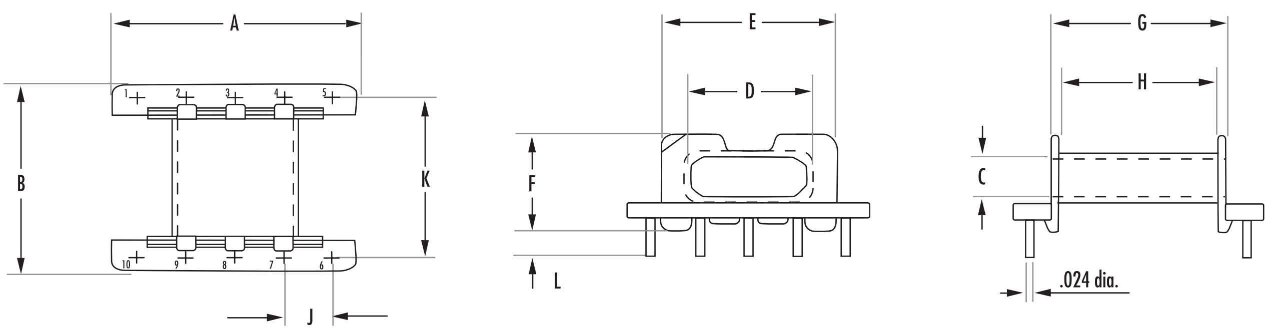


Printed Circuit Bobbins

MECHANICAL DIMENSIONS						NOMINAL WINDING AREA PER SECTION		AVERAGE LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL	PIN DIAMETER
PART	CORE SIZE	FIG.		K NOM	L±.012″	in^2	cm^2				
PCB15158A	**41515EC**	**1**	mm	13.7414	3.5052	0.026	0.169	0.118	Phenolic*	CP Wire	.024″
			in	0.541	0.138						
PCB2523TA	**42523EC**	**2**	mm	22.5044	3.5052	0.065	0.412	0.196	Phenolic*	CP Wire	.024″
			in	0.886	0.138						

* UL 94 V-0 rated

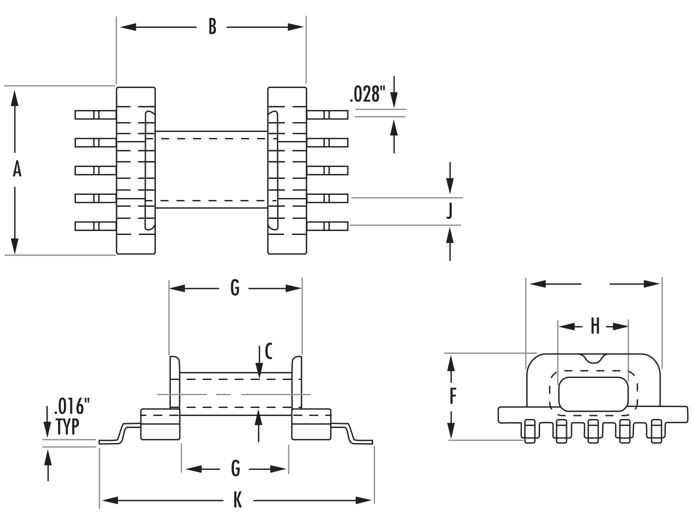
FIGURE 2



Surface Mount Bobbins

MECHANICAL DIMENSIONS												
PART	CORE SIZE	FIG.		A NOM	B NOM	C MIN	D MIN	E MAX	F NOM	G MAX	H NOM	J TYP
SMB1515TA	**41515EC**	**1**	mm	14.986	14.986	2.4892	5.3848	10.6934	7.493	10.4902	8.89	2.4892
			in	0.590	0.590	0.098	0.212	0.421	0.295	0.413	0.350	0.098

FIGURE 1



Surface Mount Bobbins

MECHANICAL DIMENSIONS					NOMINAL WINDING AREA PER SECTION		AVERAGE LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL	PIN DIAMETER
PART	CORE SIZE	FIG.		K NOM	in^2	cm^2				
SMB1515TA	41515EC	1	mm	21.59	0.027	0.175	0.12	L.C.P.*	Nickel Bronze	.016"
			in	0.850						

* UL 94 V-0 rated

Clamps

MECHANICAL DIMENSIONS								
PART	**CORE SIZE**	**FIG.**		**A**	**B**	**C**	**D**	**MATERIAL**
00C15151A*	**41515EC**	**1**	**mm**	4.4958	5.207	18.796	0.254	Stainless Steel
			in	0.177	0.205	0.740	0.010	
00C25231A*	**42523EC**	**2**	**mm**	8.001	5.3848	29.0068	0.3048	Stainless Steel
			in	0.315	0.212	1.142	0.012	

*Two clamps required per core set

FIGURE 1

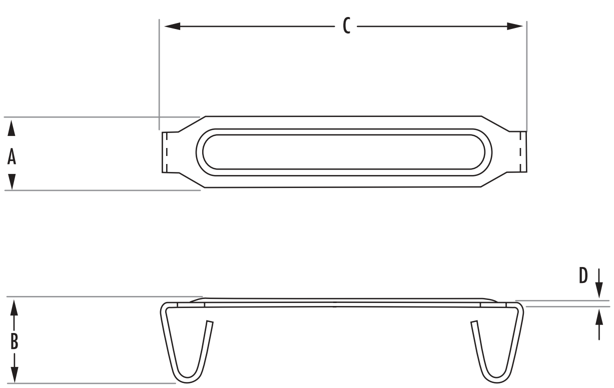
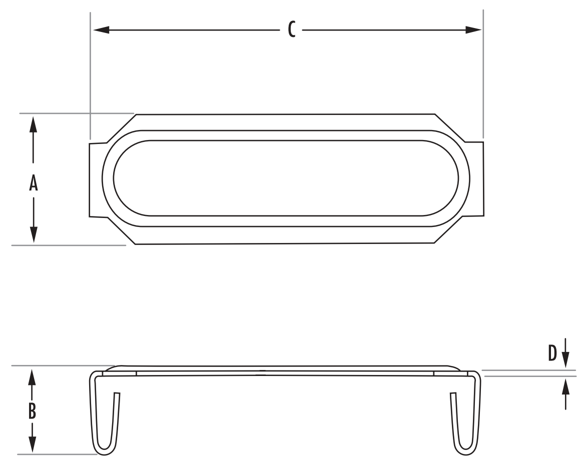


FIGURE 2



EC, ETD, EER and ER Cores

EC, ETD, EER AND ER CORES

EC, ETD and EER cores are a cross between E cores and pot cores. Like E cores they provide a wide opening on each side. This gives adequate space for the large size wire required for low output voltage switched mode power supplies. It also allows for a flow of air which keeps the assembly cooler.

The center posts of these cores are round, like that of the pot core. One of the advantages of the round center post is that the winding has a shorter path length (11% shorter) than the wire around a square center post with an equal area. This reduces the losses of the windings by 11% and enables the core to handle a higher output power. The round center post also eliminates the sharp bend in the wire that occurs with winding on a square center post. The most common application is switched mode power supplies.

HOW TO ORDER

O R 4 34 34 EC XX

- O – STANDARD CORE
- R – FERRITE CORE MATERIAL TYPE
- 4 – USED FOR ALL FERRITE TYPES
- 34 – APPROXIMATE DIAMETER IN MM
- 34 – APPROXIMATE HEIGHT IN MM
- EC – GEOMETRY CODE/GAP CODE
- XX – SPECIAL SPECIFICATION CODE

GEOMETRY CODE

EC – All E cores including ETD, EC, ER, EER, EEM, EFD, planar and lamination sizes.

EC, ETD, EER and ER Core Data (ungapped)

Any practical gap available. See pages 1.8-1.11

MECHANICAL DIMENSIONS												
PART	CORE TYPE	FIG.		A	B	C	D MIN	E	F	G	S	T
0_40906EC	**ER 9.5**	**3**	mm	9.5 + 0, -.3	2.45 ± .05	5 + 0, -.2	1.6	7.5 + .25, -0	3.50 + 0, -.2	7.21 ± .10	-	-
0_43434EC	**ETD 34**	**2**	mm	35.0 + .0, -1.6	17.3 ± .20	11.1 + 0, -.6	11.8	27 max	11.1 + 0, -.6	-	-	-
0_43517EC	**EC 35**	**1**	mm	34.5 ± .8	17.3 ± .15	9.5 ± .30	11.9	22.75 ± .55	9.5 ± .30	-	2.75 ± .25	28.5 ± .8
0_43521EC	**EER 35L**	**2**	mm	35 ± .65	20.70 ± .20	11.30 ± .35	14.40	26.15 ± .55	11.30 ± .25	-	-	-
			in	1.378 ± .020	.815 ± .008	.445 ± .010	0.567	1.028 ± .020	.445 ± .010	-	-	-
0_43939EC	**ETD 39**	**2**	mm	40.0 + 0, - 1.8	19.8 ± .20	12.8 + 0, -.6	14.2	29.3 +1.6, -0	12.8 + 0, -.6	-	-	-
0_44119EC	**EC41**	**1**	mm	40.6 ± 1.0	19.5 ± .15	11.6 ± .3	13.5	27 + .8, -.7	11.6 ± .3	-	3.25 ± .25	33.6 ± 1.0
0_44216EC	**EER 42**	**2**	mm	42.10 ± .81	21.60 ± .20	14.70 ± .30	15.60	31 ± .58	14.70 ± .30	-		
			in	1.659 ± .032	.850 ± .008	.579 ± .012	0.614	1.220 ± .023	.579 ± .012	-	-	-
0_44444EC	**ETD 44**	**2**	mm	45 + .0, -.2	22.30 ± .20	15.2 + .0, -.6	16.10	32.5 + 1.6, -0	15.2 + 0, -.6	-	-	-
			in	1.732 ± .040	.878 ± .008	.583 ± .015	0.635	1.311 ± .032	.583 ± .015	-	-	-
0_44949EC	**ETD 49**	**2**	mm	49.8 + 0, -2.2	24.7 ± .20	16.7 + 0, -.6	17.7	36.1 + 0, -1.8	16.7 + 0, -.6	-		
0_45032EC		**2**	mm	49.80 ± .76	15.90 ± .25	13.20 ± .38	9.50	39.10 ± .51	14.50 ± .25	-		
			in	1.960 ± .030	.625 ± .010	.520 ± .015	0.373	1.540 ± .020	.570 ± .010	-	-	-
0_45224EC	**EC52**	**1**	mm	52.2 ± 1.3	24.2 ± .15	13.4 ± .35	11.9	33 ± .9	13.4 ± .35	-	3.75 ± .25	44 ± 1.3
0_45959EC	**ETD 59**	**2**	mm	59.80 ± 1.30	31 ± .20	21.65 ± .45	22.10	44.70 ± 1.09	21.65 ± .45	-	-	-
			in	2.354 ± .051	1.220 ± .008	.852 ± .018	0.87	1.760 ± .043	.852 ± .018	-	-	-
0_47035EC	**EC70**	**1**	mm	70 ± 1.52	34.50 ± .15	16.38 ± .38	22.30	44.50 ± 1.14	16.38 ± .38	-	4.75 ± .250	59.6 ± .15
			in	2.756 ± .060	1.358 ± .006	.645 ± .015	0.879	1.752 ± .045	.645 ± .015	-	.187 ± .010	2.346 ± .060
0_47054EC		**2**	mm	68.58 ± 1.52	54 ± .38	20 ± .38	41.80	54.10 ± 1.27	20 ± .38	-	-	-
			in	2.700 ± .060	2.125 ± .015	.787 ± .015	1.647	2.130 ± .050	.787 ± .015	-	-	-

To order, add material code to part number.

FIGURE 1

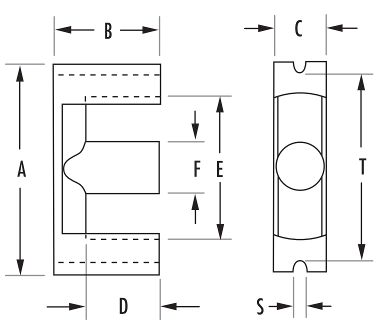
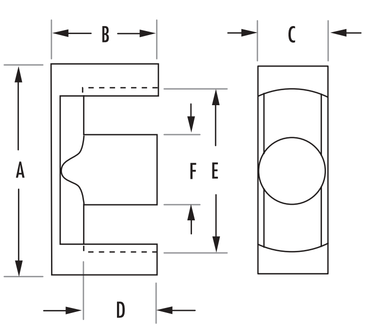


FIGURE 2



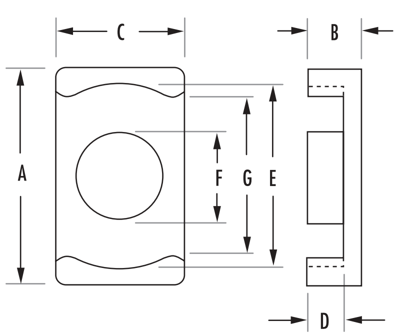
EC, ETD, EER and ER Core Data (ungapped)

A_L (mH/1000T)

	POWER MATERIALS			HIGH PERMEABILITY MATERIALS		MAGNETIC DATA						AVAILABLE HARDWARE			
	R	P	F*	J	W	l_e (mm)	A_e (mm^2)	A MIN (mm^2)	V_e (mm^3)	CORE WEIGHT (grams per set)	WaAc (cm^4)	STANDARD BOBBIN	PRINTED CIRCUIT BOBBIN	MOUNTING CLAMP	SURFACE MOUNT BOBBIN
Min	730	790	1270	1550	2520	14.2	8.47	7.6	120	0.6	.0026			✓	✓
Min	2030	2200	3600	-	-	78.6	97.1	91.6	7640	40	1.2100		✓	✓	
Min	1660	1800	3000	-	-	77.4	84.3	71.0	6530	36	0.833	✓	✓	✓	
Min	2020	2220	3550	-	-	90.8	107.0	100.0	9710	49	1.91		✓		
Min	2230	2420	4050	-	-	92.2	125.0	123.0	11500	60	2.21		✓	✓	
Min	2210	2400	3700	-	-	89.3	121.0	106.0	10800	52	1.67	✓	✓	✓	
Min	2880	3130	5000	-	-	98.7	175.0	166.0	17300	106	3.55		✓		
Min	2750	3000	4950	-	-	103	173	172.0	17800	94	3.75		✓	✓	
Min	3070	3330	5400	-	-	114.0	211	209	24000	124	5.83		✓	✓	
Min	3010	3270	5230	7160	-	84.7	161.0	156.0	13640	66	2.75				
Min	2900	3150	5040	-	-	105.0	180.0	141.0	18800	111	3.87	✓	✓	✓	
Min	4310	4680	7500	9320	-	139.0	368.0	368.0	51200	248	13.7		✓	✓	
Min	3310	3600	5760	-	-	141.0	281.0	211.0	39600	253	13.4	✓	✓	✓	
Min	2440	2650	4240	-	-	231.0	339.0	314.0	78600	396	34				

* F material nominal ± 25%

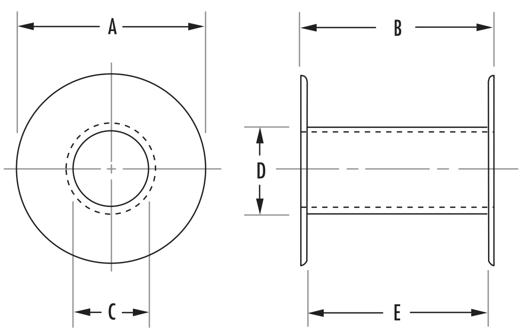
FIGURE 3



Bobbins

				MECHANICAL DIMENSIONS					NOMINAL WINDING AREA PER SECTION		AVG. LENGTH OF TURN FT	MATERIAL
PART	CORE SIZE	FIG.		A MAX	B MAX	C MAX	D MAX	E NOM	in^2	cm^2		
00B351701	**43517EC**	**1**	mm	21.9456	23.5712	9.8806	11.6586	21.7932	0.173	1.12	0.172	Glass filled
			in	0.864	0.928	0.389	0.459	0.858				Nylon*
00B411901	**44119EC**	**1**	mm	26.035	26.7462	12.065	14.097	24.6126	0.225	1.45	0.205	Glass filled
			in	1.025	1.053	0.475	0.555	0.969				Nylon*

FIGURE 1



Bobbins

				MECHANICAL DIMENSIONS					NOMINAL WINDING AREA PER SECTION		AVG. LENGTH OF TURN FT	MATERIAL
PART	CORE TYPE	FIG.		A MAX	B MAX	C MAX	D MAX	E NOM	in^2	cm^2		
00B522401	**45224EC**	**1**	mm	31.75	30.734	13.766	15.595	28.346	0.352	2.27	0.242	Glass filled
			in	1.250	1.210	0.542	0.614	1.116				Nylon*
00B703501	**47035EC**	**1**	mm	42.799	44.323	16.916	19.481	41.605	0.748	4.82	.319	Glass filled
			in	1.685	1.745	0.666	0.767	1.638				Nylon*

* UL 94 HB rated

Printed Circuit Bobbins

MECHANICAL DIMENSIONS												
PART	CORE SIZE	FIG.†		A MAX	B MAX	C MAX	D NOM	E NOM	F MAX	G NOM	H NOM	I NOM
PCB3434FA	**43434EC**	**5**	mm	40.513	21.488 nom	13.8938	11.01 min	25.5016	26.01 ref	5.08	35.20 min	-
			in	1.595	.846 nom	0.547	.437 min	1.004	1.024 ref	0.200	1.386 min	-
PCB351701	**43517EC**	**1**	mm	34.1122	28.8036	31.6484	2.032	10.0076	23.749	21.4884	21.6408	12.192
			in	1.343	1.134	1.246	0.080	0.394	0.935	0.846	0.852	0.480
PCH351701	**43517EC**	**3**	mm	34.163	29.0068	26.6954	2.032	10.0076	23.622	21.4884	21.6408	12.192
			in	1.345	1.142	1.051	0.08	0.394	0.930	0.846	0.852	0.480
PCB3521LA	**43521EC**	**10**	mm	29.21 nom	26.162 nom	14.1732	11.6586 min	25.4	39.8272 ref	4.826	29.21 min	-
			in	1.15 nom	1.03 nom	0.558	0.459 min	1.00	1.568 ref	0.190	1.15 min	-
PCB3939SA	**43939EC**	**6**	mm	44.2976	26.1874 nom	15.2908	12.7 min	30.2006	32.791 ref	5.588	40.1066 min	-
			in	1.744	1.031 nom	0.602	0.500 min	1.189	1.291 ref	0.220	1.579 min	-
PCB411901	**44119EC**	**1**	mm	38.6334	28.6258	36.5506	2.032	12.0904	26.9494	24.511	25.654	14.097
			in	1.521	1.127	1.439	0.080	0.476	1.061	0.965	1.010	0.555
PCH411901	**44119EC**	**3**	mm	38.6588	28.9052	31.1912	2.032	12.0904	26.8224	24.511	25.654	14.097
			in	1.522	1.138	1.228	0.080	0.476	1.056	0.965	1.010	0.555

† Figures 7-12 found on pages 12.8-12.9

FIGURE 1

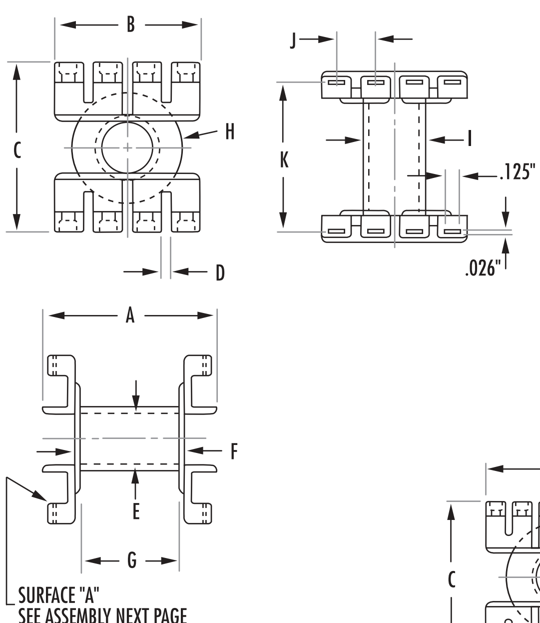


FIGURE 3

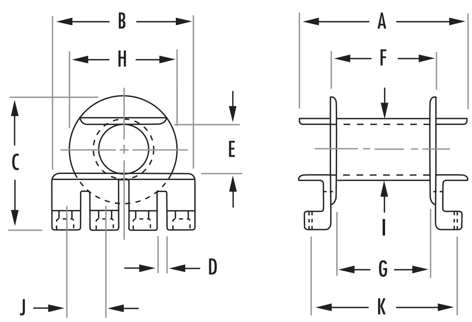
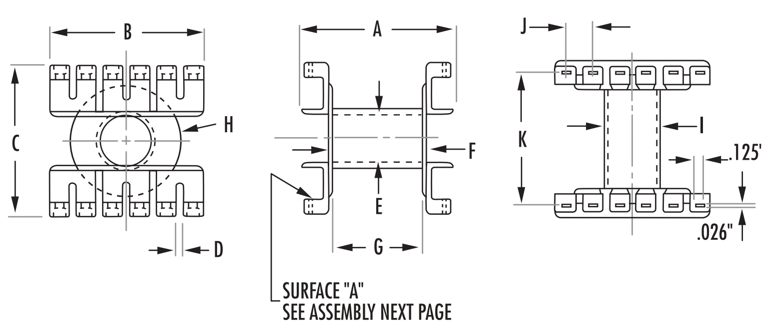


FIGURE 2



Printed Circuit Bobbins

MECHANICAL DIMENSIONS			NOMINAL WINDING AREA PER SECTION		AVG. LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL	PIN DIAMETER	BOARD CLEARANCE (in)†		
J NOM	K MAX	M NOM	in^2	cm^2					L	W	H
11.30 min	25.2984	5.0038	0.19000	1.23	0.200	Phenolic*			1.675	1.575	1.350
.445 min	0.996	0.197									
7.62	30.48	-	0.150	0.970	0.164	Glass Filled			-	-	-
0.300	1.200	-				Nylon**					
7.62	30.48	-	0.15	0.97	0.164	Glass Filled			-	-	-
0.300	1.200	-				Nylon**					
12.7	25.5016	5.08	0.230	1.48	0.20	Rynite	CP Wire	.031"	-	-	-
0.500	1.004	0.200				FR530**					
13.0048 min	28.9052	5.0038	0.270	1.740	0.220	Phenolic*			1.900	1.800	1.475
0.512 min	1.138	0.197									
7.62	33.02	-	0.21	1.35	0.197	Glass Filled			-	-	-
0.300	1.300	-				Nylon**					
7.62	33.02	-	0.21	1.35	0.197	Glass Filled			-	-	-
0.300	1.300	-				Nylon**					

* UL 94 V-1 rated **UL 94 V-0 rated
† Reference figure 12 for board clearance

FIGURE 4

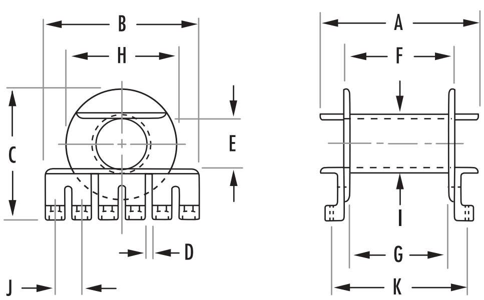


FIGURE 5

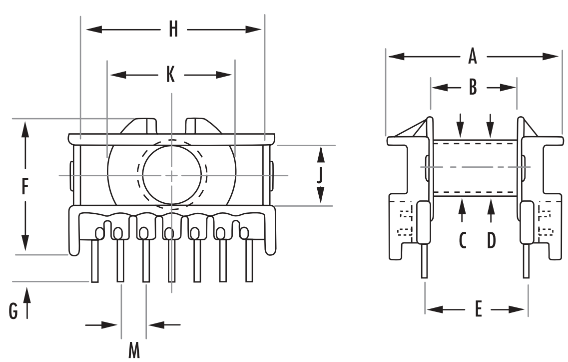
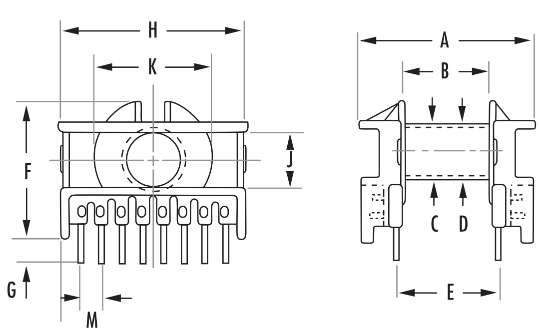


FIGURE 6



Printed Circuit Bobbins (con't)

MECHANICAL DIMENSIONS												
PART	CORE SIZE	FIG.†		A MAX	B MAX	C MAX	D NOM	E NOM	F MAX	G NOM	H NOM	I NOM
PCB4216FA	44216EC	11	mm	30.988	27.305 nom	17.983	15.392 min	24.993	45.593	5.08	39.878	-
			in	1.220	1.075 nom	0.708	0.606 min	0.984	1.795	0.200	1.570	-
PCB4444WA	44444EC	7	mm	51.308	29.997 nom	17.805	15.189 min	35.712	39.700 ref	5.08	45.135 min	-
			in	2.02	1.181 nom	0.701	0.598 min	1.406	1.563 ref	0.200	1.777 min	-
PCB4949WA	44949EC	8	mm	53.797	33.0962 nom	19.507	16.484 min	40.386	40.690 ref	5.08	49.504 min	-
			in	2.118	1.303 nom	0.768	0.649 min	1.590	1.602 ref	0.2	1.949 min	-
PCB522401	45224EC	2	mm	44.526	44.018	41.630	2.032	13.944	30.708	28.2956	31.445	16.205
			in	1.753	1.733	1.639	0.080	0.549	1.209	1.114	1.238	0.638
PCH522401	45224EC	4	mm	44.551	44.094	36.499	2.032	13.944	30.708	28.2956	31.445	16.205
			in	1.754	1.736	1.437	0.08	0.549	1.209	1.114	1.238	0.638
PCB5959AA	45959EC	9	mm	66.04	41.376 nom	24.866	22.352 min	50.8	48.514 ref	4.191	61.341 min	-
			in	2.600	1.629 nom	0.979	0.88 min	2	1.91 ref	0.165	2.415 min	-
PCB703501	47035EC	2	mm	57.937	56.794	51.816	4.4958	17.145	44.2722	41.4528	42.443	19.507
			in	2.281	2.236	2.040	0.177	0.675	1.743	1.632	1.671	0.768
PCH703501	47035EC	4	mm	57.937	56.896	47.117	4.4958	17.145	44.2722	41.4528	42.545	19.507
			in	2.281	2.24	1.855	0.177	0.675	1.743	1.632	1.675	0.768

† Figures 1-6 found on pages 12.6-12.7

FIGURE 7

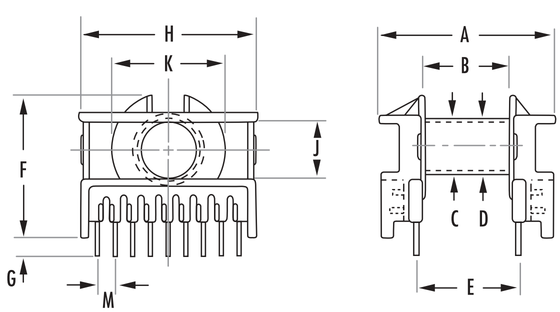


FIGURE 8

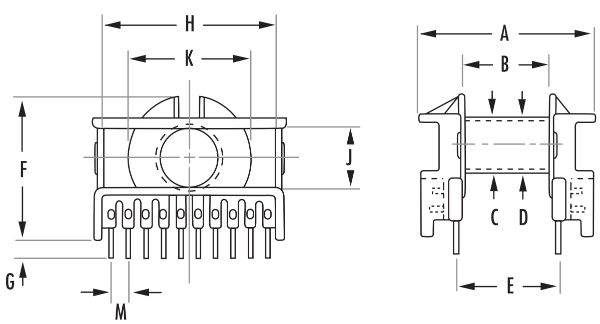


FIGURE 9

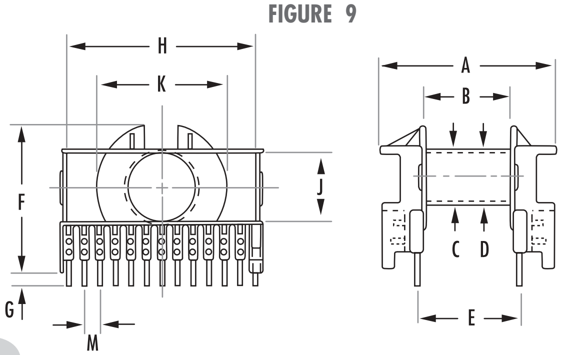
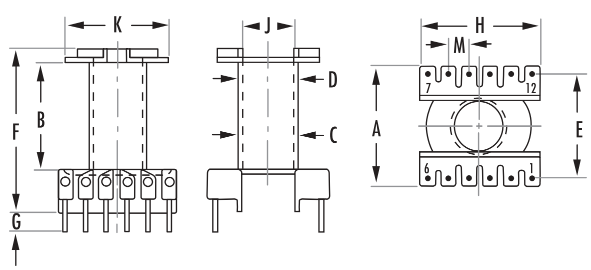


FIGURE 10



Printed Circuit Bobbins (con't)

MECHANICAL DIMENSIONS			NOMINAL WINDING AREA PER SECTION		AVG. LENGTH OF TURN FT	BOBBIN MATERIAL	PIN MATERIAL	PIN DIAMETER	BOARD CLEARANCE (in)†		
J NOM	K MAX	M NOM	in^2	cm^2					L	W	H
15.6972 0.618	30.48 ref 1.20 ref	5.0038 0.197	0.488	3.15	0.30	Rynite FR530**	CP Wire	.039"	-	-	-
15.3924 min 0.606 min	32.512 1.280	5.0038 0.197	0.33	2.13	0.25	Phenolic*			2.075	2.000	1.580
16.891 min 0.665 min	35.5092 1.398	5.0038 0.197	0.420	2.71	0.28	Phenolic*			2.275	2.175	1.680
7.62 0.300	38.1 1.500	- -	0.33	2.13	0.239	Glass Filled Nylon**			-	-	-
7.62 0.300	38.1 1.500	- -	0.33	2.13	0.239	Glass Filled Nylon**			-	-	-
22.352 min 0.88 min	43.18 1.700	5.08 0.200	0.58	3.72	0.35	Rynite FR530L**			2.845	2.635	1.940
10.16 0.400	50.8 2.000	- -	0.74	4.77	0.312	Glass Filled Nylon**			-	-	-
10.16 0.400	50.8 2.000	- -	0.74	4.77	0.312	Glass Filled Nylon**			-	-	-

* UL 94 V-1 rated **UL 94 V-0 rated. † Reference figure 12 for board clearance

FIGURE 11

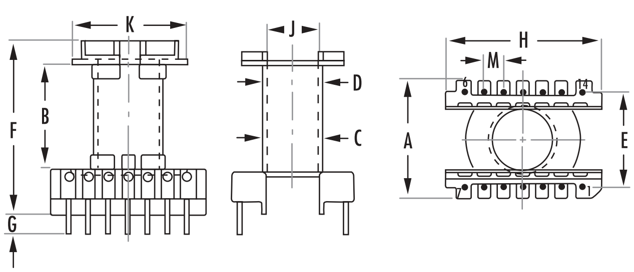
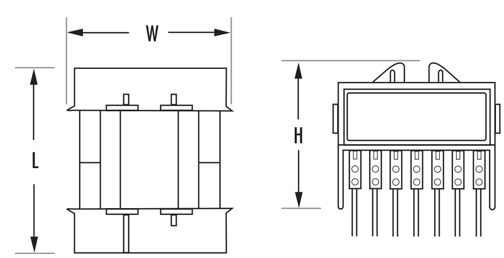
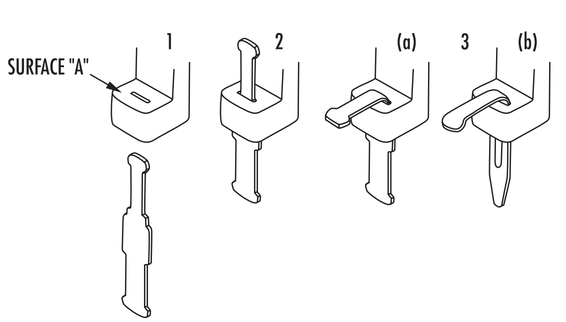
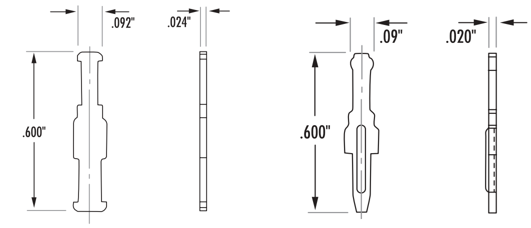


FIGURE 12



TERMINAL ASSEMBLY





General Purpose Terminal
PNEC01000

Printed Circuit Terminal
PNEC02000

NOTE: Terminals are not normally inserted but shipped separately in strip form. See above Terminal Assembly.

Mounting Clamps

PART	ITEM	CORE SIZE	FIG.		A	B	C	D	E
					MECHANICAL DIMENSIONS				
00C09061A	Clamp	40906EC	**7**	mm	10.007	5.384	3.988	13.97	-
				in	0.394	.212	.157	.055	-
00C343416	Clamp	43434EC	**4**	mm	22.8854	10.8458	39.624	-	-
	(2 required per set)			in	0.901	0.427	1.56	-	-
0AC351717	U Bolt		**3**	mm	32.385	42.164	2.1082	12.7	-
				in	1.275	1.66	0.083	0.500	-
0BC351740	Plate	43517EC	**2**	mm	39.37	9.525	31.5976	3.8862	4.445
				in	1.55	0.375	1.244	0.153	0.175
0CC351700	Nut		-	-	-	-	-	-	-
	(2 required)								
00C393916	Clamp	43939EC		mm	25.3238	12.5476	44.704	-	-
	(2 required per set)			in	0.997	0.494	1.76	-	-
0AC411919	U Bolt		**1**	mm	38.100	46.99	2.3622	12.7	-
				in	1.500	1.850	0.093	0.500	-
0BC411940	Plate	44119EC	**2**	mm	46.736	11.1252	37.211	4.7752	4.699
				in	1.840	0.438	1.465	0.188	0.185
0CC411900	Nut		-	-	-	-	-	-	-
	(2 required)								

FIGURE 1

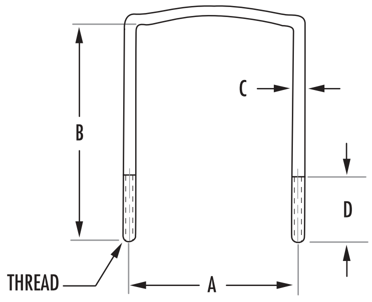


FIGURE 2

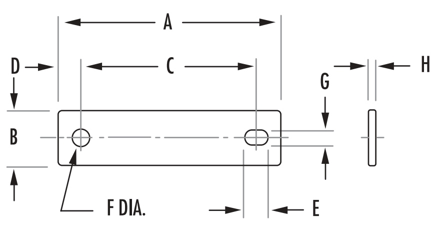
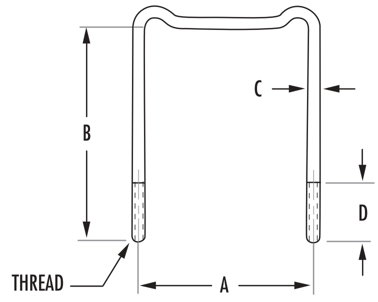


FIGURE 3



Mounting Clamps

MECHANICAL DIMENSIONS									
PART	**ITEM**	**CORE SIZE**	**FIG.**		**F**	**G**	**H**	**THREAD**	**MATERIAL**
00C09061A	Clamp	40906EC	**7**	mm	-	-	-	-	-
				in	-	-	-		
00C343416	Clamp	43434EC	**4**	mm	-	-	-	-	Stainless Steel
	(2 required per set)			in	-	-	-		
0AC351717	U Bolt		**3**	mm	-	-	-	#3-48-2A	Brass
				in	-	-	-		
0BC351740	Plate	43517EC	**2**	mm	2.6416	2.6416	1.016		Aluminum
				in	0.104	0.104	0.040		
0CC351700	Nut		-	-	-	-	-		-
	(2 required)								
00C393916	Clamp	43939EC		mm	-	-	-	-	Stainless Steel
	(2 required per set)			in	-	-	-		
0AC411919	U Bolt		**1**	mm	-	-	-	#4-40-2A	Brass
				in	-	-	-		
0BC411940	Plate	44119EC	**2**	mm	3.048	3.048	1.016		Aluminum
				in	0.120	0.120	0.040		
0CC411900	Nut		-	-	-	-	-		-
	(2 required)								

FIGURE 4

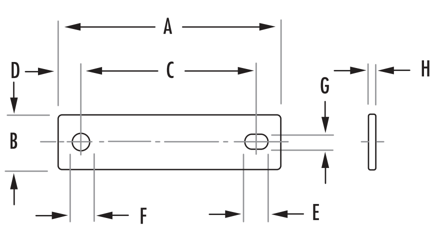
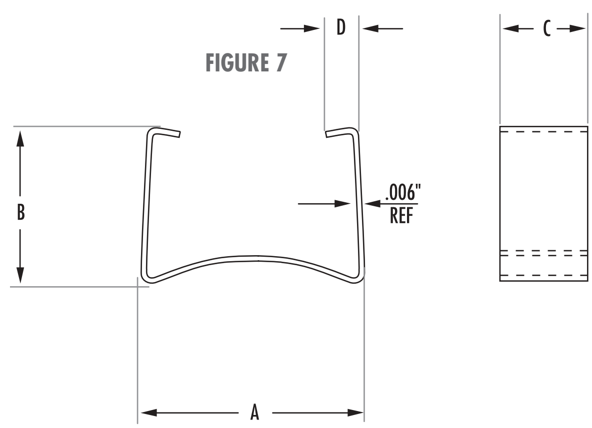


FIGURE 7



Mounting Clamps (con't)

					MECHANICAL DIMENSIONS				
PART	**ITEM**	**CORE SIZE**	**FIG.**		**A**	**B**	**C**	**D**	**E**
00C444416	Clamp	44444EC	**4**	mm	28.6766	14.9098	49.657	-	-
	(2 required per set)			in	1.129	0.587	1.955	-	-
00C494916	Clamp	44949EC	**4**	mm	30.8864	16.383	54.61	-	-
	(2 required per set)			in	1.216	0.645	2.15	-	-
0AC522423	U Bolt		**3**	mm	48.895	57.15	2.921	15.24	-
				in	1.925	2.25	0.115	0.600	-
0BC522440	Plate	45224EC	**2**	mm	59.69	12.70	48.1076	5.9182	5.715
				in	2.350	0.500	1.894	0.233	0.225
0CC522400	Nut		-	-	-	-	-	-	-
	(2 required)								
00C595916	Clamp	45959EC	**5**	mm	12.9032	22.098	65.405	-	-
	(2 required per set)			in	0.508	0.87	2.575	-	-
0AC703531	U Bolt		**3**	mm	65.405	78.74	2.921	15.24	-
				in	2.575	3.100	0.115	0.600	-
0BC703540	Plate	47035EC	**4**	mm	76.962	15.875	64.6938	6.2738	5.715
				in	3.03	0.625	2.547	0.247	0.225
00C522400	Nut		-	-	-	-	-	-	-

FIGURE 2

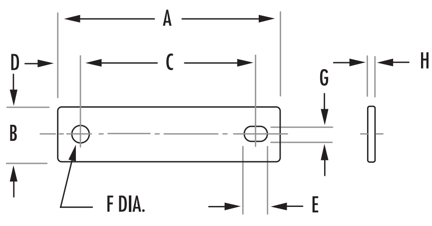
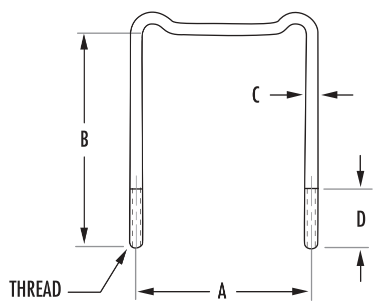


FIGURE 3



Mounting Clamps (con't)

MECHANICAL DIMENSIONS									
PART	**ITEM**	**CORE SIZE**	**FIG.**		**F**	**G**	**H**	**THREAD**	**MATERIAL**
00C444416	Clamp (2 required per set)	44444EC	**4**	mm	-	-	-	-	Stainless Steel
				in	-	-	-		
00C494916	Clamp (2 required per set)	44949EC	**4**	mm	-	-	-	-	Stainless Steel
				in	-	-	-		
0AC522423	U Bolt		**3**	mm	-	-	-	#6-32-2A	Brass
				in	-	-	-		
0BC522440	Plate	45224EC	**2**	mm	3.6576	3.6576	1.016	-	Aluminum
				in	0.144	0.144	0.040		
0CC522400	Nut (2 required)		-	-	-	-	-	-	-
00C595916	Clamp (2 required per set)	45959EC	**5**	mm	-	-	-	-	Stainless Steel
				in	-	-	-		
0AC703531	U Bolt		**3**	mm	-	-	-	#6-32-2A	Brass
				in	-	-	-		
0BC703540	Plate	47035EC	**4**	mm	5.715	3.6576	1.016	-	Aluminum
				in	0.225	0.144	0.04		
00C522400	Nut		-	-	-	-	-	-	-

FIGURE 4

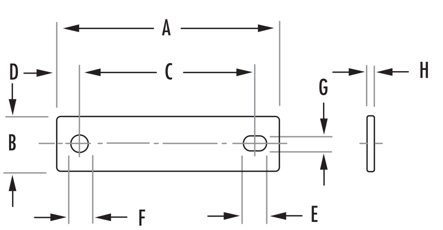
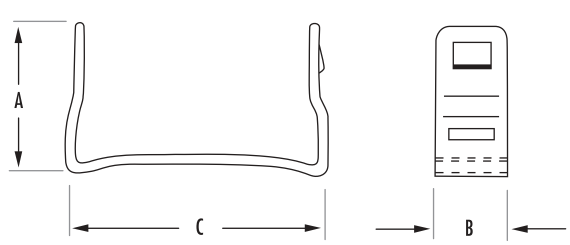


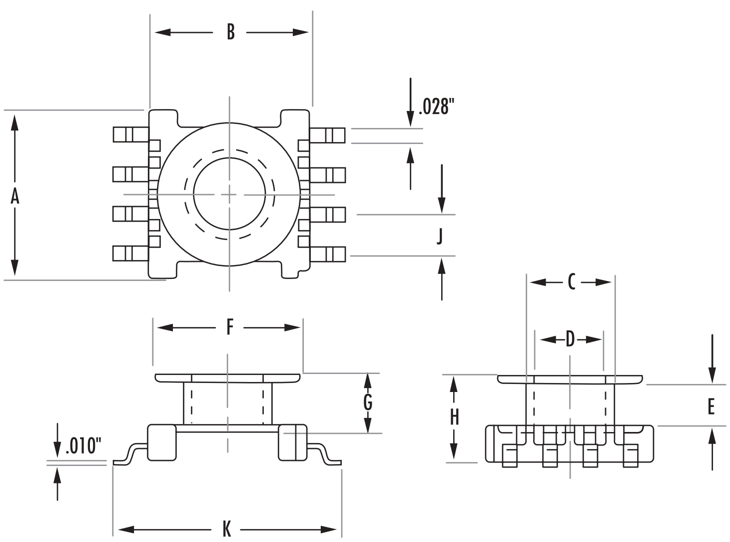
FIGURE 5



Surface Mount Bobbin

				MECHANICAL DIMENSIONS										NOMINAL WINDING AREA PER SECTION		AVERAGE LENGTH OF TURN FT
PART	CORE SIZE	FIG.		A NOM	B NOM	C MAX	D MIN	E NOM	F MAX	G MAX	H NOM	J TYP	K NOM	in^2	cm^2	
SMB09068A	40906EC	**1**	mm	8.509	8.102	4.55	3.505	2.159	7.391	2.997	4.292	2.006	11.557	.0047	.030	.06
			in	.335	.319	.179	.138	.085	.291	.118	1.69	.079	.455			

FIGURE 1



Toroids

TOROIDS

Ferrite toroids offer high magnetic efficiency as there is no air gap, and the cross sectional area is uniform. Available in many sizes (O.D.s from 0.100" to 3.375") and materials (permeabilities ranging from 750 to 15,000), this section lists common sizes. For additional sizes contact Magnetics Sales.

Typical applications for high permeability toroids (J, W, and H materials) include common mode chokes, broadband transformers, pulse transformers and current transformers. R, P and F material toroids are excellent choices for high frequency transformers. Special sizes in J material are available for Ground Fault Interrupter applications.

HOW TO ORDER

O J 4 22 06 TC XX

- O — COATING CODE (SEE PG 13.2)
- J — FERRITE CORE MATERIAL TYPE
- 4 — USED FOR ALL FERRITE TYPES
- 22 — APPROXIMATE DIAMETER IN MM
- 06 — APPROXIMATE HEIGHT IN MM
- TC — TOROID CORE
- XX — SPECIAL SPECIFICATION CODE

***COATING CODES**

O – Bare core
V – Nylon coating
Y – Parylene C®
Z – Polyester/Epoxy coating

***SPECIAL SPECIFICATION CODES**

CC – Color Coded

*See page 13.2 – 13.3 for discussion of coating and other special requirements.

COATINGS

In order to increase winding ease and improve voltage breakdown, toroids are available coated. There are three categories of coatings available; Parylene, Nylon and Polyester/Epoxy.

Parylene C® is a vacuum-deposited material which has a uniform coating (including edges) with a thickness of .0005" to .002", a smooth winding surface, and good moisture resistance to organic solvents and acid bases. The electrical characteristics are superior to other coatings. To specify Parylene use "Y" as the coating code when ordering.

Parylene C® is available for cores with O.D.s up to .500". The continuous maximum rating is 130° C. Note that minimum inductance is 5% lower than listed for Parylene coated cores.

Parylene C® offers a minimum voltage breakdown of 600 volts wire to wire.

Nylon coating (V designation) provides good adhesion, a smooth winding surface and excellent resistance to moisture and organic solvents. Typically, Nylon coating is .004" to .008" thick.

Available in the 12.7 mm to 29 mm size range, Nylon is a good finish for continuous operation from -65° C to +155° C. Nylon coating offers a minimum voltage breakdown of 1000 volts (wire to wire).

Polyester/Epoxy coating (Z designation) meets the same general visual requirements, standard dimensional and voltage breakdown guarantees as Nylon. Polyester/Epoxy is rated to 200° C continuous operation. Coating thickness with Polyester/Epoxy is typically less than with Nylon, although the guaranteed limits are the same.

The size range for Polyester/Epoxy is from 9.5 mm to 86 mm.

NOTE: H material (15,000μ) is not available in Nylon coating.

SPECIAL SPECIFICATION CODES

COLOR CODING

Toroids (as well as other cores) can be marked with a color code to help differentiate different materials. When ordering add "CC" as the special specification code.

MATERIAL	ASSIGNED COLOR CODES
R	Blue
P	Green
F	White
J	Red
W	Yellow
H	Purple

HIGH VOLTAGE

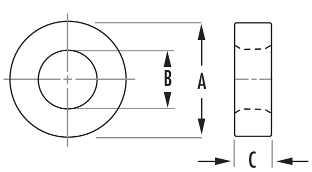
Voltage breakdown, higher than the standard guarantees, can be provided. Dimensional tolerances are relaxed to allow for the added coating. Contact Magnetics Application Engineering for specifications.

Toroid Core Data

A_L (mH/1000T)

		MECHANICAL DIMENSIONS			POWER MATERIALS			HIGH PERMEABILITY MATERIALS		
PART		A (OD)	B (ID)	C (HGT.)	R 2300µ ± 25%	P 2500µ ± 25%	F 3000µ ± 20%	J 5000µ ± 20%	W 10,000µ ± 30%	H 15,000µ ± 30%
40200TC	mm	2.54	1.27	1.27	400	454	525	875	1,750	2,625
	in	0.100	0.050	0.050						
40301TC	mm	3.51	1.83	1.27	380	410	495	825	1,650	2,475
	in	0.138	0.072	0.050						
40502TC	mm	3.94	2.24	1.27	340	368	440	735	1,470	2,205
	in	0.155	0.088	0.050						
40503TC	mm	3.94	2.24	2.54	670	716	885	1,475	2,950	4,425
	in	0.155	0.088	0.100						
40401TC	mm	4.83	2.29	1.27	440	474	570	950	1,900	2,850
	in	0.190	0.090	0.050						
40402TC	mm	4.83	2.29	2.54	870	948	1,140	1,900	3,800	5,700
	in	0.190	0.090	0.100						
40601TC	mm	5.84	3.05	1.52	450	488	585	980	1,960	2,940
	in	0.230	0.120	0.060						
40603TC	mm	5.84	3.05	3.18	940	1,020	1,225	2,040	4,080	6,120
	in	0.230	0.120	0.125						
40705TC	mm	7.62	3.18	4.78	1,920	2,088	2,505	4,175	8,350	12,500
	in	0.300	0.125	0.188						
40907TC	mm	9.53	5.59	7.11	1,730	1,884	2,260	3,765	7,530	11,300
	in	0.375	0.220	0.280						
41003TC	mm	9.53	4.75	3.18	1,000	1,095	1,314	2,196	4,392	6,590
	in	0.375	0.187	0.125						
41005TC	mm	9.53	4.75	4.78	1,510	1,650	1,980	3,308	6,616	9,920
	in	0.375	0.187	0.188						
41206TC	mm	12.7	5.16	6.35	2,600	2,820	3,384	5,640	11,280	16,900
	in	0.500	0.203	0.250						
41303TC	mm	12.7	8.14	3.15	680	745	894	1,488	2,976	4,460
	in	0.500	0.312	0.125						
41305TC	mm	12.7	8.14	5.08	1,090	1,190	1,430	2,380	4,760	7,140
	in	0.500	0.312	0.200						
41306TC	mm	12.7	8.14	6.35	1,360	1,485	1,782	2,968	5,936	8,900
	in	0.500	0.312	0.250						

To order, add coating and material code.



ΔA_L values based on testing at 5 gauss in a de-gaussed state.

For the cores listed here, dimensional tolerances for bare and coated cores are on pages 13.10-13.12. Page 3.12 also lists guidelines for dimensional tolerances of all toroids.

Other core heights are available upon special request.

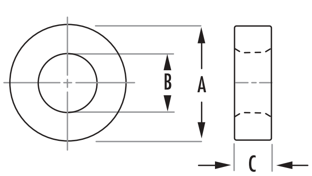
Toroid Core Data

PART	l_e (mm)	A_e (mm^2)	V_e (mm^3)	WINDOW AREA (cm^2)	CORE WEIGHT (g)	WaAc (cm^4)	AVAIL. COATINGS
	MAGNETIC DATA						
40200TC	5.53	.77	4.3	0.013	.03		**Y**
40301TC	7.65	1.03	7.87	0.026	.04		**Y**
40502TC	9.2	1.05	9.7	0.039	.05		**Y**
40503TC	9.2	2.10	19.4	0.039	.10		**Y**
40401TC	10.21	1.54	15.7	0.041	.09		**Y**
40402TC	10.21	3.08	31.4	0.041	.17		**Y**
40601TC	13.0	2.0	26.7	0.073	.14		**Y**
40603TC	13.0	4.3	56.0	0.073	.30		**Y**
40705TC	15	9.9	149.0	0.079	.90		**Y**
40907TC	22.7	13.7	310.0	0.245	1.6	0.033	**Y, Z**
41003TC	20.7	7.3	151.0	0.177	.82		**Y, Z**
41005TC	20.7	10.9	227.0	0.177	1.2	0.019	**Y, Z**
41206TC	24.6	22.1	554.0	0.209	3.3	0.046	**Y, Z**
41303TC	31.7	7.1	224.0	0.493	1.2	0.035	**Y, Z**
41305TC	31.7	11.4	361.0	0.493	1.9	0.058	**V, Y, Z**
41306TC	31.7	14.2	451.2	0.493	2.4	0.072	**V, Y, Z**

Toroid Core Data (con't)

					A_L (mH/1000T)					
MECHANICAL DIMENSIONS					**POWER MATERIALS**			**HIGH PERMEABILITY MATERIALS**		
PART		**A (OD)**	**B (ID)**	**C (HGT.)**	**R** 2300μ ± 25%	**P** 2500μ ± 25%	**F** 3000μ ± 20%	**J** 5000μ ± 20%	**W** 10,000μ ± 30%	**H** 15,000μ ± 30%
41406TC	mm	12.7	7.14	6.35	1,660	1,805	2,166	3,612	7,224	10,800
	in	0.500	0.281	0.250						
41407TC	mm	12.7	7.14	4.78	1,240	1,356	1,630	2,715	5,430	8,140
	in	0.500	0.281	0.188						
41506TC	mm	13.2	7.37	3.96	1,020	1,111	1,334	2,295	4,590	6,880
	in	0.520	0.290	0.156						
41435TC	mm	13.6	7.01	3.51	1,040	1,130	1,350	2,260	4,520	6,780
	in	0.535	0.276	0.138						
41450TC	mm	14.0	8.99	5.00	990	1,080	1,290	2,160	4,320	6,480
	in	0.551	0.354	0.197						
41605TC	mm	15.9	8.89	4.70	1,260	1,375	1,650	2,760	5,520	8,280
	in	0.625	0.350	0.185						
41809TC	mm	18.4	9.75	10.3	2,810	3,050	3,660	6,115	12,200	18,300
	in	0.726	0.384	0.404						
42106TC	mm	20.6	12.7	6.35	1,380	1,500	1,680	2,800	5,600	8,400
	in	0.810	0.500	0.250						
42109TC	mm	20.6	12.7	8.89	1,930	2,100	2,520	4,200	8,400	12,600
	in	0.810	0.500	0.350						
42206TC	mm	22.1	13.7	6.35	1,380	1,510	1,812	3,020	6,040	9,060
	in	0.870	0.540	0.250						
42207TC	mm	22.1	13.7	7.90	1,720	1,875	2,250	3,700	7,400	11,100
	in	0.870	0.540	0.312						
42212TC	mm	22.1	13.7	12.44	2,770	3,020	3,624	6,040	12,080	18,100
	in	0.870	0.540	0.500						
42507TC	mm	25.34	15.45	7.66	1,800	1,958	2,348	3,913	7,825	11,700
	in	1.000	0.610	0.312						
42508TC	mm	25.34	15.45	10.0	2,220	2,420	2,900	4,830	9,660	14,490
	in	1.000	0.610	0.394						
42908TC	mm	29.0	19.0	7.50	1,450	1,585	1,902	3,170	6,340	9,510
	in	1.142	0.748	0.295						
42915TC	mm	29.0	19.0	15.2	2,960	3,222	3,868	6,447	12,894	19,300
	in	1.142	0.748	0.600						

To order, add coating and material code.



ΔA_L values based on testing at 5 gauss in a de-gaussed state.

For the cores listed here, dimensional tolerances for bare and coated cores are on pages 13.10-13.12. Page 13.12 also lists guidelines for dimensional tolerances of all toroids.

Other core heights are available upon special request.

Toroid Core Data (con't)

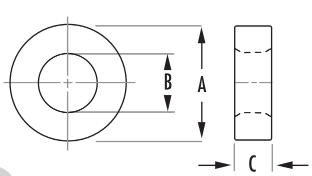
	MAGNETIC DATA						AVAIL. COATINGS
	l_e (mm)	A_e (mm^2)	V_e (mm^3)	WINDOW AREA (cm^2)	CORE WEIGHT (g)	WaAc (cm^4)	
41406TC	29.5	16.9	498.0	0.400	2.7	0.064	**V, Y, Z**
41407TC	29.5	12.6	373.0	0.400	1.9	0.050	**V, Y, Z**
41506TC	30.6	10.9	332.0	0.426	1.9	0.046	**V, Z**
41435TC	30.1	10.8	326.0	0.386	1.8	0.042	**V, Z**
41450TC	35.0	12.0	421.0	0.636	2.2	0.076	**V, Z**
41605TC	36.8	15.3	562.0	0.620	2.8	0.094	**V, Z**
41809TC	41.4	40.3	1670.0	0.746	9.9	0.301	**V, Z**
42106TC	50.0	23.1	1150.0	1.27	5.4	0.293	**V, Z**
42109TC	50.0	32.6	1630.0	1.27	8.1	0.414	**V, Z**
42206TC	54.1	26.2	1417.0	1.48	6.4	0.370	**V, Z**
42207TC	54.2	32.5	1763.0	1.48	8.5	0.466	**V, Z**
42212TC	54.2	51.3	2776	1.48	13.5	0.756	**V, Z**
42507TC	61.5	37.1	2284	1.89	11.6	0.707	**V, Z**
42508TC	61.5	48.45	2981.0	1.89	14.9	0.898	**V, Z**
42908TC	73.2	37	2704.0	2.84	12.9	1.02	**V, Z**
42915TC	73.2	74.9	5481.0	2.84	27.6	2.10	**Z**

Toroid Core Data (con't)

A_L (mH/1000T)

MECHANICAL DIMENSIONS					POWER MATERIALS			HIGH PERMEABILITY MATERIALS		
SIZE		A (OD)	B (ID)	C (HGT.)	R 2300µ ± 25%	P 2500µ ± 25%	F 3000µ ± 20%	J 5000µ ± 20%	W 10,000µ ± 30%	H 15,000µ ± 30%
43113TC	mm	30.83	19.06	12.74	2,850	3,100	3,720	6,200	12,400	-
	in	1.220	0.748	0.512						
43205TC	mm	32.0	15.0	4.50	1,480	1,610	1,930	3,220	6,440	-
	in	1.260	0.591	0.177						
43610TC	mm	36.0	23.0	10.0	2,030	2,210	2,726	4,543	9,085	-
	in	1.417	0.906	0.394						
43615TC	mm	36.0	23.0	14.6	3,100	3,366	4,040	6,736	13,400	-
	in	1.417	0.906	0.590						
43806TC	mm	38.1	19.0	6.11	2,020	2,200	2,640	4,400	8,800	-
	in	1.500	0.750	0.250						
43813TC	mm	38.1	19.0	12.45	3,850	4,185	5,020	8,365	16,700	-
	in	1.500	0.750	0.500						
43825TC	mm	38.1	19.0	25.4	8,060	8,762	10,040	16,730	33,400	-
	in	1.500	0.750	1.000						
44416TC	mm	44.5	19.0	15.9	5,360	5,830	7,000	11,600	23,200	-
	in	1.750	0.750	0.625						
44715TC	mm	46.9	27.0	15.0	3,700	4,030	4,840	8,075	16,100	-
	in	1.846	1.063	0.591						
44916TC	mm	49.1	33.8	15.6	2,710	2,950	3,540	5,900	11,800	-
	in	1.932	1.332	0.625						
44920TC	mm	49.1	31.8	15.9	2,790	3,032	3,640	6,065	12,130	-
	in	1.932	1.252	0.625						
44925TC	mm	49.1	31.8	19.0	3,420	3,718	4,460	7,435	14,870	-
	in	1.932	1.252	0.750						
44932TC	mm	49.1	33.8	31.8	5,430	5,900	7,080	11,800	23,600	-
	in	1.932	1.332	1.250						
46113TC	mm	61.0	35.6	12.7	3,140	3,491	4,107	6,845	13,690	-
	in	2.400	1.400	0.500						
46326TC	mm	63.0	38.0	24.5	5,770	6,270	7,530	12,500	25,100	-
	in	2.480	1.496	0.984						
47313TC	mm	73.7	38.9	12.5	3,700	4,024	4,880	8,140	16,280	-
	in	2.900	1.530	0.500						
47325TC	mm	3.66	38.860	25.40	7,400	8,050	9,760	16,280	32,560	-
	in	2.900	1.530	1.000						
48613TC	mm	85.7	55.5	12.7	2,510	2,726	3,310	5,520	11,040	-
	in	3.375	2.187	0.500						

To order, add coating and material code.



ΔA_L values based on testing at 5 gauss in a de-gaussed state.

For the cores listed here, dimensional tolerances for bare and coated cores are on pages 13.10-13.12. Page 13.12 also lists guidelines for dimensional tolerances of all toroids.

Other core heights are available upon special request.

Toroid Core Data (con't)

	MAGNETIC DATA						AVAIL. COATINGS
	l_e (mm)	A_e (mm^2)	V_e (mm^3)	WINDOW AREA (cm^2)	CORE WEIGHT (g)	WaAc (cm^4)	
43113TC	75.4	73.6	5547	2.83	29.3	2.11	Z
43205TC	67.2	34.5	2320.0	1.77	12.9	0.611	Z
43610TC	89.7	62.6	5616	4.15	29.4	2.61	Z
43615TC	89.6	93.3	8366	4.15	44.0	3.93	Z
43806TC	82.9	56.1	4644	2.85	26.4	1.62	Z
43813TC	83.0	114.2	9462	2.85	51.7	3.27	Z
43825TC	83.0	231.0	19200.0	2.85	103.4	6.58	Z
44416TC	88.7	187.0	16600.0	2.85	80.8	5.33	Z
44715TC	110.0	142.0	15700.0	5.72	84	8.12	Z
44916TC	127	118	15010	8.99	75.3	10.4	Z
44920TC	123.0	119.0	14700.0	7.94	74.6	9.45	Z
44925TC	123.0	146.0	18000.0	7.94	91.0	11.6	Z
44932TC	127.0	236.0	30000.0	8.99	150.6	21.2	Z
46113TC	145.0	156.0	22500.0	9.93	117.3	15.5	Z
46326TC	152.0	300	45598	11.3	231	34.4	Z
47313TC	165.0	210	34771	11.9	177	25.2	Z
47325TC	165.0	424.0	71000.0	11.9	354	50.4	Z
48613TC	215.0	187.0	40200.0	24.2	203	45.2	Z

Bare Core Limiting Dimensions

PART		R, P, F MATERIALS			W AND H MATERIALS		
		O.D. MAX	I.D. MIN	HGT. MAX	O.D. MAX	I.D. MIN	HGT. MAX
40200TC	mm	2.75	1.06	1.45	2.75	1.06	1.45
	in	0.108	0.042	0.057	0.108	0.042	0.057
40301TC	mm	3.71	1.62	1.45	3.71	1.62	1.45
	in	0.146	0.064	0.057	0.146	0.064	0.057
40502TC	mm	4.14	2.03	1.45	4.14	2.03	1.45
	in	0.163	0.080	0.057	0.163	0.080	.057
40503TC	mm	4.14	2.03	2.80	4.14	2.03	2.80
	in	0.163	0.080	0.110	0.163	0.080	0.110
40401TC	mm	5.03	2.08	1.45	5.03	2.08	1.45
	in	0.198	0.082	0.057	0.198	0.082	0.057
40402TC	mm	5.03	2.08	2.80	5.03	2.08	2.80
	in	0.198	0.082	0.110	0.198	0.082	0.110
40601TC	mm	6.13	2.76	1.71	6.13	2.76	1.71
	in	0.241	0.109	0.067	0.241	0.109	0.067
40603TC	mm	6.13	2.76	3.43	6.13	2.76	3.43
	in	0.241	0.109	0.135	0.241	0.109	0.135
40705TC	mm	7.88	2.92	4.91	8.01	2.79	5.03
	in	0.310	0.115	0.193	0.315	0.110	0.198
40907TC	mm	9.78	5.33	7.29	9.91	5.20	7.40
	in	0.385	0.210	0.287	0.390	0.205	0.291
41003TC	mm	9.78	4.49	3.31	9.91	4.36	3.43
	in	0.385	0.177	0.130	0.390	0.172	0.135
41005TC	mm	9.78	4.49	4.91	9.91	4.36	5.03
	in	0.385	0.177	0.193	0.390	0.172	0.198
41206TC	mm	12.96	4.90	6.53	13.09	4.77	6.63
	in	0.510	0.193	0.257	0.515	0.188	0.261
41303TC	mm	12.96	7.67	3.31	13.09	7.54	3.43
	in	0.510	0.302	0.130	0.515	0.297	0.135
41305TC	mm	12.96	7.67	5.26	13.09	7.54	5.36
	in	0.510	0.302	0.207	0.515	0.297	0.211
41306TC	mm	12.96	7.67	6.53	13.09	7.54	6.63
	in	0.510	0.302	0.257	0.515	0.297	0.261
41406TC	mm	12.96	6.88	6.53	13.09	6.75	6.63
	in	0.510	0.271	0.257	0.515	0.266	0.261
41407TC	mm	12.96	6.88	4.91	13.09	6.75	5.03
	in	0.510	0.271	0.193	0.515	0.266	0.198
41506TC	mm	13.47	7.11	4.09	13.59	6.98	4.22
	in	0.530	0.280	0.161	0.535	0.275	0.166
41435TC	mm	13.85	6.75	3.64	13.97	6.62	3.76
	in	0.545	0.266	0.143	0.550	0.261	0.148
41450TC	mm	14.25	8.73	5.14	14.38	8.61	5.26
	in	0.561	0.344	0.202	0.566	0.339	0.207
41605TC	mm	16.26	8.50	4.83	16.46	8.30	4.96
	in	0.640	0.335	0.190	0.648	0.327	0.195
41809TC	mm	18.83	9.37	10.52	19.03	9.16	10.65
	in	0.741	0.369	0.414	0.749	0.361	0.419
42106TC	mm	20.96	12.31	6.53	21.16	12.11	6.63
	in	0.825	0.485	0.257	0.833	0.477	0.261
42109TC	mm	20.96	12.31	9.15	21.16	12.11	9.28
	in	0.825	0.485	0.360	0.833	0.477	0.365

PART		R, P, F MATERIALS			W AND H MATERIALS		
		O.D. MAX	I.D. MIN	HGT. MAX	O.D. MAX	I.D. MIN	HGT. MAX
42206TC	mm	22.48	13.33	6.53	22.69	13.13	6.63
	in	0.885	0.525	0.257	0.893	0.517	0.261
42207TC	mm	22.48	13.33	8.18	22.69	13.13	8.31
	in	0.885	0.525	0.322	0.893	0.517	0.327
42212TC	mm	22.48	13.33	12.96	22.69	13.13	13.09
	in	0.885	0.525	0.510	0.893	0.517	0.515
42507TC	mm	25.91	14.98	8.18	26.17	14.73	8.31
	in	1.020	0.590	0.322	1.030	0.580	0.327
42508TC	mm	25.91	14.98	10.27	26.17	14.73	10.39
	in	1.020	0.590	0.404	1.030	0.580	0.409
42908TC	mm	29.52	18.49	7.68	29.77	18.23	7.78
	in	1.162	0.728	0.302	1.172	0.718	0.306
42915TC	mm	29.52	18.49	15.63	29.77	18.23	15.83
	in	1.162	0.728	0.615	1.172	0.718	0.623
43113TC	mm	31.50	18.49	13.26	31.75	18.23	13.39
	in	1.240	0.728	0.522	1.250	0.718	0.527
43205TC	mm	32.52	14.50	4.63	32.77	14.24	4.70
	in	1.280	0.571	0.182	1.290	0.561	0.185
43610TC	mm	36.50	22.50	10.27	36.76	22.25	10.39
	in	1.437	0.886	0.404	1.447	0.876	0.409
43615TC	mm	36.50	22.50	15.24	36.76	22.25	15.37
	in	1.437	0.886	0.600	1.447	0.876	0.605
43806TC	mm	38.87	18.28	6.53	39.25	17.90	6.63
	in	1.530	0.720	0.257	1.545	0.705	0.261
43813TC	mm	38.87	18.28	12.96	39.25	17.90	13.09
	in	1.530	0.720	0.510	1.545	0.705	0.515
43825TC	mm	38.87	18.28	25.91	39.25	17.90	26.17
	in	1.530	0.720	1.020	1.545	0.705	1.030
44416TC	mm	45.22	18.28	16.26	45.60	17.90	16.46
	in	1.780	0.720	0.640	1.795	0.705	0.648
44715TC	mm	47.65	26.23	15.27	48.04	25.85	15.40
	in	1.876	1.033	0.601	1.891	1.018	0.606
44916TC	mm	49.84	33.07	16.26	50.22	32.69	16.46
	in	1.962	1.302	0.640	1.977	1.287	0.648
44920TC	mm	49.84	31.03	16.26	50.22	30.65	16.46
	in	1.962	1.222	0.640	1.977	1.207	0.648
44925TC	mm	49.84	31.03	19.44	50.22	30.65	19.64
	in	1.962	1.222	0.765	1.977	1.207	0.773
44932TC	mm	49.84	33.07	32.26	50.22	32.69	32.52
	in	1.962	1.302	1.270	1.977	1.287	1.280
46113TC	mm	61.85	34.67	12.96	62.31	34.21	13.09
	in	2.435	1.365	0.510	2.453	1.347	0.515
46326TC	mm	63.89	37.10	25.38	64.34	36.65	25.58
	in	2.515	1.461	0.999	2.533	1.443	1.007
47313TC	mm	74.68	37.84	12.96	75.19	37.33	13.29
	in	2.940	1.490	0.510	2.960	1.470	0.523
47325TC	mm	74.68	37.84	25.91	95.19	37.33	26.54
	in	2.940	1.490	1.020	2.96	1.470	1.045
48613TC	mm	87.00	54.28	12.96	87.63	53.64	13.29
	in	3.425	2.137	0.510	3.450	2.112	0.523

V and Z Coated Limiting Dimensions

PART		R, P, F MATERIALS			W AND H MATERIALS		
		O.D. MAX	I.D. MIN	HGT. MAX	O.D. MAX	I.D. MIN	HGT. MAX
40907TC	mm	10.16	4.95	7.68	10.29	4.82	7.78
	in	0.400	0.195	0.302	0.405	0.190	0.306
41003TC	mm	10.16	4.11	3.69	10.29	3.98	3.81
	in	0.400	0.162	0.145	0.405	0.157	0.150
41005TC	mm	10.16	4.11	5.29	10.29	3.98	5.41
	in	0.400	0.162	0.208	0.405	0.157	0.213
41206TC	mm	13.34	4.52	6.91	13.47	4.39	7.01
	in	0.525	0.178	0.272	0.530	0.173	0.276
41303TC	mm	13.34	7.29	3.69	13.47	7.16	3.81
	in	0.525	0.287	0.145	0.530	0.282	0.150
41305TC	mm	13.34	7.29	5.64	13.47	7.16	5.75
	in	0.525	0.287	0.222	0.530	0.282	0.226
41306TC	mm	13.34	7.29	6.91	13.47	7.16	7.01
	in	0.525	0.287	0.272	0.530	0.282	0.276
41406TC	mm	13.34	6.50	6.91	13.47	6.37	7.01
	in	0.525	0.256	0.272	0.530	0.251	0.276
41407TC	mm	13.34	6.50	5.29	13.47	6.37	5.41
	in	0.525	0.256	0.208	0.530	0.251	0.213
41506TC	mm	13.84	6.73	4.47	13.97	6.60	4.60
	in	0.545	0.265	0.176	0.550	0.260	0.181
41435TC	mm	14.23	6.37	4.02	14.36	6.24	4.14
	in	0.560	0.251	0.158	0.565	0.246	0.163
41450TC	mm	14.64	8.35	5.52	14.76	8.23	5.64
	in	0.576	0.329	0.217	0.581	.0324	.0222
41605TC	mm	16.64	8.12	5.21	16.84	7.92	5.34
	in	0.655	0.320	0.205	0.663	0.312	0.210
41809TC	mm	19.21	8.99	10.90	19.41	8.78	11.03
	in	0.756	0.354	0.429	0.764	0.346	0.434
42106TC	mm	21.34	11.93	6.91	21.54	11.73	7.01
	in	0.840	0.470	0.272	0.848	0.462	0.276
42109TC	mm	21.34	11.93	9.53	21.54	11.73	9.66
	in	0.840	0.470	0.375	0.848	0.462	0.380
42206TC	mm	22.86	12.95	6.91	23.07	12.75	7.01
	in	0.900	0.510	0.272	0.908	0.502	0.276
42207TC	mm	22.86	12.95	8.56	23.07	12.75	8.69
	in	0.900	0.510	0.337	0.908	0.502	0.342
42212TC	mm	22.86	12.95	13.34	23.07	12.75	13.47
	in	0.900	0.510	0.525	0.908	0.502	0.530
42507TC	mm	26.29	14.60	8.56	26.55	14.35	8.69
	in	1.035	0.575	0.337	1.045	0.565	0.342
42508TC	mm	26.29	14.60	10.65	26.55	14.35	10.77
	in	1.035	0.575	0.419	1.045	0.565	0.424

PART		R, P, F MATERIALS			W AND H MATERIALS		
		O.D. MAX	I.D. MIN	HGT. MAX	O.D. MAX	I.D. MIN	HGT. MAX
42908TC	mm	29.90	18.11	8.06	30.15	17.85	8.16
	in	1.177	0.713	0.317	1.187	0.703	0.321
42915TC	mm	29.90	18.11	16.01	30.15	17.85	16.21
	in	1.177	0.713	0.630	1.187	0.703	0.638
43113TC	mm	31.88	18.11	13.64	32.14	17.85	13.77
	in	1.255	0.713	0.537	1.265	0.703	0.542
43205TC	mm	32.90	14.12	5.01	33.15	13.86	5.08
	in	1.295	0.556	0.197	1.305	0.546	0.200
43610TC	mm	36.89	22.12	10.65	37.14	21.86	10.77
	in	1.452	0.871	0.419	1.462	0.861	0.424
43615TC	mm	36.89	22.12	15.63	37.14	21.86	15.75
	in	1.452	0.871	0.615	1.462	0.861	0.620
43806TC	mm	39.25	17.90	6.91	39.63	17.52	7.01
	in	1.545	0.705	0.272	1.560	0.690	0.276
43813TC	mm	39.25	17.90	13.34	39.63	17.52	13.47
	in	1.545	0.705	0.525	1.560	0.690	0.530
43825TC	mm	39.25	17.90	26.29	39.63	17.52	26.55
	in	1.545	0.705	1.035	1.560	0.690	1.045
44416TC	mm	45.60	17.90	16.64	45.98	17.52	16.85
	in	1.795	0.705	0.655	1.810	0.690	0.663
44715TC	mm	48.04	25.85	15.65	48.42	25.47	15.78
	in	1.891	1.018	0.616	1.906	1.003	0.621
44916TC	mm	50.22	32.69	16.64	50.60	32.30	16.85
	in	1.977	1.287	0.655	1.992	1.272	0.663
44920TC	mm	50.22	30.65	16.64	50.60	30.27	16.85
	in	1.977	1.207	0.655	1.992	1.192	0.663
44925TC	mm	50.22	30.65	19.82	50.60	30.27	20.02
	in	1.977	1.207	0.780	1.992	1.192	0.788
44932TC	mm	50.22	32.69	32.64	50.60	32.30	32.90
	in	1.977	1.287	1.285	1.992	1.272	1.295
46113TC	mm	62.23	34.29	13.34	62.69	33.83	13.47
	in	2.450	1.350	0.525	2.468	1.332	0.530
46326TC	mm	64.27	36.72	25.76	64.72	36.27	25.96
	in	2.530	1.446	1.014	2.548	1.428	1.022
47313TC	mm	75.06	37.46	13.34	75.57	36.95	13.67
	in	2.955	1.475	0.525	2.975	1.455	0.538
47325TC	mm	75.06	37.46	26.289	75.565	36.957	26.924
	in	2.955	1.475	1.035	2.975	1.455	1.060
48613TC	mm	87.38	53.89	13.34	88.02	53.26	13.67
	in	3.440	2.122	0.525	3.465	2.097	0.538

Y Coated Limiting Dimensions and Dimensional Tolerance Guidelines

PART		R, P, F MATERIALS O.D. MAX	R, P, F MATERIALS I.D. MIN	R, P, F MATERIALS HGT. MAX	W AND H MATERIALS O.D. MAX	W AND H MATERIALS I.D. MIN	W AND H MATERIALS HGT. MAX
40200TC	mm	2.82	0.99	1.53	2.82	0.99	0.53
	in	0.111	0.039	0.060	0.111	0.039	0.060
40301TC	mm	3.79	1.54	1.53	3.79	1.54	1.53
	in	0.149	0.061	0.060	0.149	0.061	0.060
40502TC	mm	4.22	1.95	1.53	4.22	1.95	1.53
	in	0.166	0.077	0.060	0.166	0.077	0.060
40503TC	mm	4.22	1.95	2.87	4.22	1.95	2.87
	in	0.166	0.077	0.113	0.166	0.077	0.113
40401TC	mm	5.11	2.00	1.53	5.11	2.00	1.53
	in	0.201	0.079	0.060	0.201	0.079	0.060
40402TC	mm	5.11	2.00	2.87	5.11	2.00	2.87
	in	0.201	0.079	0.113	0.201	0.079	0.113
40601TC	mm	6.20	2.69	1.78	6.20	2.69	1.78
	in	0.244	0.106	0.070	0.244	0.106	0.070
40603TC	mm	6.20	2.69	3.51	6.20	2.69	3.51
	in	0.244	0.106	0.138	0.244	0.106	0.138
40705TC	mm	7.95	2.84	4.98	8.08	2.71	5.11
	in	0.313	0.112	0.196	0.318	0.107	0.201

PART		R, P, F MATERIALS O.D. MAX	R, P, F MATERIALS I.D. MIN	R, P, F MATERIALS HGT. MAX	W AND H MATERIALS O.D. MAX	W AND H MATERIALS I.D. MIN	W AND H MATERIALS HGT. MAX
40907TC	mm	9.86	5.25	7.37	9.99	5.13	7.47
	in	0.388	0.207	0.290	0.393	0.202	0.294
41003TC	mm	9.86	4.42	3.38	9.99	4.29	3.51
	in	0.388	0.174	0.133	0.393	0.169	0.138
41005TC	mm	9.86	4.42	4.98	9.99	4.29	5.11
	in	0.388	0.174	0.196	0.393	0.169	0.201
41206TC	mm	13.03	4.82	6.61	13.16	4.69	6.71
	in	0.513	0.190	0.260	0.518	0.185	0.264
41303TC	mm	13.03	7.59	3.38	13.16	7.46	3.51
	in	0.513	0.299	0.133	0.518	0.294	0.138
41305TC	mm	13.03	7.59	5.34	13.16	7.46	5.44
	in	0.513	0.299	0.210	0.518	0.294	0.214
41306TC	mm	13.03	7.59	6.61	13.16	7.46	6.71
	in	0.513	0.299	0.260	0.518	0.294	0.264
41406TC	mm	13.03	6.80	6.61	13.16	6.68	6.71
	in	0.513	0.268	0.260	0.518	0.263	0.264
41407TC	mm	13.03	6.80	4.98	13.16	6.68	5.11
	in	0.513	0.268	0.196	0.518	0.263	0.201

DIMENSIONAL TOLERANCE GUIDELINES

CORE OD'S	OD AND ID TOLERANCES R, P, F MATERIALS	OD AND ID TOLERANCES W & H MATERIALS
Up to .099"	±.005"	±.005"
.100" – .199"	±.008"	±.008"
.200" – .299"	±.011"	±.011"
.300" – .599"	±.010"	±.015"
.600" – .999"	±.015"	±.023"
1.000" – 1.499"	±.020"	±.030"
1.500" – 1.999"	±.030"	±.045"
2.000" – 2.499"	±.035"	±.053"
2.500" – 2.999"	±.040"	±.060"
3.000" – 3.500"	±.050"	±.075"

CORE HEIGHTS	HEIGHT TOLERANCES (1) (2) R, P, F MATERIALS	HEIGHT TOLERANCES (1) (2) W & H MATERIALS
Up to .099"	±.003"	±.007"
.100" – .199"	±.005"	±.010"
.200" – .299"	±.007"	±.011"
.300" – .599"	±.010"	±.015"
.600" – .999"	±.015"	±.023"
1.000" – 1.499"	±.020"	±.030"
1.500" – 1.999"	±.030"	±.045"

(1) For W and H material cores 2.8" and larger in OD, add 50% to height tolerance

(2) For cores <.300" OD, use W & H column

COATING SIZE LIMITS

Parylene (Y) 41406 and smaller *(Minimum inductance 5% lower than listed)*. Grey (Z) 40907 and larger.

FOR COATED CORES

Allow .003" for Y finish. Allow .015" for V and Z finish. Allow .030" for voltages above 1000 up to 4000.

Toroid Mounts

DIMENSIONS (IN.)												
PART	**FIG**	**FOR CORE O.D**	**A NOM**	**B NOM**	**C REF**	**D NOM**	**E REF**	**F TYP**	**G TYP**	**H NOM**	**J REF**	**K REF**
TVB22066A (6 pins)	**1**	0.500″-0.870″	0.748	0.425	0.472	0.138	0.189	0.236	0.295	0.216	0.216	0.079
TVB2908TA (10 pins)	**2**	0.810″-1.25″	1.063	0.748	0.630	0.197	0.276	0.590	0.197	0.295	0.320	0.138
TVB3610FA (14 pins)	**3**	1.142″-1.500″	1.409	0.819	0.433	0.197	0.276	0.630	G_1 0.248 G_2 0.197	0.299	0.384	0.177

These vertical mount accessories are designed to accommodate a variety of toroidal core sizes on to printed circuit board or other assemblies. (Contact Magnetics Application Engineering for new parts not shown here)

FIGURE 1
For use with P/N's 41206TC – 42212TC

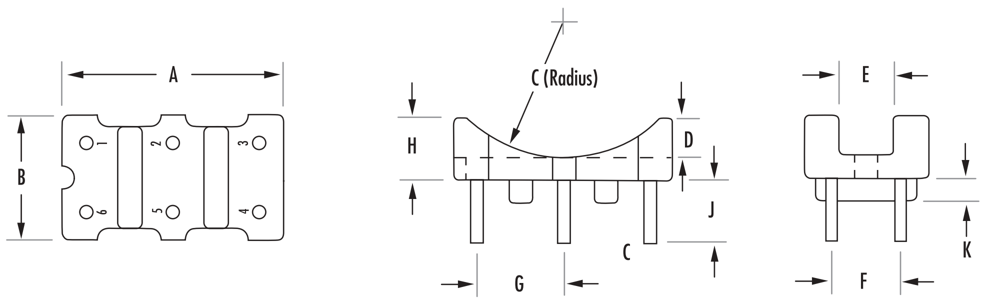


FIGURE 2
For use with P/N's 42507TC – 43113TC

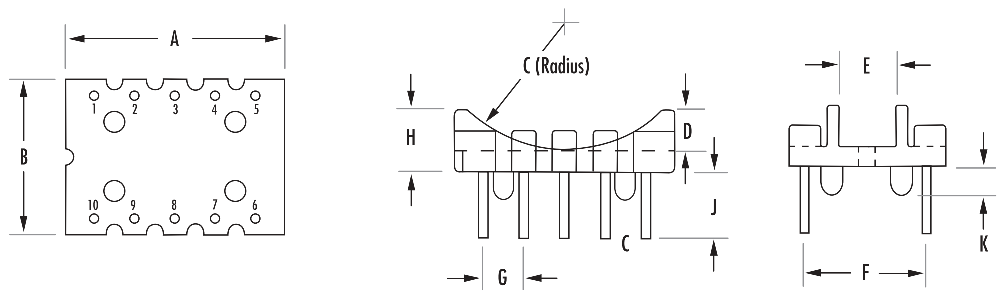
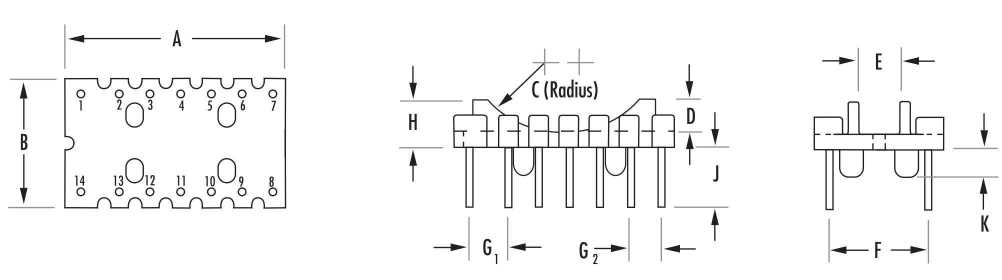


FIGURE 3
For use with P/N's 42908TC – 43825TC

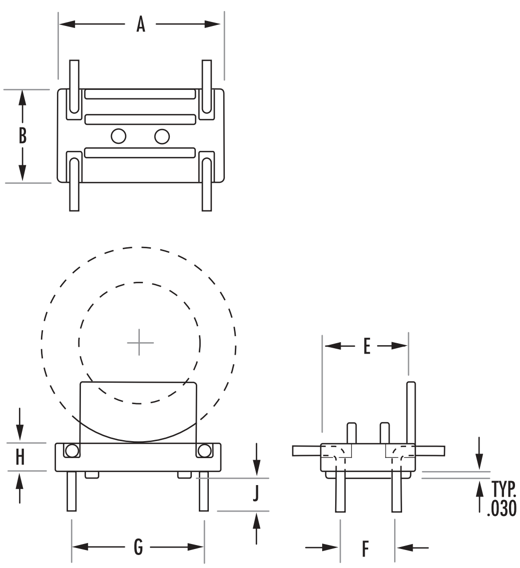


All parts
Material: Phenolic
UL 94 VO rated
Pin Material: CP Wire
Pin Diameter: .039″

Toroid Mounts (con't)

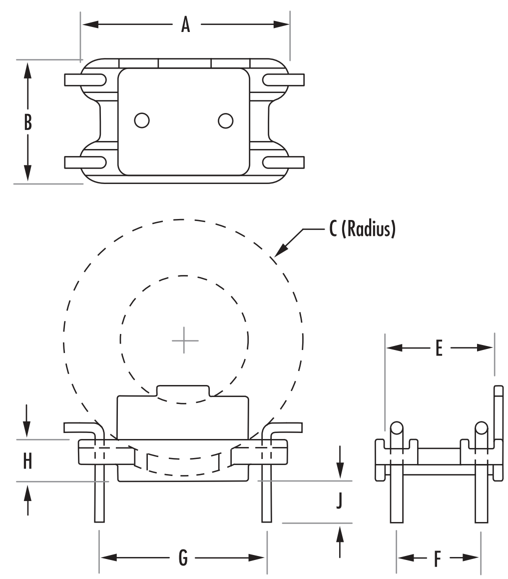
		DIMENSIONS (IN.) (NOM.)								
PART	**FIG**	**A**	**B**	**C**	**E**	**F**	**G**	**H**	**J**	**FOR CORE O.D.**
TVH22064A	**1**	0.750	0.425	-	0.385	0.250	0.600	0.125	0.150	0.5" – 1.00"
TVH25074A	**2**	1.000	0.600	0.600	0.510	0.400	0.800	0.200	0.200	0.81" – 1.14"
TVH38134A	**2**	1.100	0.800	0.800	0.710	0.600	0.900	0.200	0.200	1.25" – 1.50"
TVH49164A	**2**	1.400	0.900	1.270	0.810	0.700	1.20	0.200	0.200	1.5" – 2.5"
TVH61134A	**2**	1.700	1.100	1.400	1.010	0.900	1.500	0.200	0.200	1.9" - 2.8"

FIGURE 1



Material: Nylon
UL 94 VO rated
Pin Material: CP Wire
Pin Diameter: .040″

FIGURE 2



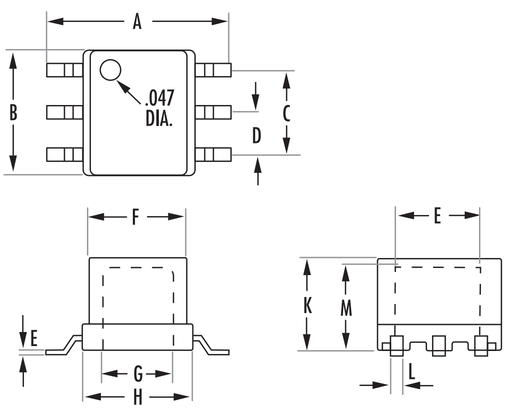
Material: Nylon
UL 94 VO rated
Pin Material: CP Wire
Pin Diameter: .050″

Toroid Cups and Headers

DIMENSIONS (IN.)														
PART	**FIG**	**A MAX**	**B MAX**	**C NOM**	**D TYP**	**E NOM**	**F MAX**	**G MIN**	**H NOM**	**J MIN**	**K MAX**	**L NOM**	**M MIN**	**FOR CORE O.D.**
SMC03016A	**1**	0.431	0.303	0.200	0.100	0.010	0.232	0.161	0.264	0.197	0.228	0.028	0.189	<0.155
SMC06018A	**2**	0.636	0.409	0.300	0.100	0.012	0.409	0.301	0.449	0.301	0.240	0.024	0.205	<0.250
SMH05025A	**3**	0.240	0.161	0.157	0.079	0.010.	0.250	-	-	-	0.043	0.024	-	<0.200
SMH07058A	**4**	0.398	0.378	0.295	0.098	0.010	0.494	-	-	-	0.063	0.024	-	<0.310

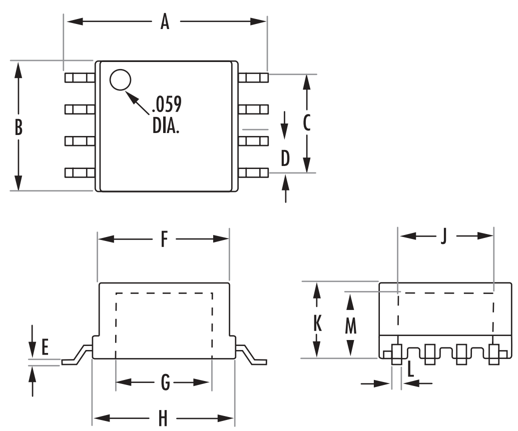
SURFACE MOUNT HEADERS Several surface mount headers are available. See page 6.16 for sizes and dimensions.

FIGURE 1



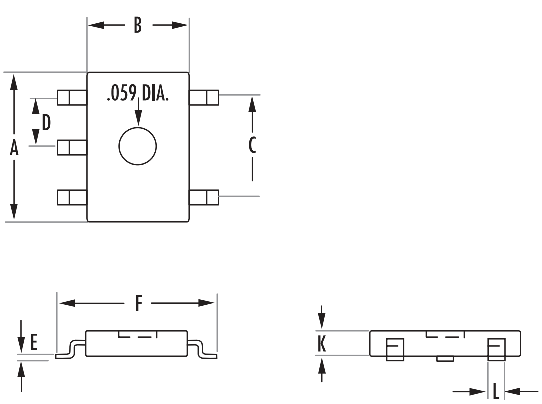
Material: L.C.P.
UL 94 VO rated
Pin Material: Phosphor Bronze

FIGURE 2



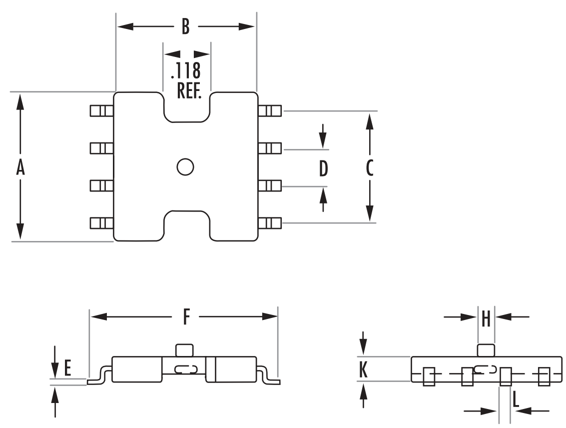
Material: Phenolic
UL 94 VO rated
Pin Material: Phosphor Bronze

FIGURE 3



Material: Phenolic
UL 94 VO rated
Pin Material: Phosphor Bronze

FIGURE 4

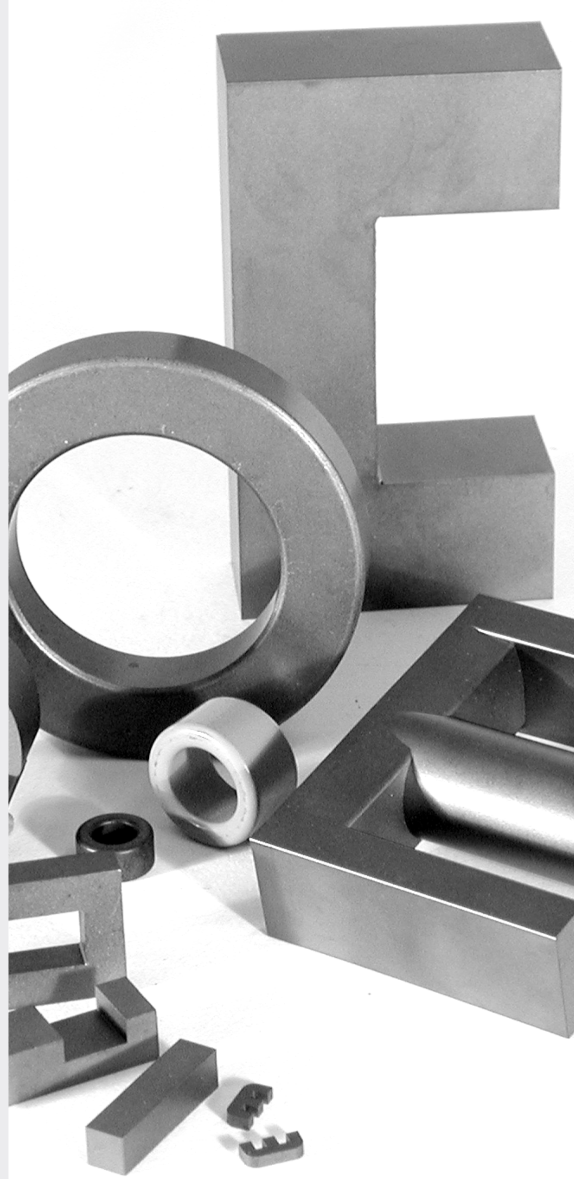


Material: L.C.P.
UL 94 VO rated
Pin Material: Phosphor Bronze

Notes

General Information

Section 14



SYMBOL	UNITS	DEFINITION
μ	—	Permeability—The ratio of magnetic flux density in gausses to magnetic field strength in oersteds. $$\mu = \frac{B}{H}$$
μ_i	—	Initial Permeability—The value of the permeability at very low magnetic field strengths. $$\mu_i = \lim_{H \to 0} \frac{B}{H}$$
μ_e	—	Effective Permeability—If a magnetic circuit is not homogeneous (i.e., contains an air gap), the effective permeability is the permeability of a hypothetical homogeneous (ungapped) structure of the same shape, dimensions, and reluctance, that would give the inductance equivalent to the gapped structure.
A_L	millihenries per 1,000 turns or nanohenries/turn^2	Inductance factor—In a wound core, the inductance per unit turn when L is in henries. More often, when L is expressed in millihenries, A_L is the inductance as measured using a thousand turn coil. When calculating for other turns, use: $L\ (mH) = A_L n^2/1{,}000^2$.
TC	/°C	Temperature Coefficient—The relative change in permeability per °C when measured at two different temperatures. $$TC = \frac{\mu_2 - \mu_1}{\mu_2\,(T_2 - T_1)}$$
TF	/°C	Temperature Factor—The temperature coefficient of a material per unit of permeability. $$TF = \frac{TC}{\mu_i}$$
TC_e	/°C	Effective Temperature Coefficient—The actual temperature coefficient of a magnetic structure whose material permeability has been reduced to μ_e by gapping. $$TC_e = TF \times \mu_e$$
DA	—	Disaccommodation—The relative decrease in permeability of a magnetic material with time after magnetic conditioning (demagnetization). $$DA = \frac{\Delta\mu}{\mu_1} \Big/ \log \frac{t_2}{t_1}$$ t1 = time from demagnetization to 1st measurement t2 = time from demagnetization to 2nd measurement For each decade of time, when $t_2 = 10t_1$ $$DA = \frac{\Delta\mu}{\mu_i}$$
DF	—	Disaccommodation Factor—The disaccommodation of a material per unit of permeability. $$DF = \frac{DA}{\mu_i}$$

SYMBOL	UNITS	DEFINITION
DF_e	—	Effective Disaccommodation Coefficient—The actual disaccommodation of a magnetic circuit whose material permeability has been reduced to μ_e by gapping. $DF_e = DF \times \mu_e$
Q	—	Q Factor—The efficiency of an inductor, that is the ratio of series inductive reactance to loss resistance. $Q = \frac{\omega L_S}{R_S}$
$\tan\delta$	—	Loss angle—Deviation from ideal phase angle (90˚) due to losses. $\tan\delta = \frac{R_S}{\omega L_S} = \frac{1}{Q}$
$\frac{\tan\delta}{\mu_i}$	—	Relative loss factor—Losses per unit of permeability. Figure of merit of a material. $\frac{\tan\delta}{\mu_i} = \frac{1}{\mu_i Q}$
C_h	/gausses	Hysteresis coefficient—The coefficient in the Legg** equation which separates the hysteresis losses from the eddy current and residual losses. $\frac{R_S}{\mu_i f L_S} = C_h B + C_e f + C_r$ This coefficient can be evaluated by noting the variation of series resistance with B.
$\frac{C_h}{\mu_i 2}$	/gausses	Relative Hysteresis Factor. This hysteresis coefficient normalized to unit permeability so that it is strictly a material property.
$C_{h(e)}$	/gausses	Effective Hysteresis Coefficient—The actual hysteresis loss in a magnetic structure whose permeability has been reduced to μ_e by gapping. $C_{h(e)} = \frac{C_h}{\mu_i 2} \times \mu_e^2$
B	gausses	Flux density—The magnetic flux in maxwells per cm^2 of cross sectional area.
B_{max}	gausses Teslas	The flux density at high field strengths (normally 25 oersteds). 10^4 gausses = 1 Tesla
H	oersteds	Field strength—The externally applied magnetizing field in oersteds.
Hc	oersteds amp-turns/m	Coercive force—The reverse magnetic field needed to reduce a magnetically saturated structure from remanence to zero magnetic induction. 1oersted = 79.5 amp-turns/m
L	henries	Inductance—The magnetic flux linkages in maxwells-turns per ampere of magnetizing current. $L = -N \frac{d\phi}{di}$
l_e	cm	Effective magnetic path length—In a structure containing a non-uniform cross section, the effective magnetic path length is that length of a similar structure with uniform cross section which is equivalent to the first for purposes of magnetic calculations.
A_e	cm^2	Effective cross-sectional area—In a structure containing a non-uniform cross section, the effective magnetic cross section is the area of a structure with uniform cross section which is equivalent to the first for purposes of magnetic calculations.
V_e	cm^3	Effective magnetic volume.
T_c	˚C	Curie Temperature—Temperature at which a ferromagnetic material loses its ferromagnetism and becomes paramagnetic (μ_e approaches 1).

**V.E. Legg, Magnetic Measurements at Low Flux Densities Using the Alternating Current Bridge, Bell System Technical Journal, 15, 39 (1936)

References

1.* Handbook of Modern Ferromagnetic Materials
Alex Goldman
Klywer Academic Publishers, Norwell, MA 02061

2.* Magnetic Core Selection for Transformers & Inductors,
Colonel Wm. T. McLyman
Marcel Dekker, 270 Madison Avenue, New York, NY 10016-0602

3.* Transformer and Inductor Design Handbook (second edition)
Colonel Wm. T. McLyman
270 Madison Avenue, New York, NY 10016-0602

4.* Fundamentals of Power Electronics
Robert Erickson
Chapman and Hall, New York, NY 10003

5.* Introduction to Power Electronics
Daniel Hart
Prentice-Hall, Upper Saddle River, NJ 07458

6.* Resonant Power Converters
Marian Kazimierczok
John Wiley & Sons, Inc., New York, NY 10158

7.* Power Switching Coverters
Simon Ang
Marcel Dekker, 270 Madison Avenue, New York, NY 10016

8.* Designing Magnetic Components for High Frequency DC-DC Converters
Colonel W.T. McLyman
Kg Magnetics, Idyllwild, CA 92549

9.* Elements of Power Electronics
Philip Krein
Oxford University Press, Cary, NC 27513

10.* Modern DC-DC Switchmode Power Converter Circuits (reprint)
Severns & Bloom, e/j Bloom associates inc.

11.* Switchmode Power Conversion
K. Kit Sum
Marcel Dekker, 270 Madison Avenue, New York, NY 10016-0602

12.* Applications of Magnetism, J.K. Watson, (self-published).

13.* Switching Power Supply Design (second edition)
A.I. Pressman
McGraw-Hill Publishing Co., 1221 Avenue of Americas, New York, NY 10020

14.* EMI Filter Design
R. Ozenbaugh
Marcel Dekker, 270 Madison Avenue, New York, NY 10016-0602

15.* Handbook of Switch Mode Power Supply Design
K. Billings
McGraw-Hill Publishing Co., 1221 Avenue of Americas, New York, NY 10020

16.* Handbook of Transformer Applications (second edition)
W. Flanagan
McGraw-Hill Publishing Co., 1221 Avenue of Americas, New York, NY 10020

17.* Practical Switching Power Supply Design,
Marty Brown
Academic Press Inc., San Diego, CA 92101

18. Modern Ferrite Technology
Alex Goldman
Van Nostrand Reinhold, 115 Fifth Avenue, New York, NY 10003

19. Power Line Filter Design for Switch-Mode Power Supplies
Mark J. Nave
EMC Services, P.O. Box 2504, Huntsville, AL, Telephone 205-461-0241

20.* Solid-State Power Conversion Handbook
R. Tarter
John Wiley & Sons Inc., 605 Third Avenue, New York, NY 10158

21.* Power Electronics: Converters, Applications & Design (second edition)
N. Mohan et. al.
John Wiley & Sons Inc., 605 Third Avenue, New York, NY 10158

22.* Power Supply Cookbook
Marty Brown
Butterworth - Heinemann, 313 Washington Street, Newton, MA 02158

23.* Designing Magnetic Components for High Frequency DC-DC Converters
Colonel Wm. T. McLyman
KG Magnetics Inc., P.O. Box 3703, 26504 Crestview Dr.,
Idyllwild, CA 92549, Telephone 909-659-4548

24.* Pulse Width Modulated DC-DC Converters
Keng Wu
Chapman and Hall, New York, NY 10003

25.* Power Electronics-Principles & Applications
Joseph Vithayathil
McGraw Hill Inc., 1221 Avenue of Americas, New York, NY 10020

26. MMPA Publications of Soft Ferrites
PC 110 Pot Core Standard
UEI 310 U, E and I Core Standard
FTC 410 Toroid Standard
Soft Ferrites, A User's Guide
Available from: Magnetic Materials Producers Association,
8 South Michigan Avenue, Suite 1000, Chicago, IL 60603,
Telephone 312-456-5590, Fax 312-580-0165

*Available from: e/j Bloom associates inc.,
115 Duran Drive, San Rafael, CA 94903-2317
Phone (415) 492-8443 Fax (415) 492-1239
email ejbloom@compuserve.com http://www.ejbloom.com

ADDITIONAL MAGNETICS FERRITE LITERATURE

CG-01 - A Critical Comparison of Ferrites with other Magnetic Materials
FC-S1 - Ferrite Material Selection Guide
FC-S2 - EMI-RFI Filter, Common Mode Filter - Material Selection
FC-S3 - Qcurves for Ferrite Cores
FC-S4 - Step Gap E-Core Swing Chokes
FC-S7 - Curve Fit Equations for Ferrite Materials
FC-S8 - Designing with Ferrite Planar Cores
CG-2 - Material Selection Charts for Frequency, Temperature, Geometry, Stability
PS-01 - Cores for SMPS
CG-03 - Cores for Flybacks
HED-01 - Cores for Hall Effect Devices

Other Products from Magnetics

POWDER CORES

Powder cores are excellent as low loss inductors for switched-mode power supplies, switching regulators and noise filters. Most core types can be shipped immediately from stock.

Molypermalloy powder cores (MPP) are available in ten permeabilities ranging from 14 through 550, and have guaranteed inductance limits of ±8%. Insulation on the cores is a high dielectric strength finish not affected by normal potting compounds and waxes. Thirty sizes include I.D.s from 0.070" (1.78 mm) to 1.938" (49.2 mm) and O.D.s from 0.140" (3.56 mm) to 3.063" (77.8 mm). Standard cores include either temperature stabilized (as wide as -65° C at 125° C for stable operation) or standard stabilization.

High Flux powder cores have a much higher energy storage capacity than MPP cores and are available in six permeabilities from 26µ through 160µ. High Flux cores a re available in sizes identical to MPP cores.

Kool Mµ® powder cores have a higher energy storage capacity than MPP cores and are available in five permeabilities from 26µ through 125µ. Kool Mµ toroids are available in sizes identical to MPP cores, and this material is also available in a number of E-core sizes. Permeability for Kool Mµ E-cores is from 26 to 90 and sizes are tooled ranging from the EF 12.6 to the Metric E80 size.

MPP THINZ® are extremely low height (<1 mm) self-shielded power inductor cores, allowing finished inductor heights in the 1.5 mm to 2mm range. THINZ come in 5 sizes with O.D.s ranging from 0.120" through 0.310" and four permeabilities: 125µ, 160µ, 200µ and 250µ.

For further information view Powder Cores Design Manual at www.mag-inc.com.

STRIP WOUND CORES

Tape wound cores are made from high permeability alloys of nickel-iron, grain oriented silicon-iron. The alloys are known as Orthonol®, Alloy 48, Square Permalloy 80, Supermalloy and Magnesil® . Cores are available in more than 50 standard sizes. For a wide range of frequency applications, materials are produced in thicknesses from 1/2 mil(0.013 mm) through 14 mils (0.356 mm). Cases are robust nylon boxes, rated for 200° C continuous operation and 2000 voltage minimum breakdown.

Applications include: magnetic amplifiers, reactors, regulators, static magnetic devices and current transformers.

For further information view the Tape Wound Core Design Manual at www.mag-inc.com.

Miniature Tape Wound Bobbin Cores are manufactured from Permalloy 80 and Orthonol ultra-thin tape (0.000125" to 0.001" thick). They are available in widths from 0.031" to 0.250" (wider on special request). Wound on non-magnetic stainless steel bobbins, core diameters are available down to 0.050", with flux capacities as low as several maxwells.

Magnetics' sophisticated pulse test equipment reproduces most test programs and can measure accurately in the millivolt-microsecond region.

Applications include: magnetometers, flux gates, oscillators, inverters and magnetic amplifiers.

For further information view the Bobbin Core Design Manual at www.mag-inc.com.

RAPID PROTOTYPING SERVICE

Magnetics' world-class materials offer unique and powerful advantages to almost any application. An even greater competitive edge can be gained through innovations in new core shapes and custom geometries, and Magnetics is poised to help. Our Rapid Prototyping Service can quickly make a wide variety of core shapes in ferrite, MPP, High Flux, or Kool Mu®. The time between receipt of your drawing and delivery of the parts to you is usually less than 10 days. This quick turnaround time results in a shorter design period, which gets your product to market faster. Plus, our application engineers may be able to provide design assistance that could lead to a lower piece price. To learn more about how our Rapid Prototyping Service can help you shorten your design cycle, contact a Magnetics Application Engineer.

Notes

www.mag-inc.com

Visit MAGNETICS' website for a wealth of easy to access information on soft magnetic cores and materials…

All product specifications for MAGNETICS' ferrite cores, powder cores and strip wound cores can be found quickly by using the menu driven product locator.

MAGNETICS' Digital Library contains all of the company's technical bulletins, white papers and design manuals, which can be viewed on-screen or downloaded.

The Software section of the website provides access to the MAGNETICS' software design aids for designing Common Mode Filters, Current Transformers, Inductors and MagAmps.

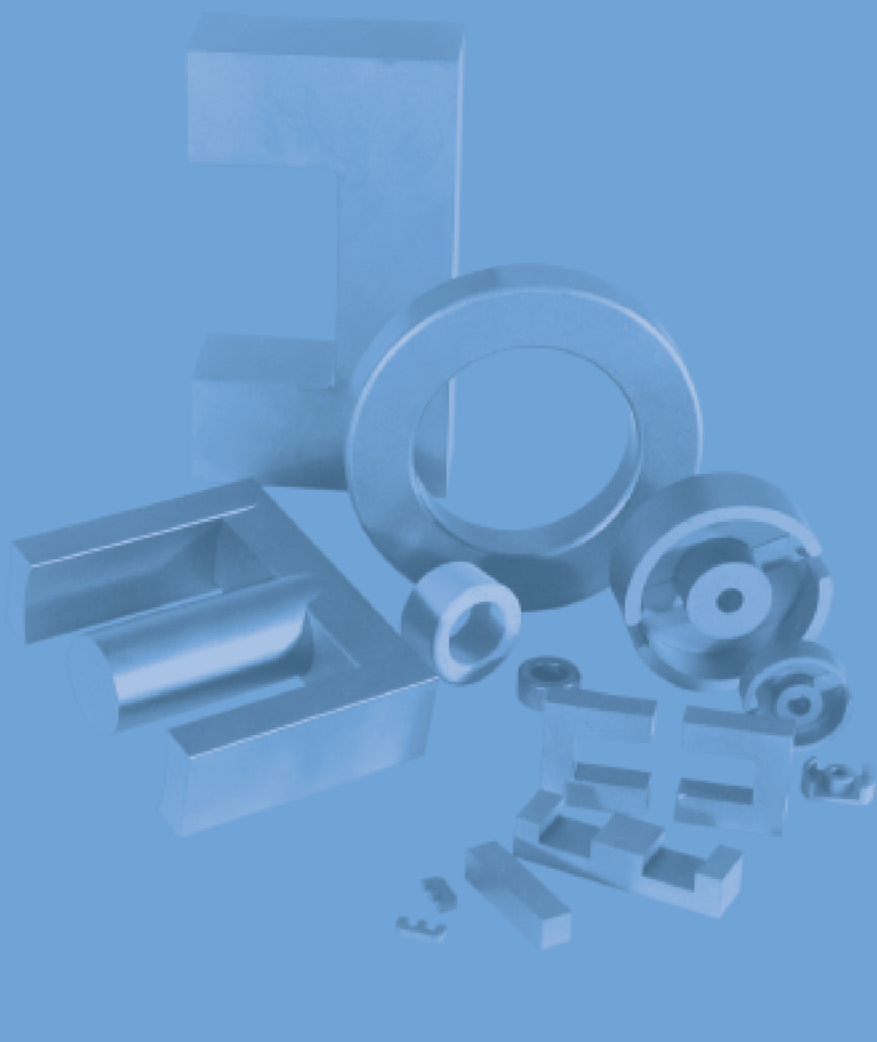
Contact information for MAGNETICS' global distribution network, including access to STOCKCHECK, an easy way to check distributor inventory via the web.

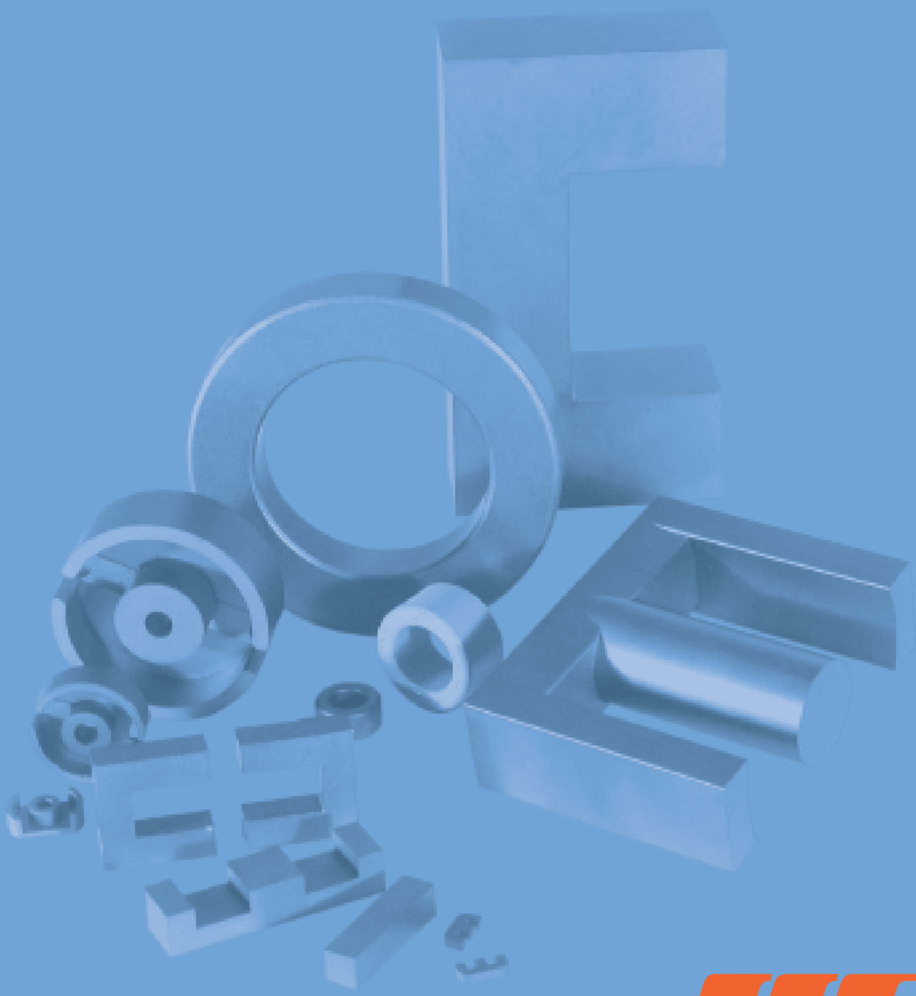
CONTACT MAGNETICS

P.O. Box 11422
Pittsburgh, PA 15238-0422

Phone: 412-696-1300 or 1-800-245-3984
Fax: 412-696-0333

email: magnetics@spang.com
web: www.mag-inc.com





P.O. Box 11422
Pittsburgh, PA 15238-0422
Phone: 1.800.245.3984
Fax: 412.696.0333

www.mag-inc.com MAGNETICS® magnetics@spang.com