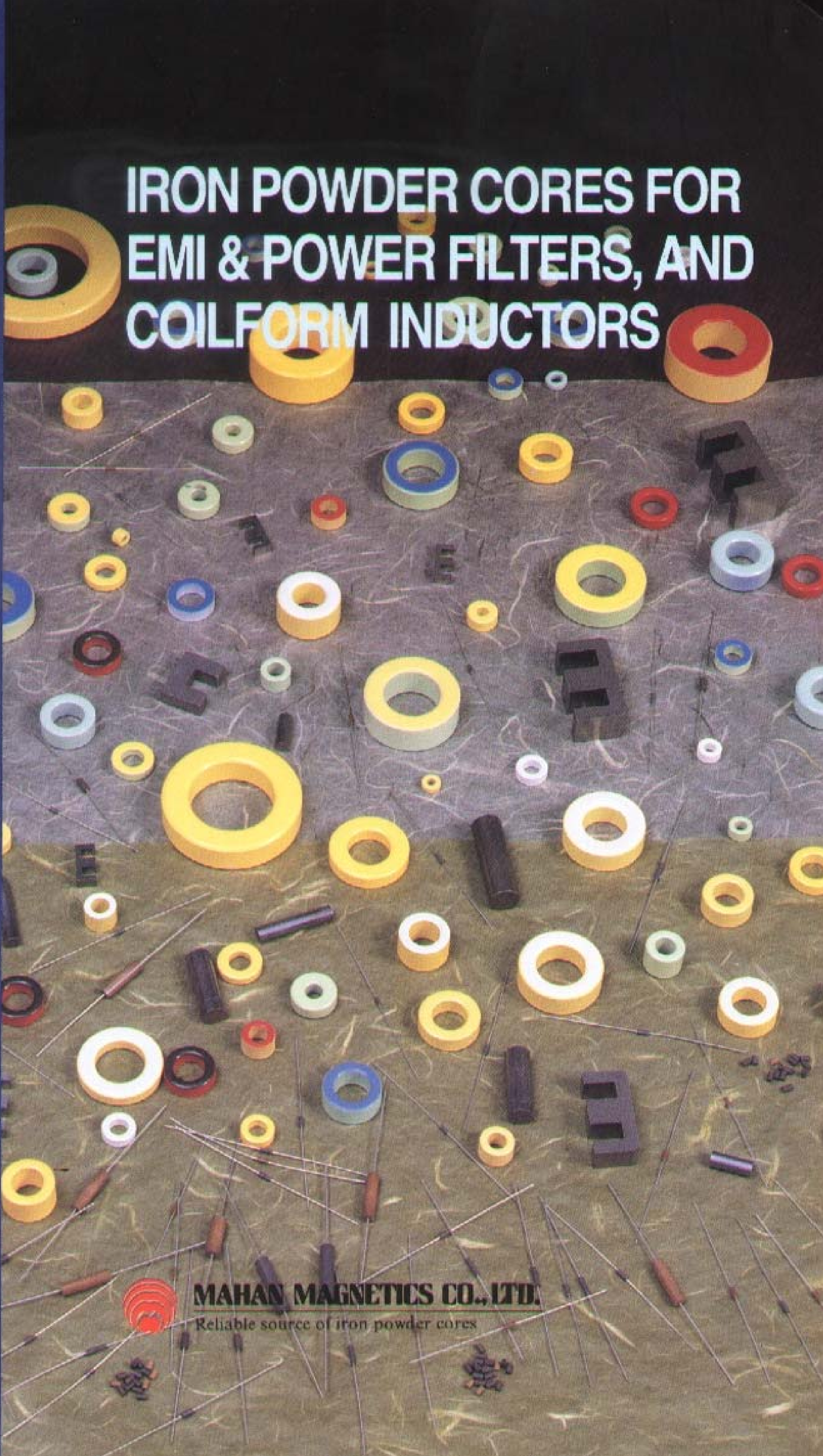
IRON POWDER CORES FOR EMI & POWER FILTERS, AND COILFORM INDUCTORS



MAHAN MAGNETICS CO., LTD.

Reliable source of iron powder cores

Contents

Contents

Introduction to Mahan Magnetics Co., Ltd

Since establishment of Mahan Magnetics in January 1987, we have specialized in developing and manufacturing iron powder cores and provided industries worldwide with quality soft magnet cores, such as iron powder cores for EMI filter, fixed inductor and power choke, the number of which is over three hundred million pieces total.

Our major products are toroids for power and RF application, E, U, bar and coilforms.

Currently, in 1993, we are developing various types of material and shape for higher frequency application, and others with less core loss and will introduce these in foreseeable future.

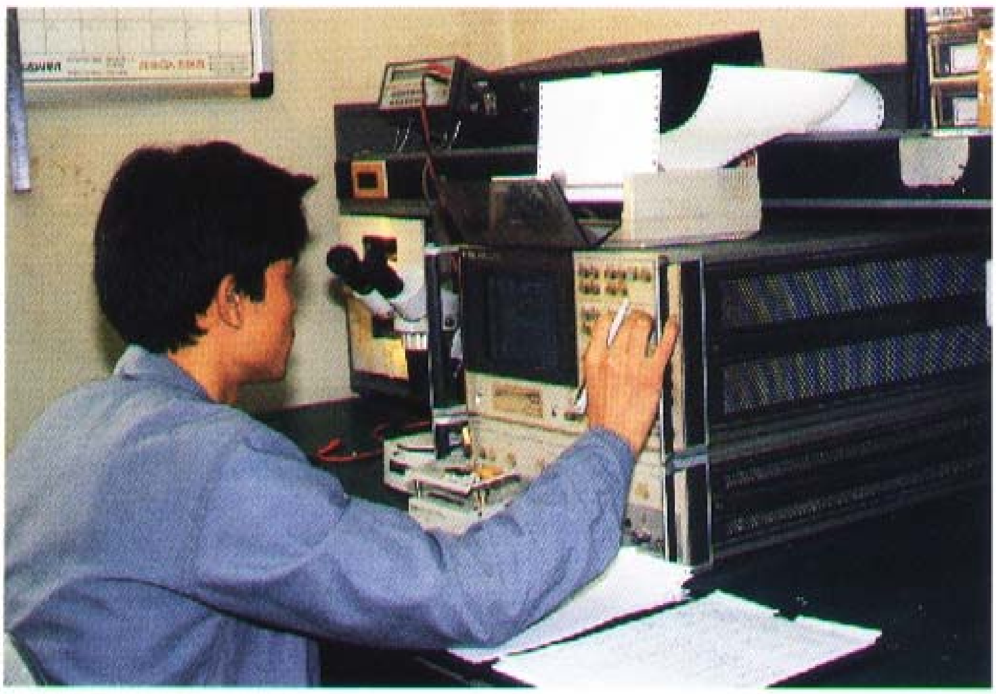
In the following pages of this catalog and others, you will find our collection of iron powder cores. If you have any questions regarding these or new types in shape or material, please don't hesitate to contact us.

We will do our best to meet our customer's requirements fast with reasonable cost and to give satisfaction in every respect. And I believe that Mahan is well positioned and experienced to do this.

November, 1993

SG Han/CEO

SungGunHan



Typical Properties and Applications

Major Application

- Output chokes for switching power supplies
- Conducted EMI noise filter (AM range).
- Frequency control circuits by SCR.
- Pulse transformers.
- DC output/input filters.
- Light dimmer chokes.
- DC to DC converters.
- Precision Inductors.

Material properties

Material Code	#11	#16	#17	#19
Applicable frequency	Up to 50 Khz	100Khz	500Khz	2Mhz
Initial permeability	60	75	75	35
Temperature coefficient (ppm/degree, ℃)	930	895	660	220
Inductance tolerance	± 10%	± 10%	±10%	± 10%
Core loss(mW/cc) (100Khz, 100 gauss)	50	44	27	14
DC bias characteristics, % (1 Khz, 20 g, 50 Oe)	55	51	60	88

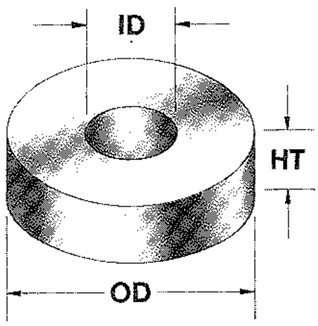
Mahan Code Numbering System

T 080 - 16 0 3

- 3 — Finish Code
- 0 — Code Height: O:Standard Height Alphabet (A, B, C, etc) : Special Height
- 16 — Material Code
- 080 — Outside Diameter, 1/100inch
- T — Type of Core(T=Toroidal, E=E Core, U=U Core)

* Finish Code : All Mahan Magnetics powdered iron toroidal cores have a minimum dielectric strength of 1,000 volts, rms.

Magnetics Formulae



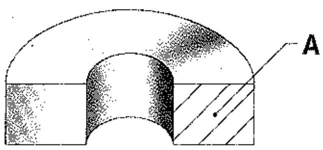
Physical | **Toroid**

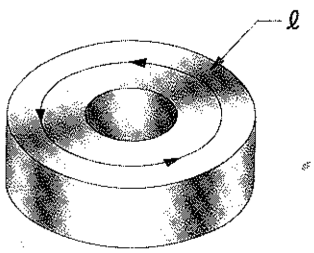
Cross Sectional Area: $A = \frac{OD - ID}{2} \times HT \times 6.45^{*}\,\mathrm{cm}^2$

Mean Magnetic Path Length: $l = \frac{OD + ID}{2} \times \pi \times 2.54^{*}\,\mathrm{cm}$

Core Volume: $V = A \times l\ \mathrm{cm}^2$

No corrections for corner radii, die taper or rounded tooling are made
* Metric conversion, omit if dimensions are in cm





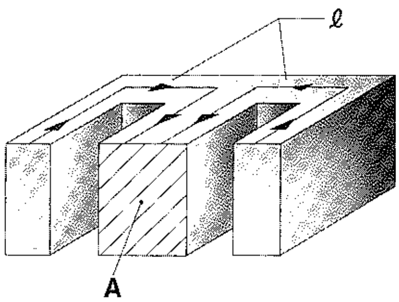
Electrical | **All Cores**

Inductance: $L = \frac{\mu \times .4\pi \times N^2 \times A}{l \times 10^8}$ henries

Flux Density (Gauss): $B = \frac{E \times 10^8}{4.44 \times A \times N \times f}$ (ac signal)

$B = \frac{Et \times 10^8}{N \times A}$ (Square wave)

Magnetizing Force (Oersteds): $H = \frac{.4\pi\, N I_p}{l}$



Permeability: $\mu = \frac{B}{H}$

Inductance vs. Turns: L in mh $N = 1000\sqrt{\frac{L}{L_{1000}}}$

L in h $N = 100\sqrt{\frac{L}{L_{100}}}$

Where

OD = Outside diameter in inches
ID = Inside diameter in inches
HT = Height in inches
π = Pi = 3.14159
μ = Permeability
N = Number of turns
A = Cross sectional area in cm^2
l = Magnetic path length in cm
f = Frequency in Hz

B = Flux density in gauss
h = Inductance in henries
H = Oersteds
I_p = Peak Current in amperes
t = Time in seconds
L_{1000} = Inductance per 1000 turns
L_{100} = Inductance per 100 turns
E = Volts

Toroids

Toroid Specification

		Inductance at 10Khz B=10 Gauss			inductance Tolerance ± 10%	
MAHAN PART NO	M'MS PART NO	FINISHED DIMENSION			AL Value(μ H) 10Khz, 10 Gauss at 100 turns	TEST VOLTAGE (mV)
		O.D(mm/in)	I.D(mm/in)	H.T(mm/in)		
T030-1103	T30-40	7.80/0.307	3.84/0.151	3.25/0.128	280	28
1603	26				335	
1703	52				305	
1903	8/90				140	
T037-1103	T37-40	9.53/0.375	5.21/0.205	3.25/0.128	245	30
1603	26				285	
1703	52				260	
1903	8/90				120	
T037-16B3	---	9.53/0.375	5.21/0.205	4.83/0.190	410	46
17B3	---				400	
T038-1103	T38-40	9.53/0.375	4.45/0.175	4.83/0.190	415	50
1603	26				490	
1703	52				490	
1903	8/90				200	
T044-1103	T44-40	11.18/0.440	5.82/0.229	4.04/0.159	310	48
1603	26				370	
1703	52				350	
1903	8/90				180	
T044-16J3	---	11.18/0.440	5.82/0.229	4.72/0.186	444	56
17J3					420	
T044-16A3	---	11.18/0.440	5.82/0.229	5.94/0.234	550	70
17A3	---				520	
T050-16E3	---	12.82/0.505	7.62/0.300	5.32/0.209	390	60
17E3	---				390	
T050-16D3	---	12.82/0.505	7.62/0.300	8.52/0.335	640	100
17D3	---				600	
T051-11K3	T50-40	12.70/0.500	7.70/0.303	4.83/0.190	295	54
16K3	26				330	
17K3	52				330	
19K3	8/90				175	

MAHAN PART NO	M'MS PART NO	FINISHED DIMENSION O.D(mm/in)	I.D(mm/in)	H.T(mm/in)	AL Value(μ H) 10Khz, 10 Gauss at 100 turns	TEST VOLTAGE (mV)
T051-1603	---	12.70/0.500	7.70/0.303	5.00/0.197	350	56
1703	---				350	
T051-11A3	T50-40B	12.70/0.500	7.70/0.303	6.35/0.250	385	70
16A3	26B				435	
17A3	52B				435	
19A3	8B/90				235	
T051-16G3	---	12.70/0.500	7.70/0.303	8.50/0.335	580	90
17G3	---				550	
T051-11D3	T50-40D	12.70/0.500	7.70/0.303	9.53/0.375	590	100
16D3	26D				720	
17D3	52D				660	
T058-1603	---	15.00/0.590	8.00/0.315	6.70/0.264	600	104
1703	---				580	
T058-16A3	---	15.00/0.590	8.00/0.315	10.40/0.410	910	160
17A3	---				850	
T060-1103	T60-40	15.24/0.600	8.53/0.336	5.94/0.234	415	88
1603	26				500	
1703	52				470	
1903	8/90				190	
T060-16D3	T60-26D	15.24/0.600	8.53/0.336	11.94/0.470	970	178
17D3	52D				940	
T067-1603	---	17.27/0.680	9.80/0.386	5.18/0.204	435	86
1703	---				440	
T067-16A3	---	17.27/0.680	9.80/0.386	6.84/0.268	550	110
17A3	---				540	
T069-1103	T68-40	17.53/0.690	9.40/0.370	4.83/0.190	350	86
1603	26				435	
1703	52				400	
1903	8/90				195	
T069-11A3	T68-40A	17.53/0.690	9.40/0.370	6.35/0.250	470	114
16A3	26A				580	
17A3	52A				540	
19A3	8A/90				260	
T069-11B3	T68-40D	17.53/0.690	9.40/0.370	9.52/0.375	700	172
16B3	26D				870	
17B3	52D				800	

※TOLERANCE : T030~T094 ⇨ ±0.38㎜(0.015inch)

MAHAN PART NO	M'MS PART NO	FINISHED DIMENSION			AL Value(μ H) 10Khz, 10 Gauss at 100 turns	TEST VOLTAGE (mV)
		O.D(mm/in)	I.D(mm/in)	H.T(mm/in)		
T072-1103	T72-40	18.29/0.720	7.11/0.280	6.60/0.260	710	164
1603	26				900	
1703	52				820	
1903	8/90				360	
T080-1103	T80-40	20.20/0.795	12.57/0.495	6.35/0.260	395	100
1603	26				460	
1703	52				420	
1903	8/90				180	
T080-16A3	---	20.20/0.795	12.57/0.495	9.22/0.363	640	150
17A3	---				580	
T080-11K3	T80-40B	20.20/0.795	12.57/0.495	9.53/0.375	590	170
16K3	26B				710	
17K3	52B				630	
19K3	8B/90				295	
T080-11B3	T80-40D	20.20/0.795	12.57/0.495	12.70/0.500	790	210
16B3	26D				920	
17B3	52D				830	
T090-1103	T90-40	22.86/0.900	13.97/0.550	9.53/0.375	570	170
1603	26				710	
1703	52				630	
1903	8/90				295	
T090-16A3	---	22.86/0.900	13.97/0.550	11.50/0.452	820	220
17A3	---				750	
T094-1103	T94-40	23.93/0.942	14.22/0.560	7.92/0.312	490	160
1603	26				600	
1703	52				570	
1903	8/90				250	
T106-11A3	T106-40A	26.92/1.060	14.48/0.570	7.92/0.312	580	200
16A3	26A				670	
17A3	52A				670	
T106-11J3	T106-40	26.92/1.060	14.48/0.570	11.10/0.437	810	300
16J3	26				930	
17J3	52				950	
19J3	8/90				450	
T106-11B3	T106-40B	26.92/1.060	14.48/0.570	14.60/0.575	1060	400
16B3	26B				1240	
17B3	52B				1240	

※TOLERANCE : T030~T094 ⇨ ±0.38㎜(0.015inch)
T106~T150 ⇨ ±0.51㎜(0.020inch)

MAHAN PART NO	M'MS PART NO	FINISHED DIMENSION			AL Value(μ H) 10Khz, 10 Gauss at 100 turns	TEST VOLTAGE (mV)
		O.D(mm/in)	I.D(mm/in)	H.T(mm/in)		
T125-16A3	T124-26	31.62/1.245	18.00/0.710	7.11/0.280	580	210
T130-11A3	T130-40A	33.00/1.300	19.80/0.780	5.72/0.225	340	160
16A3	26A				410	
T130-11J3	T130-40	33.00/1.300	19.80/0.780	11.10/0.437	690	320
16J3	26				810	
17J3	52				790	
19J3	8/90				350	
T131-1103	T131-40	33.00/1.300	16.26/0.640	11.10/0.437	930	400
1603	26				1160	
1703	52				1080	
1903	8/90				525	
T132-1103	T132-40	33.00/1.300	17.78/0.700	11.10/0.437	830	360
1603	26				1030	
1703	52				950	
T141-1103	T141-40	35.94/1.415	23.35/0.880	10.50/0.415	600	300
1603	26				750	
1703	52				690	
T150-1103	T150-40	38.35/1.510	21.46/0.845	11.10/0.437	780	400
1603	26				960	
1703	52				980	
T157-1103	T157-40	39.90/1.570	24.13/0.950	14.48/0.570	860	500
1603	26				1000	
1703	52				990	
1903	8/90				420	
T175-1103	T175-40	44.45/1.750	27.18/1.070	16.50/0.650	900	600
1603	26				1050	
1703	52				1050	
T185-1103	T184-40	46.74/1.840	24.13/0.950	18.00/0.710	1430	860
1603	26				1690	
1703	52				1590	
1903	8/90				720	
T200-1103	T200-40	50.80/2.000	31.75/1.250	13.97/0.550	790	580
1603	26				920	
1703	52				920	
1903	8/90				425	

※TOLERANCE : T106~T150 ⇨ ±0.51㎜(0.020inch)
T157~T300 ⇨ ±0.64㎜(0.025inch)

MAHAN PART NO	M'MS PART NO	FINISHED DIMENSION			AL Value(μ H) 10Khz, 10 Gauss at 100 turns	TEST VOLTAGE (mV)
		O.D(mm/in)	I.D(mm/in)	H.T(mm/in)		
T200-11B3	T200-40B	50.80/2.000	31.75/1.250	25.40/1.000	1420	1000
16B3	26B				1600	
17B3	52B				1550	
19B3	8B/90				785	
T201-1103	T201-40	50.80/2.000	24.13/0.950	22.20/0.875	1940	1200
1603	26				2420	
1703	52				2240	
T225-1103	T225-40	57.15/2.250	35.75/1.405	13.97/0.550	780	630
1603	26				980	
1703	52				920	
1903	8/90				425	
T225-16B3	T225-26B	57.15/2.250	35.70/1.405	25.40/1.000	1600	1150
17B3	52B				1550	
T250-1103	T250-40	63.50/2.500	31.75/1.250	25.40/1.000	1940	1700
1603	26				2420	
1703	52				2420	
T300-1103	T300-40	77.22/3.040	49.20/1.930	12.70/0.500	710	760
1603	26				800	
1703	52				800	
1903	8/90				370	
T300-11B3	T300-40D	77.22/3.040	49.20/1.930	25.40/1.000	1420	1600
16B3	26D				1600	
17B3	52D				1500	
T325-1603	---	82.75/3.258	53.30/2.100	17.50/0.689	1100	1150
1703	---				1000	

※TOLERANCE : T157~T300 ⇨ ±0.64mm(0.025inch)
T325 ⇨ ±1.00mm(0.040inch)

INDUCTANCE

The cores are manufactured to the AL values listed : the permeability for each material is for reference only. The toroidal cores are typically tested with a full single -layer winding. The E cores are tested with 100 turns. In all cases, the AL values are based on a peak AC flux density of 10 gauss at a test frequency of 10kHz.

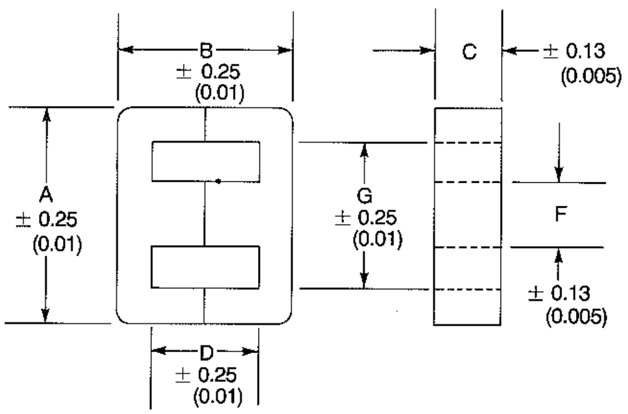
TEMPERATURE EFFECTS

Operating temperature of Mahan iron powder cores is from-55 degreeC to + 125 degree C. But because of higher Curie tempearature of iron powder material itself, it will work properly to several hundred degree C.
However, continuous operation over 125 degree C core temperature may cause a permanent damage of insulation of iron powder itself, and coating material, which results in decrease of inductance, increase of core loss, etc.
Degree of this change depends upon the conditions functioning out of the above limit. So high temperature application dominated mainly by outstandinǧ core loss is not recommended for continuously proper operation in the circuitries, ie, higher frequency, comparatively large current AC chokes.

E Cores

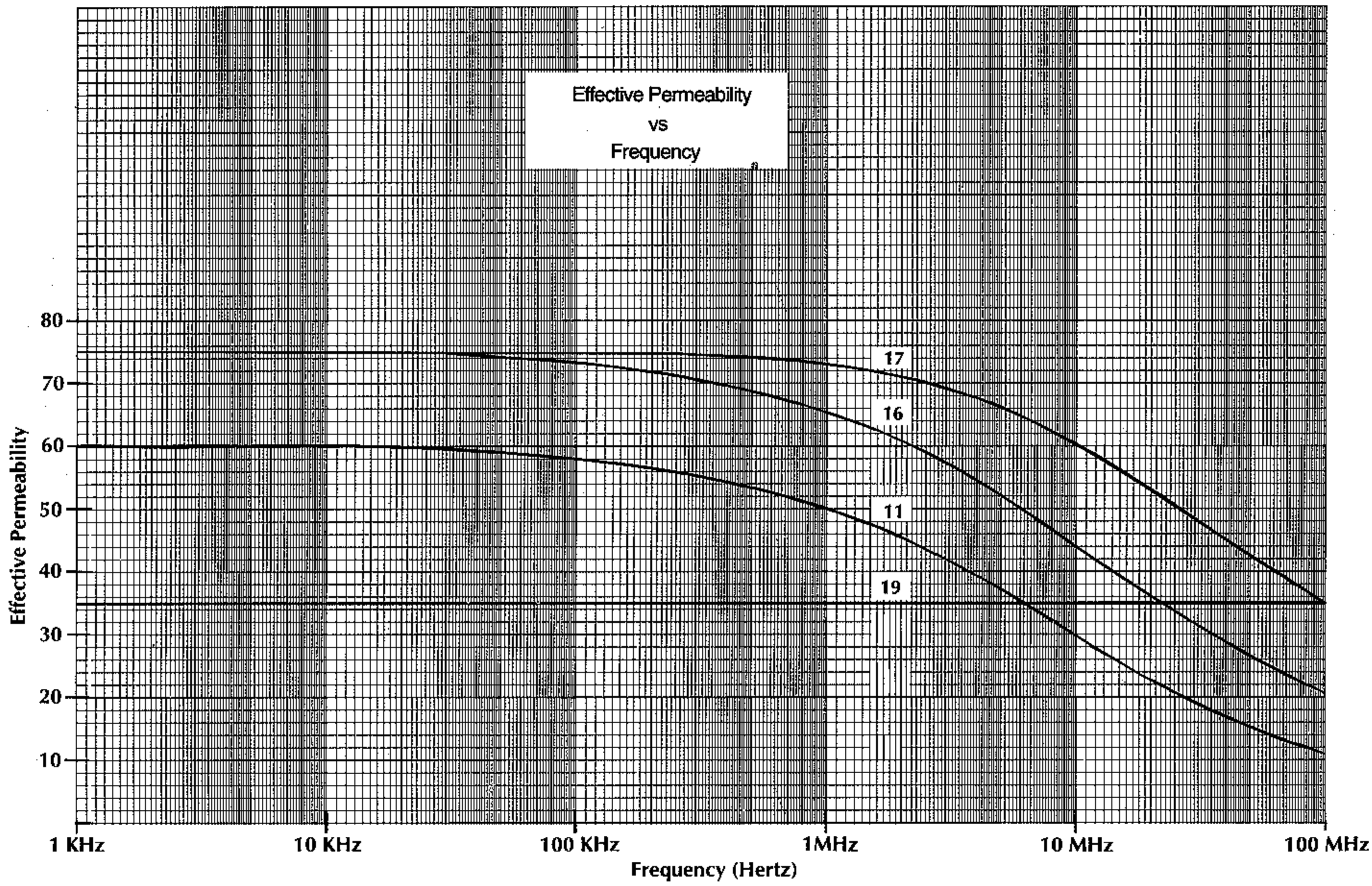
MAHAN PART NO	M'MS PART NO	FINISHED DIMENSION A	B	C	D	F	G	AL Value(μ H) 10Khz, 10Gauss at 100 turns	TEST VOLTAGE (mV)
E075-1101	E75-40	19.05/ 0.075	16.13/ 0.635	4.75/ 0.187	11.56/ 0.455	4.75/ 0.187	14.28/ 0.562	550	100
1601	26							640	
1701	52							590	
1901	8							330	
E100-1101	E100-40	25.40/ 1.000	19.05/ 0.705	6.36/ 0.250	12.70/ 0.500	6.35/ 0.250	19.05/ 0.750	810	180
1601	26							920	
1701	52							850	
1901	8							480	
E137-1101	E137-40	34.93/ 1.375	29.21/ 1.150	9.53/ 0.375	19.05/ 0.750	9.53/ 0.375	25.40/ 1.000	1130	400
1601	26							1340	
1701	52							1310	
1901	8							670	
E145-1601	E145-26	36.83/ 1.455	34.80/ 1.370	10.80/ 0.425	24.13/ 0.950	10.80/ 0.425	26.30/ 1.035	1460	580
1701	52							1460	
E162-1101	E162-40	41.28/ 1.625	34.09/ 1.342	12.70/ 0.500	21.39/ 0.842	12.70/ 0.500	28.58/ 1.125	1750	710
1601	26							1950	
1701	52							1990	
1901	8							1050	
E168-1101	E168-40	42.80/ 1.685	42.16/ 1.660	15.00/ 0.590	30.73/ 1.210	12.06/ 0.475	30.73/ 1.210	1630	800
1601	26							1950	
1701	52							1790	
1901	8							970	
E168-11A1	E168-40A	42.80/ 1.685	42.16/ 1.660	20.00/ 0.787	30.73/ 1.210	12.06/ 0.475	30.73/ 1.210	1960	1000
16A1	26A							2320	
17A1	52A							2300	
19A1	8A							1160	
E187-1101	E187-40	43.37/ 1.865	39.42/ 1.552	15.75/ 0.620	24.18/ 0.952	15.75/ 0.620	31.75/ 1.250	2530	1100
1601	26							2970	
1701	52							2850	
1901	8							1410	
E200-1101	E200-40	56.13/ 2.210	55.37/ 2.180	20.80/ 0.820	38.35/ 1.510	17.27/ 0.680	38.61/ 1.520	2400	1500
1601	26							2860	
1701	52							2620	
1901	8							1430	
E225-1101	E225-40	56.89/ 2.240	47.63/ 1.875	18.92/ 0.745	28.96/ 1.140	18.92/ 0.745	38.10/ 1.500	3030	1600
1601	26							3500	
1701	52							3420	
1901	8							1730	

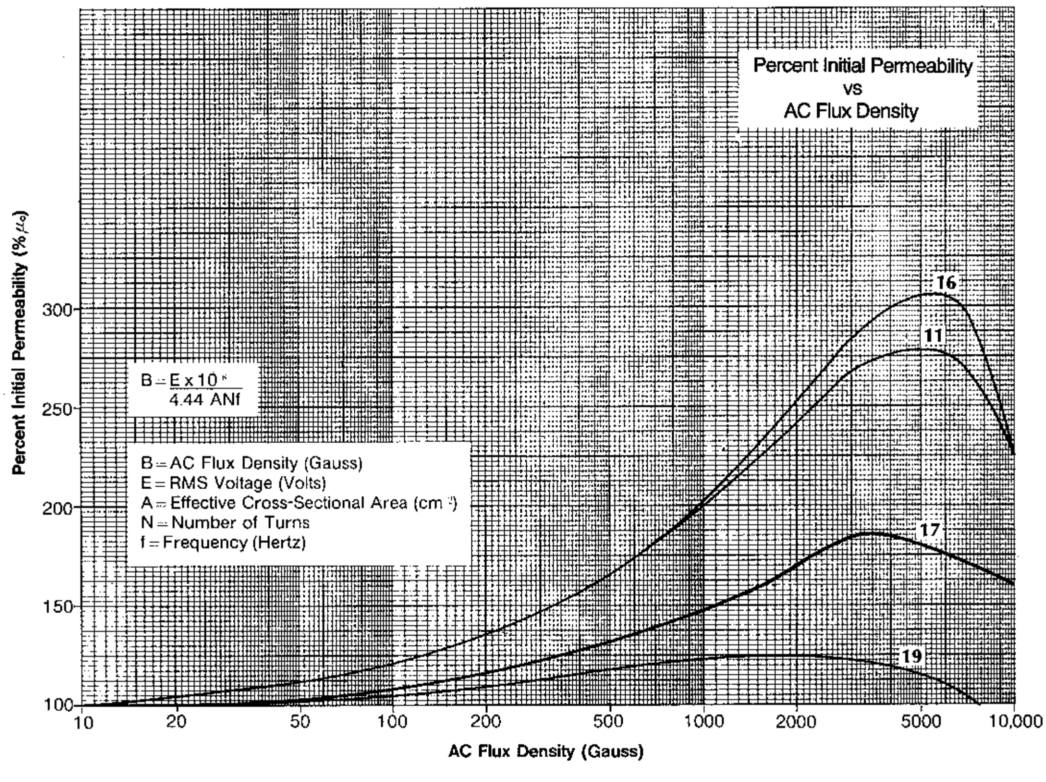
Tolerance(mm)



E cores are becoming more popular in the electronic industry because of their convenient shape and easy winding. A plastic coilform or bobbin designed to fit over one of the core legs can be easily wound independent of core halves. The cores are then inserted into the bobbin so the faces mate. The assembly can then be fastened with cement or with specially designed mounting hardware.

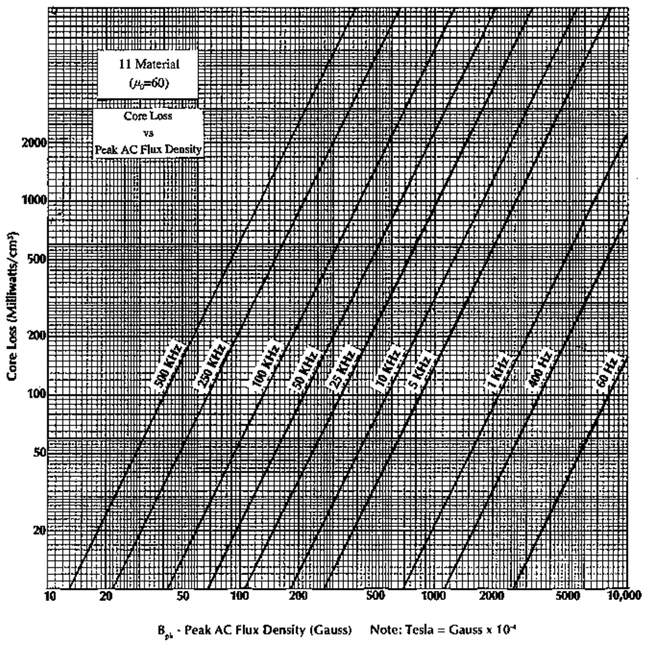
Permeability vs. Frequency





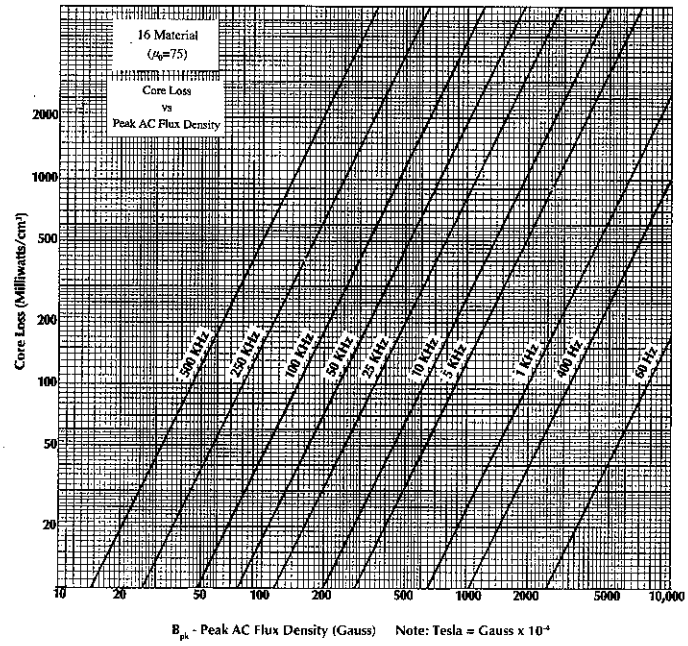
CORE LOSS(Typical)

μ =60 -11 Material



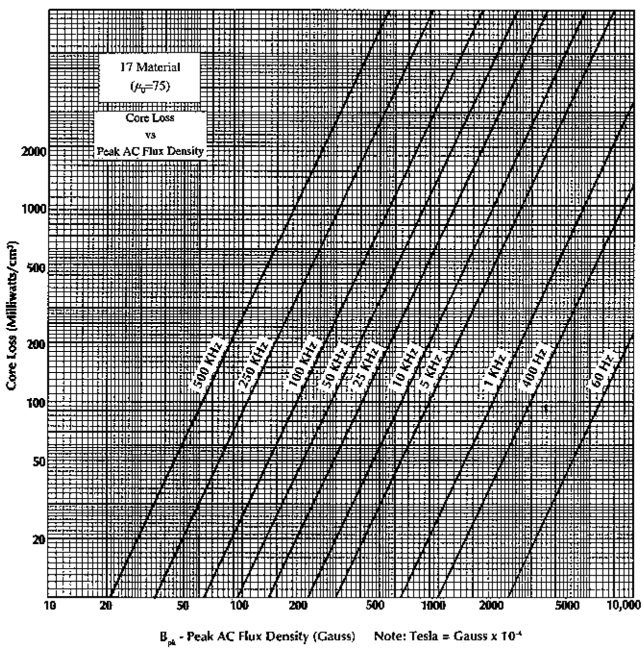
Typical Applications : Light dimmer and other 60Hz filter applications. DC output chokes and power factor correction chokes below 100 KHz. The least expensive material.

μ =75 -16 Material



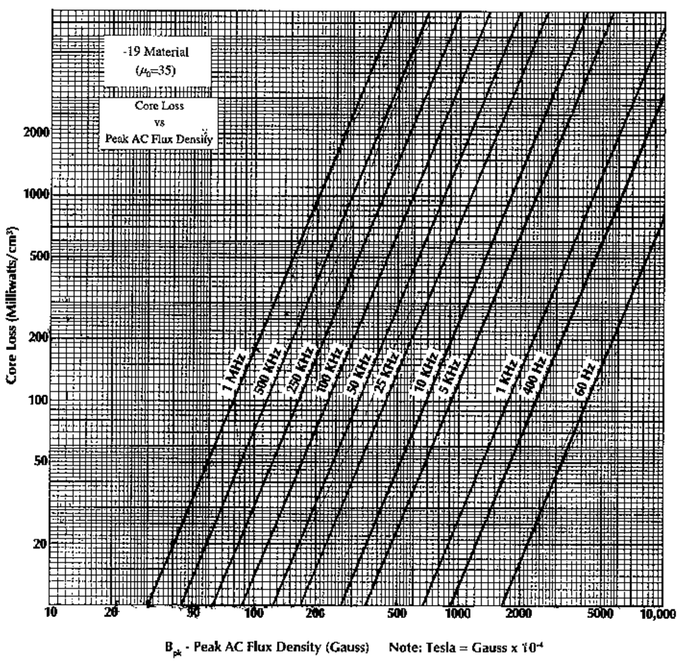
Typical Applications : DC output chokes and power factor correction chokes upto 100KHz. Light dimmer and other 60Hz filter applications.

μ =75 -17 Material



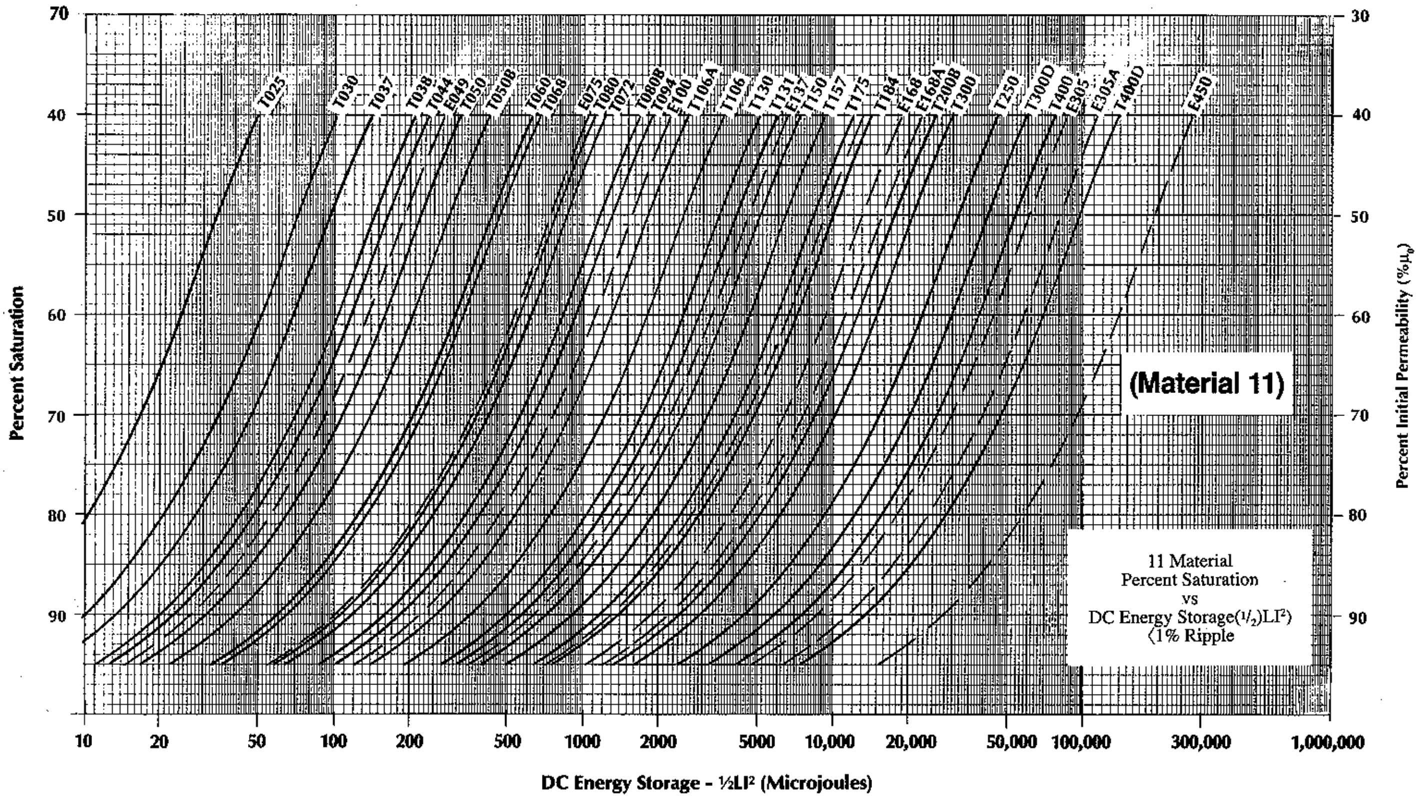
Typical Applications : DC output chokes and power factor correction chokes from 10KHz to 500KHZ. Lower core loss at high frequency than -16 Material.

μ =35 -19 Material

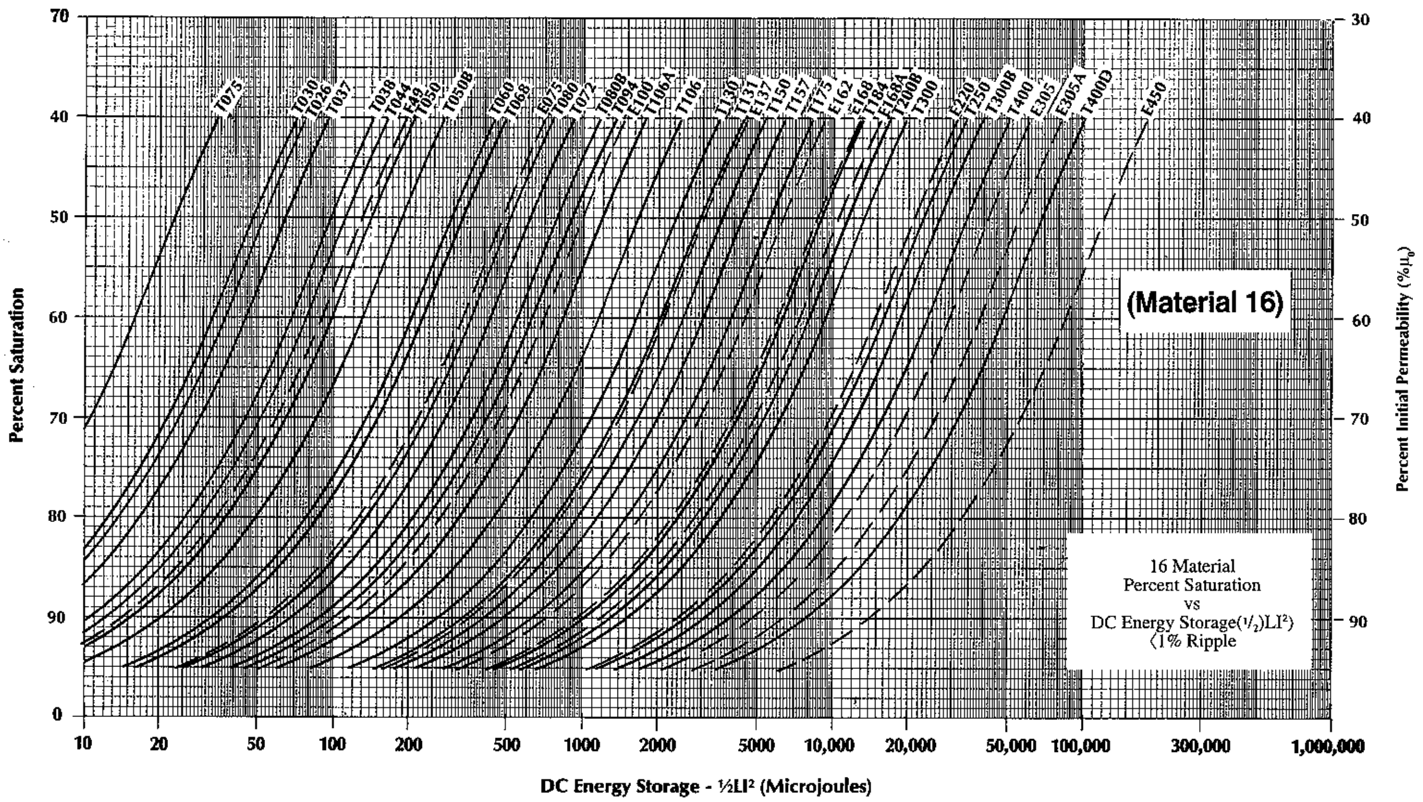


Typical Applications : DC output chokes and power factor correction chokes from 50KHz to 5MHz. This matertial has low core loss and good linearity with high bias required.

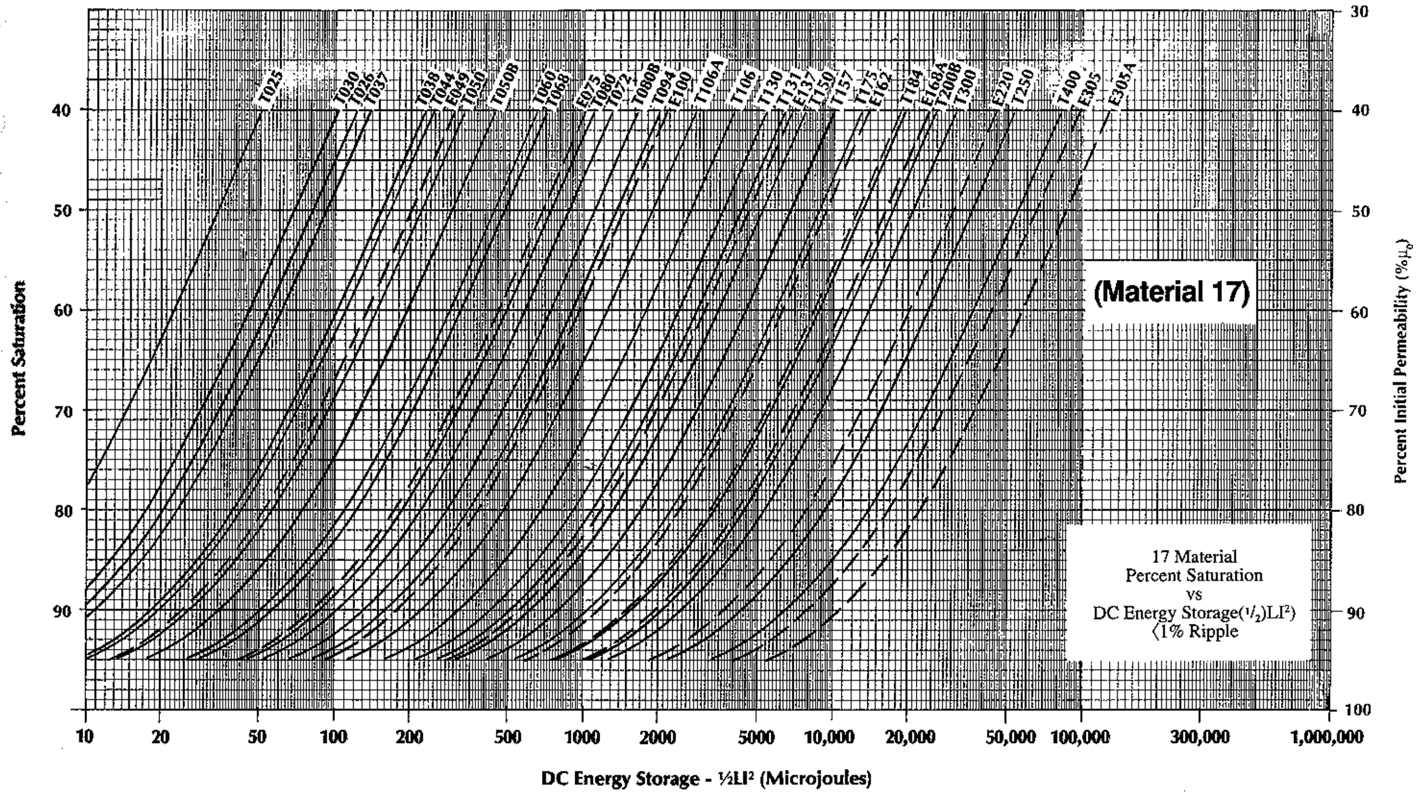
DC Energy Storage (Material 11)



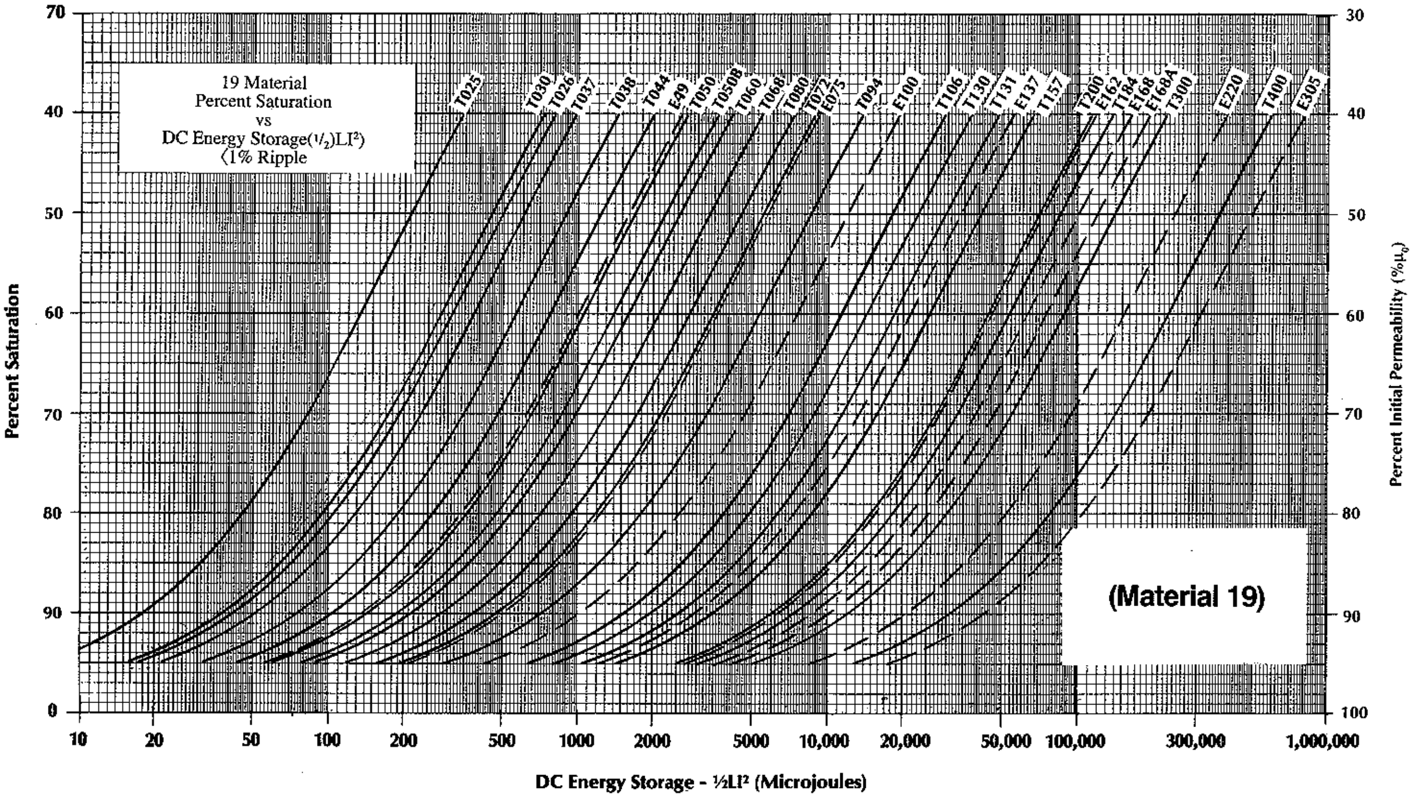
DC Energy Storage (Material 16)



DC Energy Storage (Material 17)



DC Energy Storage (Material 19)



RF Toroids

In RF circuit applications a wide variety of iron powder material has been used for many years for its stability, frequency response, high "Q", and narrow permeability tolerances, and for its close uniformity within lots and relative uniformity from lot to lot, many of engineers prefer iron powder material in their radio frequency circuits. Because iron powder has high Curie temperature, it is well suited to operation from -55℃ and also functions up to two hundred degrees Celcius. But continued operation above 125℃ may result in a permanent shift in characteristics.

Material Properities for RF Applications

Material Code	Basic Powder Material	Initial Permeability	Temperature Coefficient (ppm/℃)	Suggested Frequency Ranges						
				50KHZ–250KHZ	250KHZ–500KHZ	500KHZ–2MHZ	2MHZ–10MHZ	10MHZ–40MHZ	40MHZ–150MHZ	150MHZ–250MHZ
00	Phenolic	1	0						→	→
03	Carbonyl J	7	165					→	→	
04	Carbonyl SF	8	35				→	→		
05	Carbonyl TH	9	30			→	→	→		
06	Carbonyl E	10	45	→	→	→	→			
07	Carbonyl C	20	120	→	→	→				
08	Carbonyl GS6	25	180		→	→	→			
09	Carbonyl HP	30	320	→	→	→				
19	Carbonyl GQ4	35	220	→	→	→				

*Major material sources : GAF in USA and BASF in Germany.

Coilforms

Iron powder coilform cores have been widely used in high precision telecommunication equipments for many years. It is usually called as axial type cores because it has two leads on both ends. For axial type cores ferrite is most widely used but for inductors of small inductance iron powder material is preferred to the other materials.

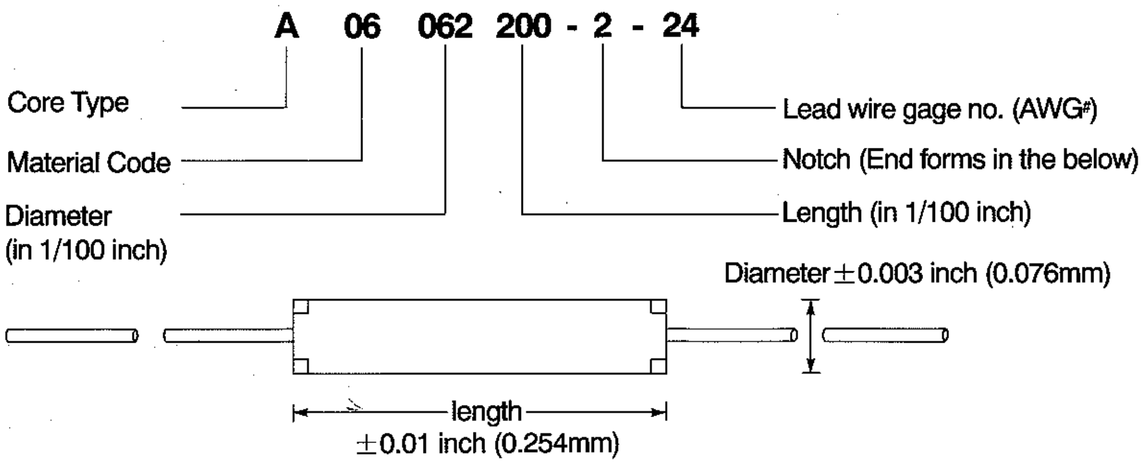
It has temperature stability, high "Q", high Curie temperature and mechanical ruggedness. And its narrow permeability tolerances allow many engineers to use this material without hesitation.
Mahan produces many kinds of iron powder coilform cores for your selection. The chart below will give you an assistance to select proper material for your requirements.
Because iron of lower permeability has high frequency ranges it is necessary to use material of inherently lower permeability for high frequency application. The use of iron powder coilforms will guarantee higher "Q" and reliability of lead attachment to core body than any other material.

Material Properties for Iron Powder Coilforms

Material Code	Basic Powder Material	Initial Permeability	Temperature Coefficient (ppm/ ℃)	Suggested Frequency Ranges						
				50KHZ–250KHZ	250KHZ–500KHZ	500KHZ–2MHZ	2MHZ–10MHZ	10MHZ–40MHZ	40MHZ–150MHZ	150MHZ–250MHZ
00	Phenolic	1	0						→	→
03	Carbonyl J	7	165					→	→	
04	Carbonyl SF	8	35				→	→		
05	Carbonyl TH	9	30			→	→	→		
06	Carbonyl E	10	45	→	→	→				
07	Carbonyl C	20	120	→	→	→				

* Major Material Source : GAF in U.S.A. and BASF in Germany

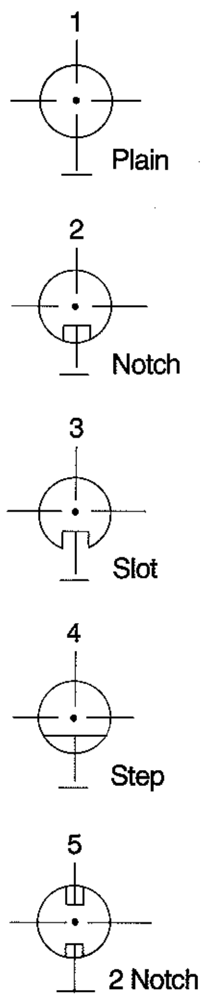
Mahan Coilforms Part Numbering System



Dimensions		END FORM OPTION AVAILABLE	LEAD TYPE (1 ½ "100%tin plated) AWG#
Diameter in/mm	Length in/mm		
.047/1.19	.170/4.32	1	#24, #26
.047/1.19	.175/4.45	1	#24, #26
.051/1.29	.150/3.81	1	#24, #26
.051/1.29	.175/4.45	1	#24, #26
.062/1.57	.194/4.93	1,2,5	#22, #24, #26
.062/1.57	.200/5.08	1,2,5	#22, #24, #26
.070/1.78	.196/4.98	1,2,5	#22, #24, #26
.070/1.78	.200/5.08	1,2,5	#22, #24, #26
.070/1.78	.322/8.18	1,2,5	#22, #24, #26
.076/1.93	.312/7.92	1,2,5	#22, #24, #26
.107/2.72	.250/6.35	1,2,3,4,5	#20, #22
.125/3.17	.600/15.24	1,2,3,4,5	#21, #22
.187/4.75	.600/15.24	1,3	#20, #21, #22
.218/5.54	.600/15.24	1,3	#20, #21, #22
.250/6.35	.600/15.24	1,3	#20, #21, #22

* Core dimensions, end forms, and leads are option.
* Please make contact with our sales office for your special applications.

End Forms :



Glossary

AC Flux Density (Gauss) : Number of flux lines per unit of cross-sectional area generated by an alternating magnetic field.

$$Bac = \frac{(E)(10^8)}{(4.44)(A)(N)(f)} \quad \text{or} \quad Bac = \frac{\sqrt{2}NIA_L(\%\mu_0)}{A10^2}$$

Where : E = rms voltage
A = cross-section area (cm²)
N = number of turns
f = frequency (hertz)

Where : N = number of turns
I = rms current (amperes)
A_L = inductance index (μ h/100t)
% μ_0 = percent of μ_0 at operating conditions(%)
A = cross-section area (cm²)

Ampere Turns(NI) : The product of current (I) flowing in the winding times number of turns (N).

Butt-Gap : The gapping of E-Cores by equally spacing all three legs of the cores rather than introducing a gap in the center leg only. Twice as much center-leg gap is required to electrically duplicate a given butt-gap.

Common-Mode Noise : Electrical interference that is common to both lines. Also known as balanced noise.

Copper Loss : (Watts) : The power loss or heat generated by current flowing in a conductor of given resistance : copper loss = I^2R.

Core Loss(Watts) : The power absorbed by a core subjected to an alternating magnetic field.

Cross-Sectional Area(cm²) : The effective area available for lines of flux.

DC Energy Storage(microjoules)-1/2 LI² : The product of one-half the inductance in microhenries times the current, in amperes, squared ; when the current is predominantly DC.

DC Energy Inductors : An inductor which will carry primarily DC current.

Differential-Mode Noise : Electrical interference that is not common to both lines. Also known as unbalanced noise.

Distributed Air-Gap : The minute air gaps around the individual particles in a powder core.

Effective Permeability : The relative permeability of a magnetic structure under a given set of conditions.

Electro-Magnetic Radiation : Magnetic lines of flux which escape the magnetic structure.

Full Winding : For toroidal cores, a winding which theoretically will result in 45% of the core's inside diameter remaining. Type of insulation, tightness of winding, and coil winding equipment limitations will determine the feasibility of the figures provided.

Initial Permeability(μ_0) : Permeability = μ = B/H
Initial permeability is that value of permeability when Bac = 10gs.

Inductance Rating(A_L value μh/100turns) : The inductance in microhenries for a 100 turn winding at inital permeability(Bac = 10gs.) Since inductance varies squared with turns we have the following relationships :

$$\frac{L^1}{t_1^2} = \frac{L^2}{t_2^2}$$

100 μ h/100 turns = 10mh/1000 turns = 10nh/t²

Magnetizing Force(oersteds) : Field strength which produces magnetic flux.

Microjoules(10^{-6} joules): The units of energy.

Mean Magnetic Path(cm) : the effective magnetic length of a core structure.

Percent Initial Permeability(% μ) : The percentage of effective permeability to initial permeability (can be greater than or less than 100%).

Percent Ripple : The percentage of ripple or AC flux to total flux, or in an inductor the percentage of alternating current.

Percent Saturation : The reciprocal of percent initial permeability.
ie 90% of mitial permeability = 10% saturation.

Permeabilty(μ) : By Definition μ = B/H. Where B is the flux density in gauss and H is the magnetizing force in oersteds.

Ripple Flux : Flux generated by a time-varying magnetic field.

Simple Winding : For toroidal cores a winding which theoretically will result in 78% of the cores inside diameter remaining. Oftentimes this will produce a single layer winding.

Single Layer Winding : For a toroidal core, a winding which will result in full utilization of the inside circumference of the core without the overlapping of turns. Thickness of insulation and tightness of wind will affect results.

Swing : A term used to describe how inductance responds to changes in current. (Example) : A 2 : 1 swing corresponds to an inductor which exhibits 2 times the inductance, at very low current, as it does at maximum-rated current.
(This means that the core is operating at 50% of initial permeability at maximum current).

Surface Area(cm²) : The effective area available to dissipate heat.

Temperature Rise(℃) : The increse in surface temperature of the inductor due to total power dissipation in the component (both copper and core loss)

$$Rise(℃) = \frac{\text{Total Power Dissipation (Milliwatts)}}{\text{Surface Area(cm}^2)} \; .833$$

■ **Authorized Dealers:**

■ **North America**
Bankson and Associates Int'l., Inc.
Phone:1-909-672-6020
FAX:1-909-672-6022

■ **Taiwan**
FORMOSA SHING-GA ENTERPRISE CO., LTD
Phone:886-2-756-7589
FAX:886-2-756-3026

■ **Hong Kong**
NYP Trinity Limited
Phone:852-557-1882
FAX:852-897-9110

■ **Italy**
E. C. M
Phone:39-2-90, 75, 44, 72
FAX:39-2-90, 75, 36, 35

■ **Spain**
Prodin
phone:34-3-373, 82, 62
FAX:34-3-373, 89, 64

■ **India**
Ceedee
phone:91-22-2083138
FAX:91-22-2082853

■ **England**
CCS
phone:44-0296-415999
FAX:44-0296-437688

● International Country Code included in the Phone/FAX numbers.

MAHAN MAGNETICS CO., LTD.

903, 9FL., GUN AM BLDG.
831-37, YEOGSAM-DONG, GANGNAM-GU,
SEOUL, KOREA. ZIP CODE:135-080
Phone:82-2-558-3754
FAX:82-2-558-2208

Printed in Korea.