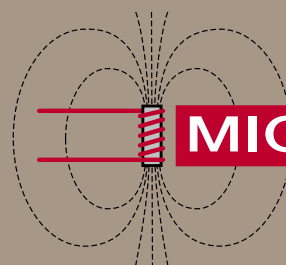


200C SERIES™

High Temperature Powder Cores
For Power Applications



MICROMETALS

IRON POWDER CORES

Issue C
February 2007



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INTRODUCTION

Micrometals 200C Series™ of magnetic alloy materials are specifically designed for severe environment applications where cores are exposed to or generate elevated temperatures. These cost-competitive core materials are not subject to thermal aging for operating temperatures up to +200 °C. Revision C of this catalog introduces 2 new materials to the 60 series of materials. The -63 Material offers excellent high frequency properties while the -66 Material offers core losses that are well suited from 100kHz to 500kHz.

FINISH

The toroidal cores are provided with a protective coating. The T16 and T20 sizes are coated with Parylene C. The larger cores are coated with a two color code finish that is UL approved for Flame Class UL94V-0 per file #E140098(S).

AVAILABILITY

Part numbers which appear in bold print are considered stock items and will be most available. Other items are available on a build-to-order basis.

SAMPLES & ENGINEERING KITS

Micrometals will gladly extend sample cores and design assistance to aid in your core selection. Contact the factory regarding available engineering kits.

WARRANTY

Parts are warranted to conform to the specifications in the latest issue of this catalog. Micrometals' liability is limited to return of parts and repayment of price; or replacement of nonconforming parts. Notice of nonconformance must be made within 30 days after delivery. Before using these products, buyer agrees to determine suitability of the product for their intended use or application. Micrometals shall not be liable for any other loss or damage, including but not limited to incidental or consequential damages.

TEL. (714) 970-9400
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MICROMETALS

GENERAL MATERIAL PROPERTIES

Material Mix No.	Reference Permeability (μ_0)	Material Density (g/cm ³)	Relative Cost	Color Code
-60	55	6.1	2.2	Brown/Black
-61	35	6.1	2.2	Brown/Gray
-63	35	5.9	3.7	Brown/Beige
-66	66	6.2	2.9	Brown/Brown
-70	100	7.4	14	Beige/Black
-M125	125	7.7	15	Lt Blue/Lt. Blue

CORE LOSS COMPARISON (mW/cm³)

PERM. WITH DC BIAS

Material Mix No.	60Hz @5000G	1kHz @1500G	10kHz @500G	50kHz @225G	100kHz @140G	500kHz @50G	1MHz @40G	DC = 50 Oersteds	
								% μ_0	$\mu_{\text{effective}}$
-60	43	72	76	70	52	38	68	74	40.6
-61	80	118	113	97	69	43	72	87	30.5
-63	74	77	60	47	31	15	20	92	31.2
-66	48	69	48	29	17	14	31	63	44.0
-70	5.8	9.0	9.6	13	13	28	70	50	49.5
-M125	5.3	6.3	6.2	10	13	34	86	44	55.0

MAGNETIC TOLERANCE & DIMENSIONAL TOLERANCE (inches)

MATERIAL MIX NO.	-60, -61, -63 & -66 Materials			-70 Material			-M125 Material	
A_L Tolerance	±10%			±10%			±10%	
TOROIDS*	OD	ID	Ht	TOROIDS*	OD	ID	Ht	
T14 - T20	±.010	±.010	±.010	T150 - T225	±.025	±.025	±.030	
T22 - T38	±.015	±.015	±.020	T249 - T400	±.030	±.030	±.030	
T40 - T72	±.020	±.020	±.020	T520 - T650	±.050	±.050	±.050	
T80 - T141	±.020	±.020	±.025					
E-CORES	A	B	C	D	F	G	Max. Gap**	
E49 - E118	±.010	±.010	±.005	±.007	±.005	±.007	.0015	
E125 - E162	±.015	±.015	±.007	±.010	±.007	±.010	.0015	
E168 - E225	±.015	±.015	±.010	±.010	±.007	±.010	.0020	
E305 - E450	±.030	±.030	±.015	±.020	±.015	±.020	.0030	
E610	±.040	±.040	±.025	±.030	±.025	±.030	.005	

*Tolerance includes coating **Gap per piece.

MATERIAL DESCRIPTION

60 Series: The 60 series of materials are cost effective magnetic powder alloy materials available in a wide range of properties with permeabilities ranging from 35 to 66. The -63 Material has excellent high frequency properties and can be utilized past 10MHz. The -66 Material has the best performance in the 100kHz to 500kHz range.

70 Series: The 70 series is a magnetic powder alloy including nickel. The -70 Material has higher permeability than the 60 series with excellent losses up to 400kHz. The -70 Material is a relatively expensive material, most competitively priced in smaller sizes.

M Series: The M series is a moly-permalloy powder material and will have the highest permeability and lowest losses below 200kHz. Similar to the -70 Material in cost, the -M125 Material will be most competitively priced in physically small sizes.

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FAX (714) 970-0400

MICROMETALS

TOROIDAL CORES

COLOR CODE

- 60 Brown/Black
- 61 Brown/Gray
- 63 Brown/Beige
- 66 Brown/Brown
- 70 Beige/Black
- M125 Lt. Blue/Lt. Blue

TYPICAL PART NO.

T 80 - 60 B /

OD in 100th inches
 Micrometals Mix No.
 Letter indicates Alternate Height
 Code Area For Other Characteristics

Refer to page 1 for tolerances.

MICROMETALS Part No.	A_L nH/N ²	OD in/mm	ID in/mm	Ht in/mm	ℓ cm	A cm ²	V cm ³
T20-60	13.0	.200/5.08	.088/2.24	.070/1.78	1.15	.023	.026
T20-63	7.8						
T20-66	15.5						
T20-70	22.5						
T25-60	17.0	.255/6.48	.120/3.05	.096/2.44	1.50	.037	.055
T25-63	10.0						
T25-66	20.0						
T25-70	31.0						
T30-60	22.0	.307/7.80	.151/3.84	.128/3.25	1.84	.060	.110
T30-63	14.0						
T30-66	26.5						
T30-70	40.5						
T30-M125	52.0						
T30-M125E	64.0	.310/7.87	.156/3.96	.156/3.96	1.84	.073	.134
T37-60	19.0	.375/9.53	.205/5.21	.128/3.25	2.31	.064	.147
T37-63	12.0						
T37-66	22.5						
T37-70	34.0						
T38-60	36.0	.375/9.53	.175/4.45	.190/4.83	2.18	.114	.248
T38-63	22.5						
T38-66	43.0						
T38-70	65.0						
T39-M125	53.3	.380/9.65	.188/4.78	.125/3.18	2.27	.072	.164
T40-66	31.5	.400/10.20	.200/5.08	.156/3.96	2.39	.096	.229
T40-M125	66.0						
T44-60	25.5	.440/11.20	.229/5.82	.159/4.04	2.68	.099	.266
T44-63	16.0						
T44-66	30.5						
T44-70	46.5						
T45-63B	18.0	.440/11.20	.250/6.35	.190/4.83	2.75	.135	.370
T45-66B	34.0						
T45-M125C	53.0	.440/11.20	.250/6.35	.156/3.96	2.75	.091	.250

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MICROMETALS

TOROIDAL CORES

COLOR CODE

- 60 Brown/Black
- 61 Brown/Gray
- 63 Brown/Beige
- 66 Brown/Brown
- 70 Beige/Black
- M125 Lt. Blue/Lt. Blue

TYPICAL PART NO.

T 80 - 60 B /

OD in 100th inches
 Micrometals Mix No.
 Letter indicates Alternate Height
 Code Area For Other Characteristics

Refer to page 1 for tolerances.

MICROMETALS Part No.	A_L nH/N ²	OD in/mm	ID in/mm	Ht in/mm	ℓ cm	A cm ²	V cm ³
T50-60	24.0	.500/12.70	.303/7.70	.190/4.83	3.19	.112	.358
T50-63	15.5						
T50-66	29.0						
T50-70	44.0						
T50-M125	56.0						
T50-60B	32.0	.500/12.7	.303/7.70	.250/6.35	3.19	.148	.471
T50-63B	20.0						
T50-66B	38.0						
T50-70B	58.0						
T50-63C	27.5	.500/12.7	.303/7.70	.335/8.51	3.19	.200	.637
T50-66C	51.0						
T50-66D	57.0	.500/12.7	.303/7.70	.375/9.53	3.19	.223	.711
T50-70D	88.0						
T60-60	34.5	.600/15.2	.336/8.53	.234/5.94	3.74	.187	.699
T60-63	21.5						
T60-66	41.0						
T60-70	62.0						
T66-M125	72.0	.650/16.5	.400/10.2	.250/6.35	4.19	.192	.803
T68-60	29.0	.690/17.5	.370/9.40	.190/4.83	4.23	.179	.759
T68-63	18.5						
T68-66	35.0						
T68-70	53.0						
T68-60A	39.5	.690/17.5	.370/9.40	.250/6.35	4.23	.242	1.03
T68-63A	25.0						
T68-66A	47.0						
T68-70A	71.0						
T80-60	31.0	.795/20.2	.495/12.6	.250/6.35	5.14	.231	1.19
T80-63	19.5						
T80-66	37.0						
T80-70	56.0						
T80-M125	68.0						
T80-60B	46.5	.795/20.2	.495/12.6	.375/9.53	5.14	.347	1.78
T80-63B	29.0						
T80-66B	55.0						
T80-70B	84.0						

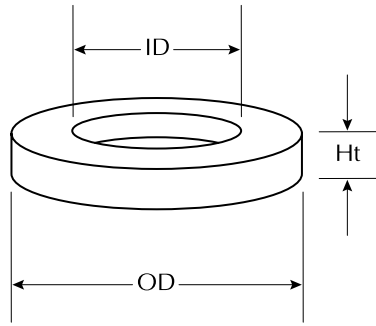
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MICROMETALS

TOROIDAL CORES

COLOR CODE

-60	Brown/Black
-61	Brown/Gray
-63	Brown/Beige
-66	Brown/Brown
-70	Beige/Black
-M125	Lt. Blue/Lt. Blue



TYPICAL PART NO.

T 80 - 60 B /

OD in 100th inches
 Micrometals Mix No.
 Letter indicates Alternate Height
 Code Area For Other Characteristics

Refer to page 1 for tolerances.

MICROMETALS Part No.	A _L nH/N ²	OD in/mm	ID in/mm	Ht in/mm	ℓ cm	A cm ²	V cm ³
T90-60	47.0	.900/22.9	.550/14.0	.375/9.53	5.78	.395	2.28
T90-66	56.0						
T90-70	85.0						
T90-M125E	90.0	.900/22.9	.550/14.0	.300/7.62	5.78	.320	1.85
T93-M125	105.0	.928/23.6	.567/14.4	.350/8.89	5.96	.389	2.32
T94-60	42.0	.942/23.9	.560/14.2	.312/7.92	5.97	.362	2.16
T94-63	26.0						
T94-66	50.0						
T94-70	76.0						
T106-60	70.0	1.060/26.9	.570/14.5	.437/11.1	6.49	.659	4.28
T106-63	44.5						
T106-66	84.0						
T106-70	125.0						
T106-M125	157.0						
T106-60B	91.0	1.060/26.9	.570/14.5	.575/14.6	6.49	.858	5.57
T106-63B	57.0						
T106-66B	109.0						
T130-60	58.0	1.300/33.0	.780/19.8	.437/11.1	8.28	.698	5.78
T130-63	36.0						
T130-66	69.0						
T130-70	105.0						
T150-60	65.0	1.510/38.4	.845/21.5	.437/11.1	9.38	.887	8.31
T150-63	41.0						
T150-66	78.0						
T150-70	118.0						
T157-60	73.0	1.570/39.9	.950/24.1	.570/14.5	10.1	1.06	10.7
T157-63	45.0						
T157-66	87.0						
T157-70	130.0						
T175-60	82.0	1.750/44.5	1.070/27.2	.650/16.5	11.2	1.34	15.0
T175-66	97.0						
T184-60	116.0	1.840/46.7	.950/24.1	.710/18.0	11.2	1.88	21.0
T184-63	72.0						
T184-66	139.0						

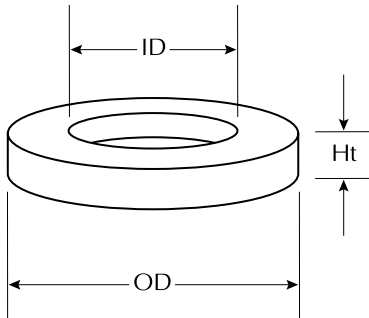
TEL. (714) 970-9400
 FAX (714) 970-0400

MICROMETALS

TOROIDAL CORES

COLOR CODE

- 60 Brown/Black
- 61 Brown/Gray
- 63 Brown/Beige
- 66 Brown/Brown
- 70 Beige/Black
- M125 Lt. Blue/Lt. Blue



TYPICAL PART NO.

T 80 - 60 B /

OD in 100th inches
 Micrometals Mix No.
 Letter indicates Alternate Height
 Code Area For Other Characteristics

Refer to page 1 for tolerances.

MICROMETALS Part No.	A_L nH/N ²	OD in/mm	ID in/mm	Ht in/mm	ℓ cm	A cm ²	V cm ³
T200-60	67.0	2.000/50.8	1.250/31.8	.550/14.0	13.0	1.27	16.4
T200-66	80.0						
T200-60B	120.0	2.000/50.8	1.250/31.8	1.000/25.4	13.0	2.32	30.0
T200-66B	145.0						
T225-60	67.0	2.250/57.2	1.405/35.7	.550/14.0	14.6	1.42	20.7
T225-61	42.5						
T225-63	42.5						
T225-60B	120.0	2.250/57.2	1.405/35.7	1.000/25.4	14.6	2.59	37.8
T225-66B	145.0						
T250-60	177.0	2.500/63.5	1.250/31.8	1.000/25.4	15.0	3.84	57.4
T250-61	113.0						
T250-63	113.0						
T250-66	210.0						
T250-61A	56.0	2.500/63.5	1.250/31.8	.500/12.7	15.0	1.92	28.7
T300-60	58.0	3.040/77.2	1.930/49.0	.500/12.7	19.8	1.68	33.4
T300-61	37.0						
T300-66	70.0						
T300-60D	116.0	3.040/77.2	1.930/49.0	1.000/25.4	19.8	3.38	67.0
T300-63D	74.0						
T300-66D	140.0						
T400-60	96.0	4.000/102	2.250/57.2	.650/16.5	25.0	3.46	86.4
T400-66	114.0						
T400-60D	192.0	4.000/102	2.250/57.2	1.300/33.0	25.0	6.85	171
T400-61D	120.0						
T400-63D	120.0						
T400-66D	228.0						
T520-63	68.0	5.200/132	3.080/78.2	.800/20.3	33.1	5.24	173
T520-66	130.0						
T650-63	200.0	6.500/165	3.500/88.9	2.000/50.8	39.9	18.4	734
T650-66	380.0						

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 FAX (714) 970-0400

MICROMETALS

E CORES

COLOR CODE
 -60 Brown/Black
 -66 Brown/Brown
 -70 Beige/Black

TYPICAL PART NO.

E 168 - 60 A /

“A” dimension in 100th inches
 Micrometals Mix No.
 Letter Indicates Alternate “C” dimension
 Indicates Center-leg gap per half in .001 inches

E49-E100 Not Color Coded
 Refer to page 1 for tolerances.

E CORES ORDERED PER HALF

MICROMETALS Part No. (BOBBIN)	A _i nH/N ² (REF. SIZE)	MAGNETIC DIMENSIONS						MAGNETIC DIMENSIONS			
		A in/mm	B in/mm	C in/mm	D in/mm	F in/mm	G in/mm	ℓ cm	A cm ²	V cm ³	W cm ²
E49-66 E49-70 (PB49)	32.0 45.0 (US LAM: EE-28-29)	.500/12.7	.437/11.1	.125/3.18	.312/7.93	.125/3.18	.375/9.53	2.86	.101	.288	.252
E75-60 E75-70 (PB75)	50.0 72.0 (US LAM: EI-187)	.750/19.1	.635/16.1	.187/4.75	.455/11.6	.187/4.75	.562/14.3	4.20	.226	.936	.551
E100-60 (PB100E)	75.0 (US LAM: EE-24-25)	1.000/25.4	.750/19.1	.250/6.35	.500/12.7	.250/6.35	.750/19.1	5.08	.403	2.05	.806
E137-60 E137-66 (PB137)	100.0 113.0 (US LAM: EI-375)	1.375/34.9	1.145/29.1	.375/9.53	.770/19.6	.375/9.53	1.000/25.4	7.40	.907	6.72	1.55
E162-66 (PB162)	168.0 (US LAM: EI-21)	1.625/41.3	1.342/34.1	.500/12.7	.842/21.4	.500/12.7	1.125/28.6	8.41	1.61	13.6	1.70
E168-60 E168-66 (PB168)	135.0 155.0 (DIN: 42/15)	1.685/42.8	1.660/42.2	.590/15.0	1.210/30.7	.475/12.0	1.210/30.7	10.4	1.81	18.5	2.87
E168-66A (PB168A)	190.0 (DIN: 42/20)	1.685/42.8	1.660/42.2	.787/20.0	1.210/30.7	.475/12.0	1.210/30.7	10.4	2.41	24.6	2.87
E220-60 E220-66 (PB220)	196.0 220.0 (DIN: 55/21)	2.210/56.1	2.180/55.4	.820/20.8	1.510/38.3	.680/17.3	1.520/38.6	13.2	3.62	47.7	4.09
E305-60 E305-66 (PB305 or PB305/V0)	222.0 250.0	3.051/77.5	3.051/77.5	.933/23.7	2.118/53.8	.933/23.7	2.118/53.8	18.5	5.62	104	8.10
E305-60A E305-66A (PB305A or PB305A/V0)	280.0 315.0	3.051/77.5	3.051/77.5	1.244/31.6	2.118/53.8	.933/23.7	2.118/53.8	18.5	7.49	139	8.10
E450-60 E450-66 (PB450/V0)	400.0 460.0 (US LAM: EI-30)	4.500/114	3.636/92.4	1.375/34.9	2.250/57.2	1.375/34.9	3.120/79.3	22.9	12.2	280	12.7
E610-66	500.0	6.102/155	6.102/155	1.866/47.4	4.236/108	1.866/47.4	4.236/108	37.0	22.5	832	32.4

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MICROMETALS

MAGNETIC CHARACTERISTICS

PERCENT PERMEABILITY vs DC MAGNETIZING FORCE

Formula: $\% \mu_0 = ((a+cH+eH^2)/(1+bH+dH^2))^{1/2}$		Where: $\% \mu_0 =$ Percentage (i.e. 90% = 90) H = DC Magnetizing Force (oersteds)			
Material	a	b	c	d	e
-60	10140	6.06×10^{-3}	-0.570	2.24×10^{-4}	0.0304
-61	10050	2.12×10^{-3}	-0.362	8.82×10^{-5}	0.0137
-63	10000	-6.28×10^{-5}	-7.41	6.16×10^{-5}	0.0168
-66	10000	8.67×10^{-3}	-5.72	4.66×10^{-4}	0.0315
-70	10040	-4.41×10^{-3}	-83.5	7.40×10^{-4}	0.2220
-M125	9900	-1.60×10^{-2}	-88.6	1.11×10^{-3}	0.2260

PERCENT PERMEABILITY vs PEAK AC FLUX DENSITY*

Formula: $\% \mu_0 = ((a+cB +eB^2)/(1+bB+dB^2))^{1/2}$		Where: $\% \mu_0 =$ Percentage (i.e. 90% = 90) B = Peak AC Flux Density (gauss)			
Material	a	b	c	d	e
-60	9800	1.66×10^{-3}	27.7	1.04×10^{-8}	-1.33×10^{-3}
-61	9970	4.95×10^{-4}	11.5	6.54×10^{-10}	-8.78×10^{-4}
-63	10000	-3.41×10^{-5}	3.08	4.63×10^{-8}	-7.36×10^{-5}
-66	10000	4.64×10^{-5}	12.1	3.27×10^{-8}	-1.01×10^{-3}
-70	10120	8.81×10^{-4}	11.4	8.82×10^{-9}	-8.29×10^{-4}
-M125	10120	8.81×10^{-4}	11.4	8.82×10^{-9}	-8.29×10^{-4}

CORE LOSS vs PEAK AC FLUX DENSITY

Formula: $CL(mW/cm^3) = \frac{f}{\frac{a}{B^3} + \frac{b}{B^{2.3}} + \frac{c}{B^{1.65}}} + (df^2 B^2)$		Where: CL = Core Loss (mW/cm ³) B = Peak AC Flux Density (gauss) f = Frequency (hertz)		
Material	a	b	c	d
-60	5.3×10^8	1.4×10^8	1.2×10^6	2.7×10^{-14}
-61	4.0×10^8	1.1×10^8	5.1×10^5	2.4×10^{-14}
-63	9.9×10^8	2.6×10^8	1.0×10^4	3.3×10^{-15}
-66	1.7×10^{10}	5.0×10^7	1.2×10^6	1.7×10^{-14}
-70	1.0×10^{10}	1.3×10^9	7.9×10^6	4.2×10^{-14}
-M125	3.1×10^{10}	2.7×10^9	3.3×10^6	5.3×10^{-14}

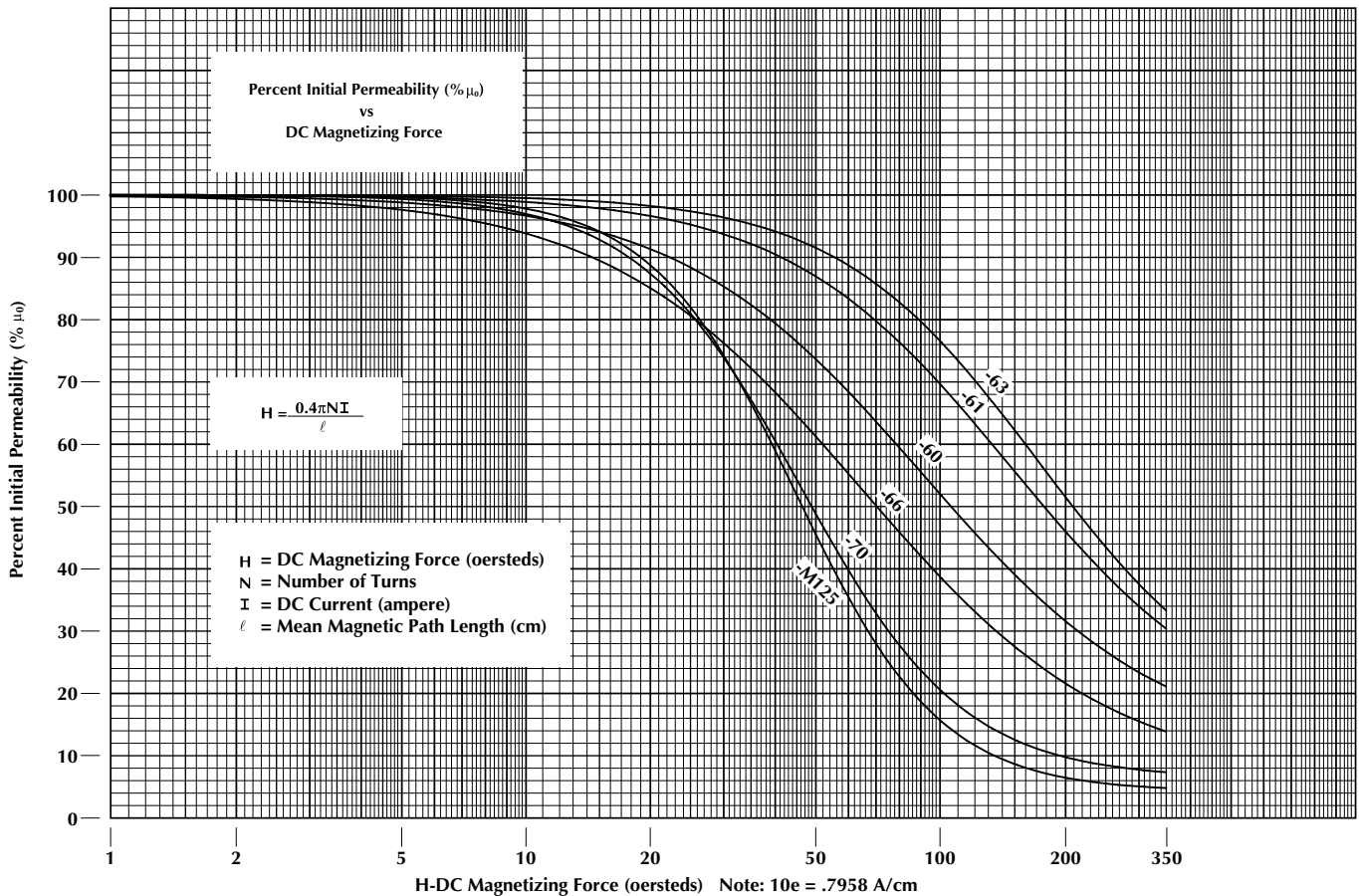
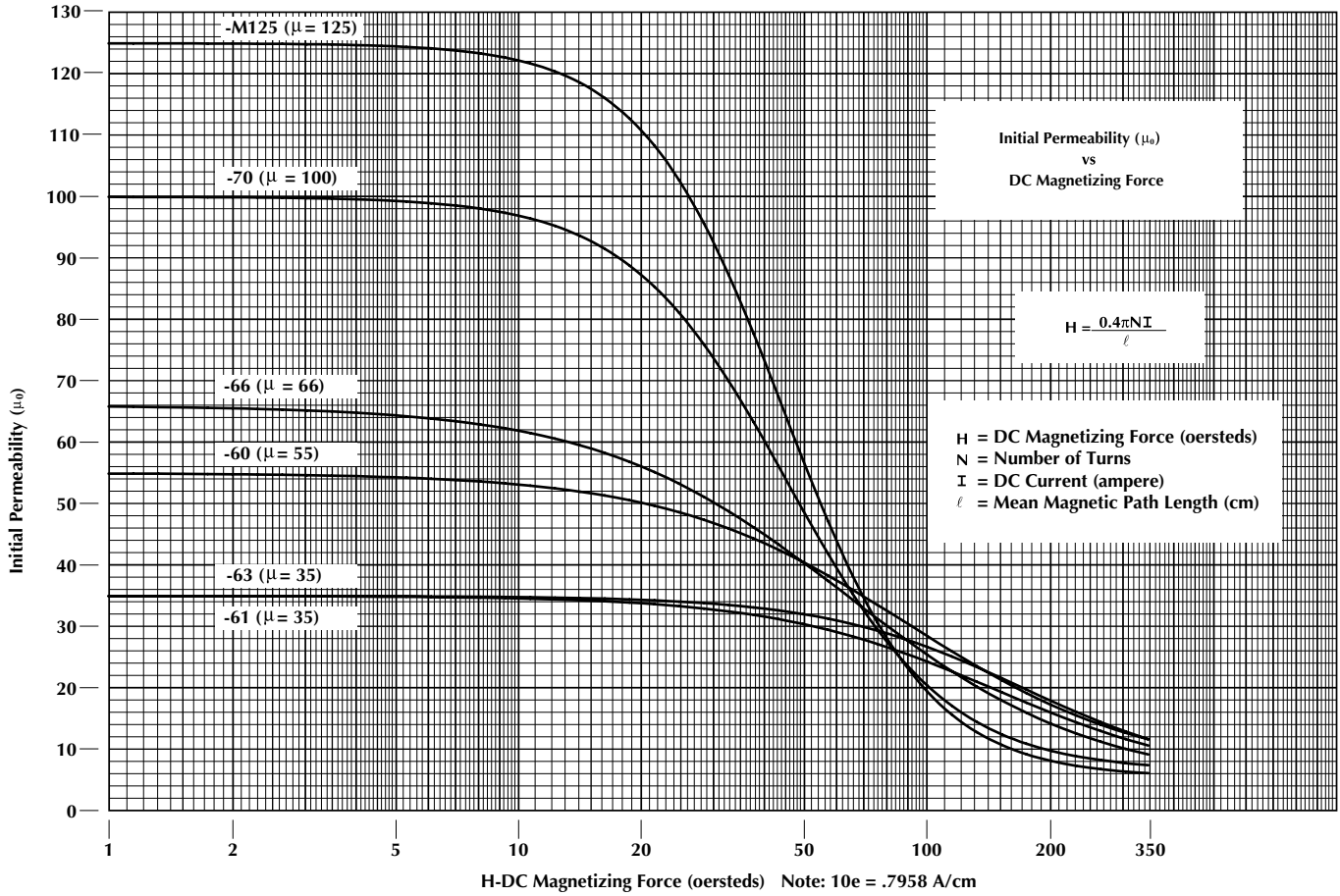
* Curve fit formula valid only for ranges shown on graph

The magnetic characteristic curves shown on pages 8 and 9 have a typical tolerance of +20%, -10%.
The core loss curves on pages 10 to 12 have a typical tolerance of $\pm 15\%$.

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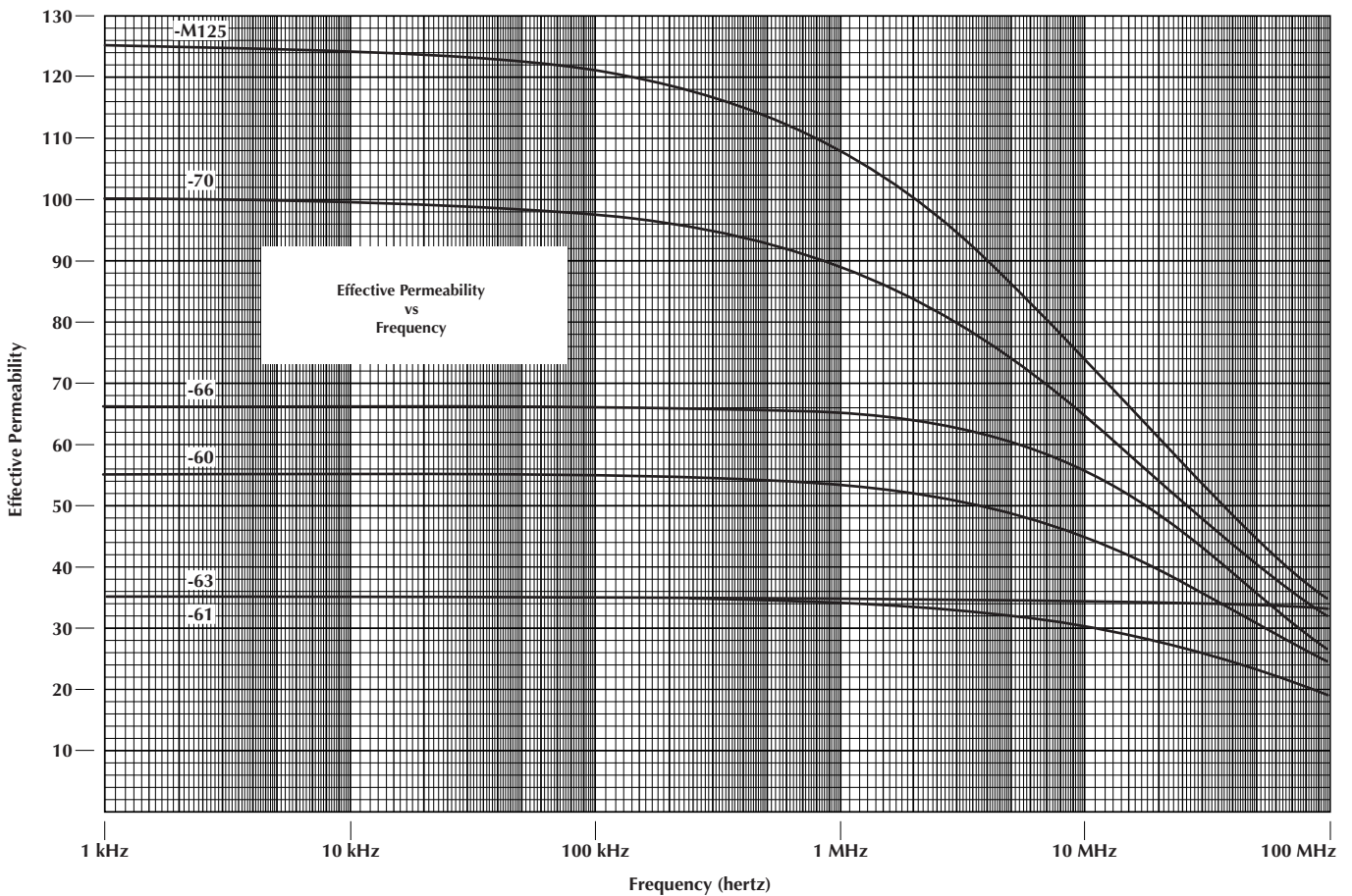
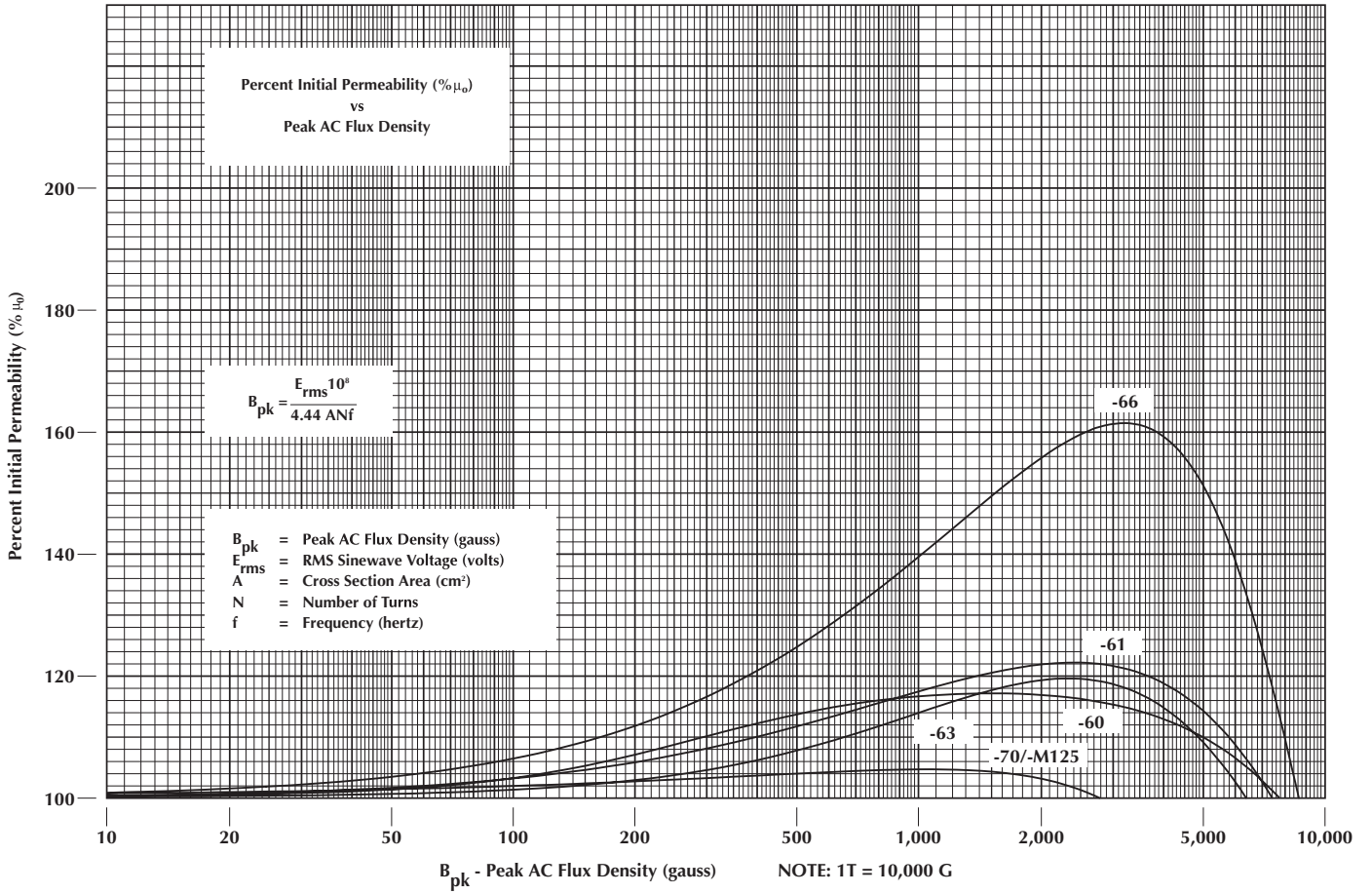
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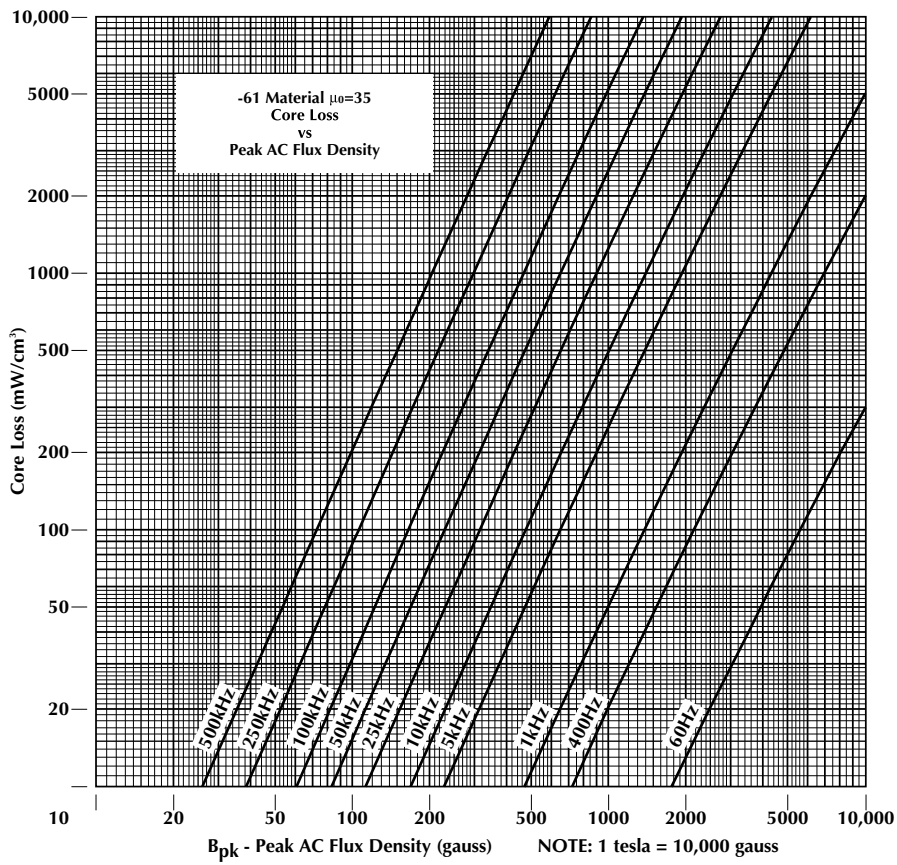
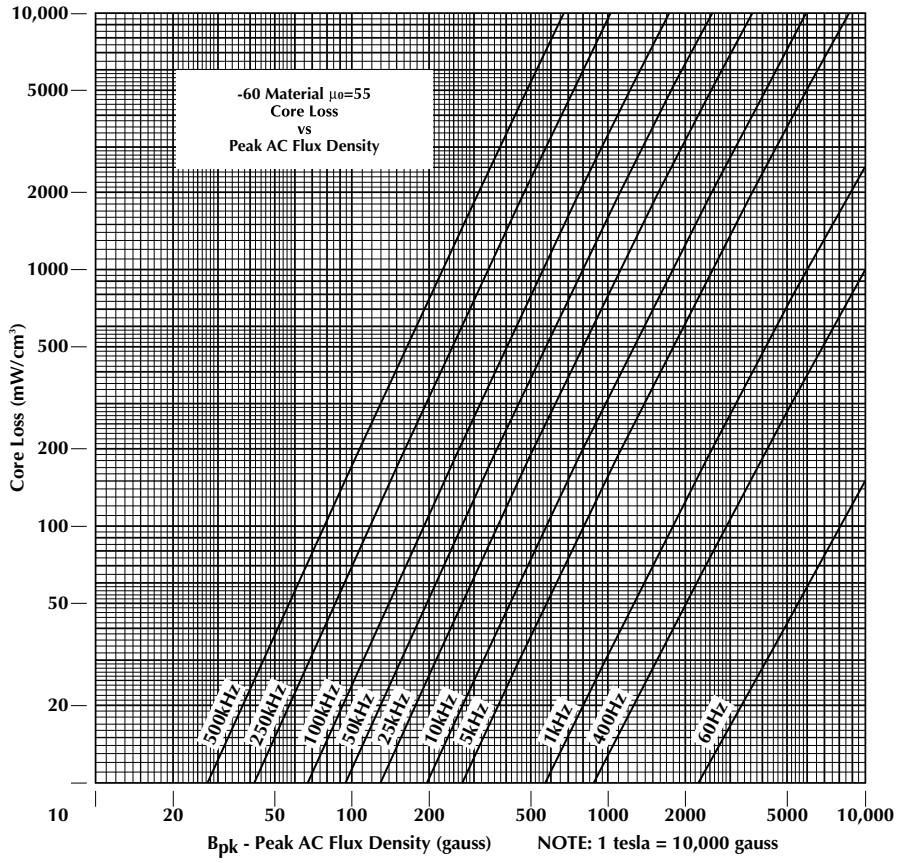
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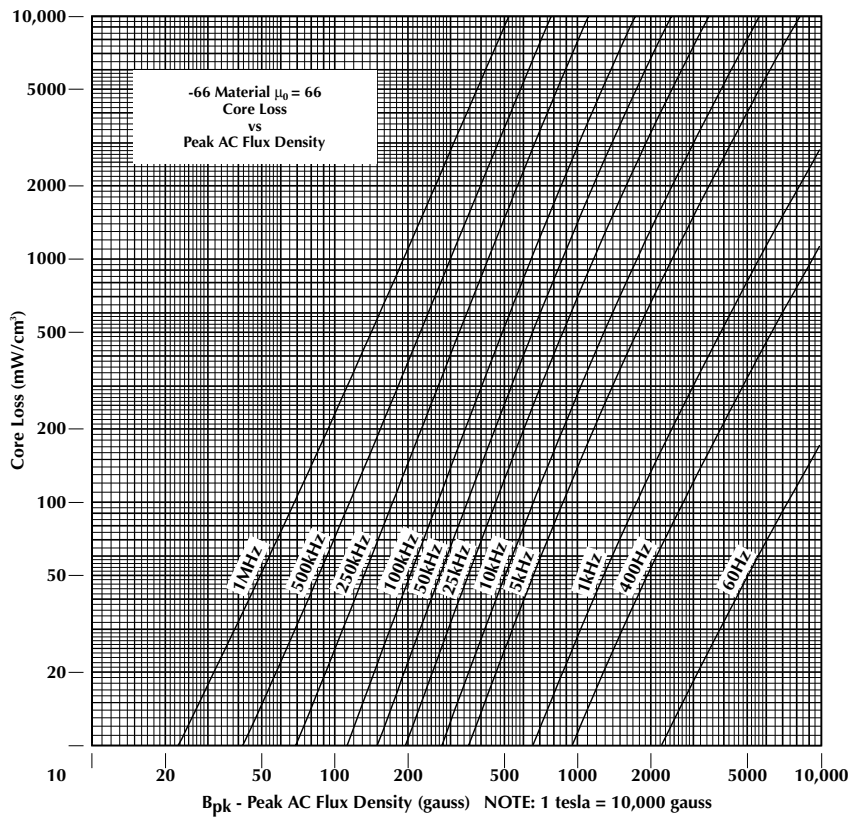
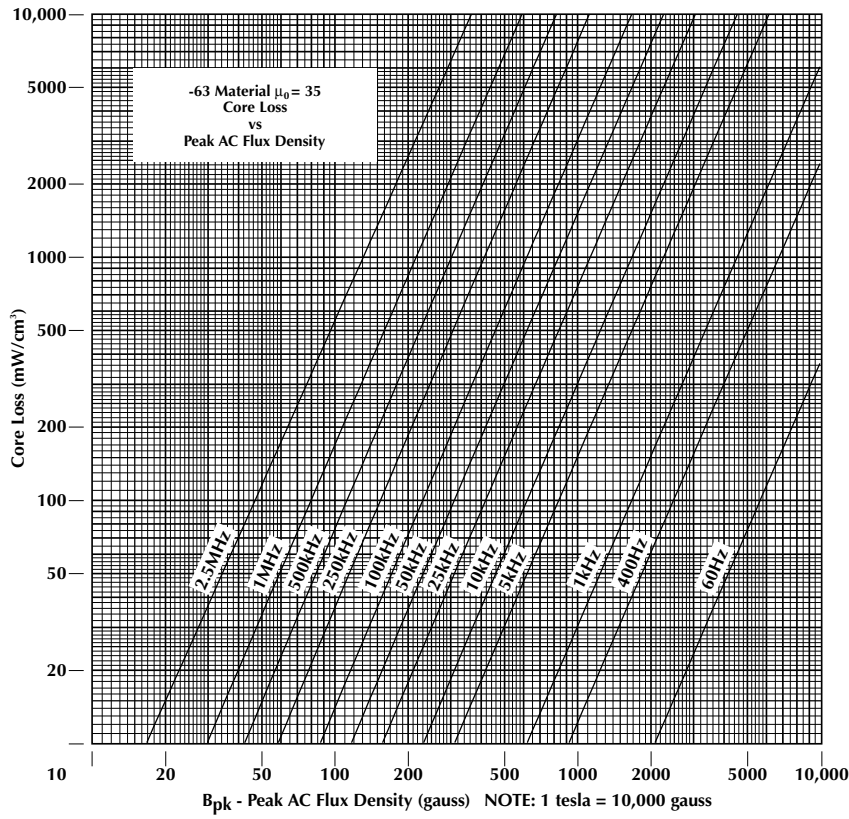
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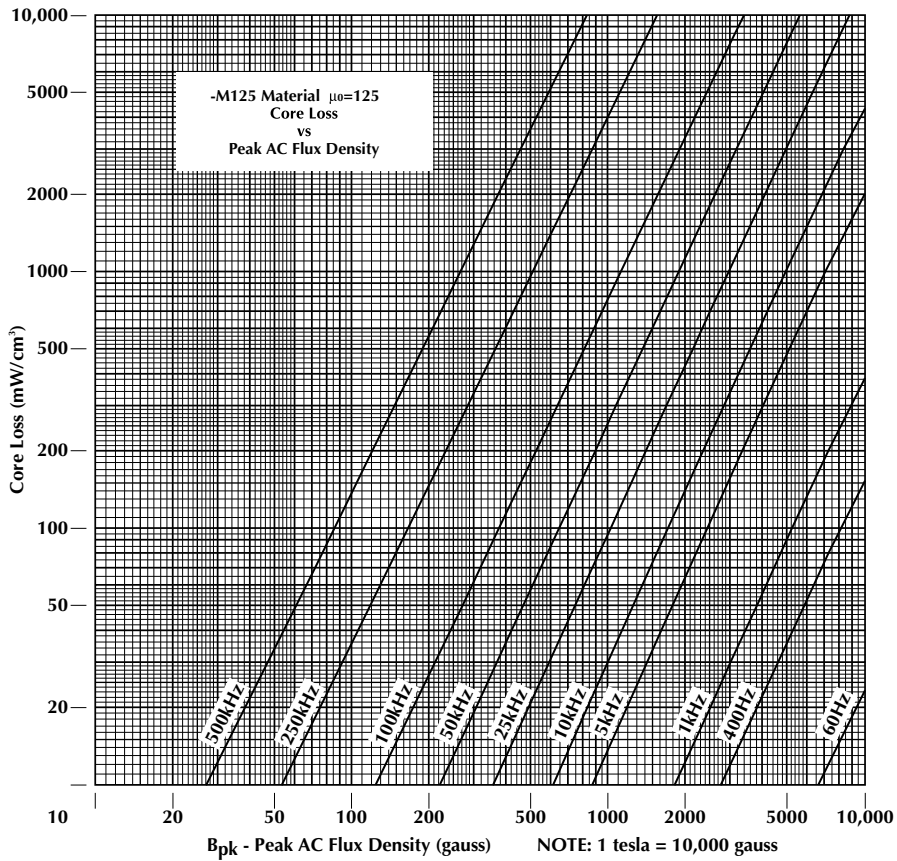
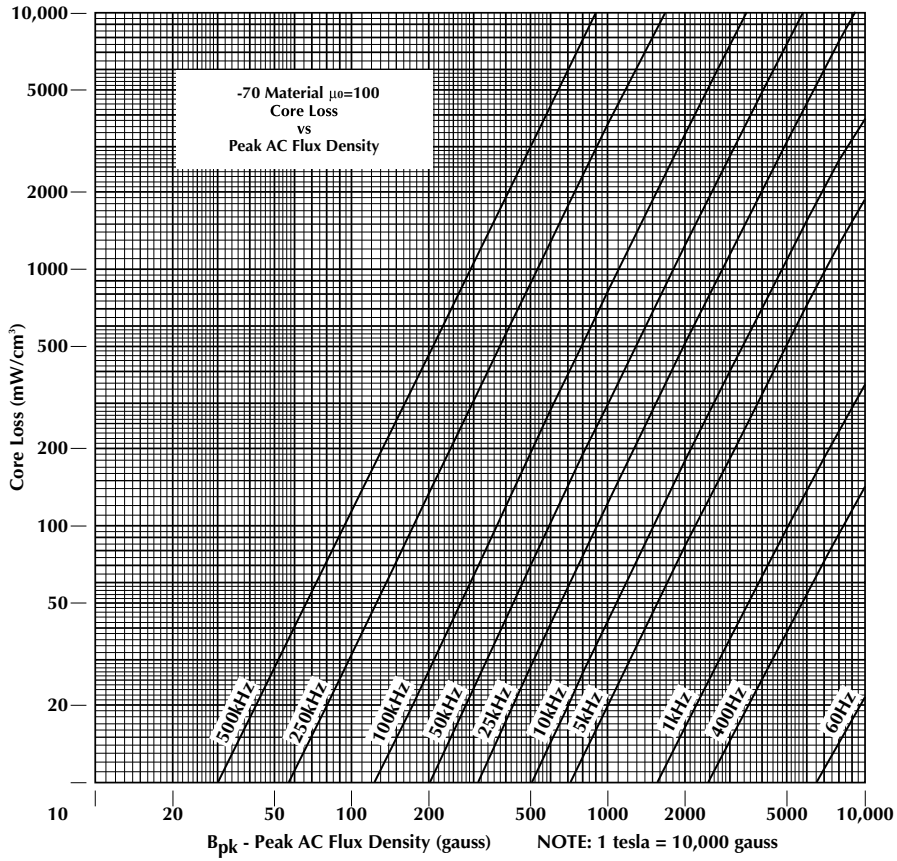
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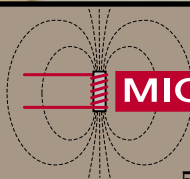
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