Section 2. Materials

Material Characteristics (1)

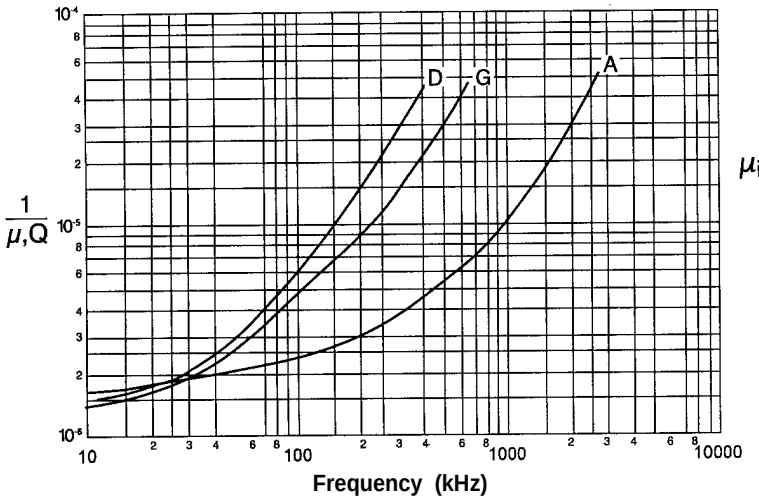
			INDUCTORS AND LOW LEVEL APPLICATIONS			EMI/RFI FILTERS AND BROADBAND TRANSFORMERS		
		MATERIALS →	A	D	G	J	W	H
Initial Permeability	μ_i	—	750 ± 20%	2000 ± 20%	2300 ± 20%	5000 ± 20%	10000 ± 30%	15000 ± 30%
Maximum Usable Frequency (50% roll-off)	f	MHz	<9	<4	<4	<1	<.25	<.15
Relative Loss Factor	$\frac{\tan \delta}{\mu_{iac}}$	10^{-6}	<12 (.5MHz) <20 (1MHz)	<6 (.1MHz)	<6 (.1MHz)	<20 (100kHz)	<7 (10kHz)	<15 (10kHz)
*Curie Temperature	T_c	°C	>260	>145	>180	>140	>125	>120
* Relative Temp. Factor - 30°C to +20°C + 20°C to +70°C	/°C	10^{-6}/°C	 2.0 to 4.0 (Typ.) 1.0 to 3.0	 .9 to 2.1 9 to 2.1	 -. 7 to +.7			
*Flux Density @ 1194 A/m (15 Oe)	B_m	G mT	4600 460	3800 380	4600 460	4300 430	4300 430	4200 420
* Remanence	B_r	G mT	2300 230	1000 100	1300 130	1000 100	800 80	800 80
* Coercivity	H_c	Oe A/m	0.7 56	0.25 20	0.15 12	0.1 8	0.04 3	0.04 3
Disaccommodation Factor	D_F	10^{-6}	<15	<2.0	<3.5	<3	<3	<2.5
* Resistivity	ρ	Ω-m	4	3	8	1	.15	.1
* Density	δ	g/cm^3	4.5	4.7	4.7	4.8	4.8	4.9
*Power Loss (P_L), Sine Wave, in mW/cm² (typical)	25kHz 200mT (2000G)	@25°C @60°C @100°C @120°C						
	100kHz 100mT (1000G)	@25°C @60°C @100°C @120°C						
	500kHz 50mT (500G)	@25 °C @80°C @100 °C @120 °C	225 275 375					
	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	
	DS Cores					X	X	
	RM Cores		X	X	X	X	X	
	EP Cores					X	X	
	E, U Cores					X	X	
	EC, ETD Cores							
	PQ Cores							
	Toroids		X	X	X	X	X	X
	Blocks					X		

NOTE (1). 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 * are typical.

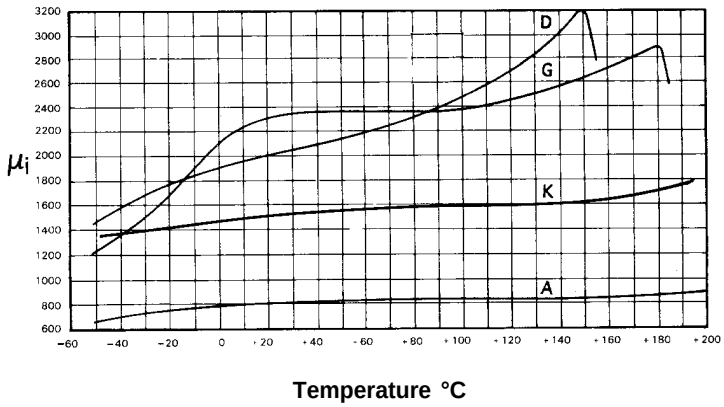
Material Characteristics (cont.) (1)

			INDUCTORS AND POWER TRANSFORMERS			
		MATERIALS →	K	R	P	F
Initial Permeability	μ_i	—	1500 ± 25%	2300 ± 25%	2500 ± 25%	3000 ± 20%
Maximum Usable Frequency (50% roll-off)	f	MHz	<2	<1.5	<1.2	<1.3
Relative Loss Factor	$\frac{\tan \delta}{\mu_{iac}}$	10^{-6}				<8(100kHz)
*Curie Temperature	T_c	°C	>230	>230	>230	>250
*Relative Temp. Factor - 30°C to +20°C +20°C to +70°C	/°C	10^{-6}/°C				
*Flux Density @ 1194 A/m (15 Oe)	B_m	G mT	4600 460	5000 500	5000 500	4900 490
*Remanence	B_r	G mT	900 90	1100 110	1100 110	1200 120
*Coercivity	H_c	Oe A/m	0.2 16	0.18 14	0.18 14	0.2 16
Disaccommodation Factor	D_F	10^{-6}				
*Resisitivity	ρ	Ω-m	20	6	5	2
*Density	δ	g/cm^3	4.7	4.8	4.8	4.8
* Power Loss (P_L), Sine Wave, in mW/cm³ (typical)	25kHz 200mT (2000G)	@25°C @60°C @100°C @120°C		130 85 70 85	120 90 95 130	90 160 240
	100kHz 100mT (1000G)	@25°C @60°C @100°C @120°C	100 90 110 130	140 100 70 90	125 90 125 165	100 180 225
	500kHz 50mT (500G)	@25°C @60°C @100°C @120°C	100 100 120 140	375 300 250 300	300 250 275 350	
	700kHz 50mT (500G)	@25°C @60°C @100°C @120°C	180 200 220 290			
Available in:	Pot Cores		X	X	X	X
	RS Cores		X	X	X	X
	DS Cores		X	X	X	X
	RM Cores		X	X	X	X
	EP Cores		X	X	X	X
	E, U Cores		X	X	X	X
	EC, ETD Cores		X	X	X	X
	PQ Cores		X	X	X	X
	Toroids		X	X	X	X
	Blocks		X	X	X	

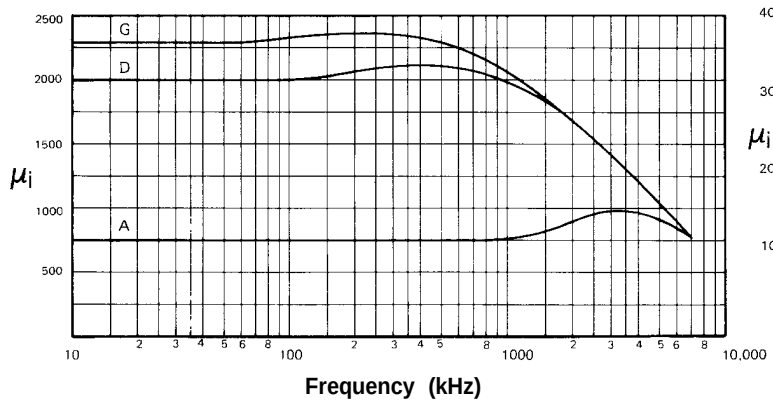
Graph 1 — Relative Loss Factor vs. Frequency



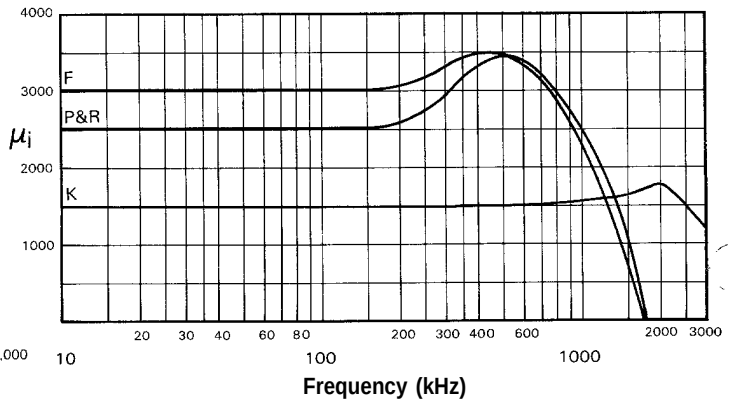
Graph 2 — Initial Permeability (μ_i) vs. Temperature



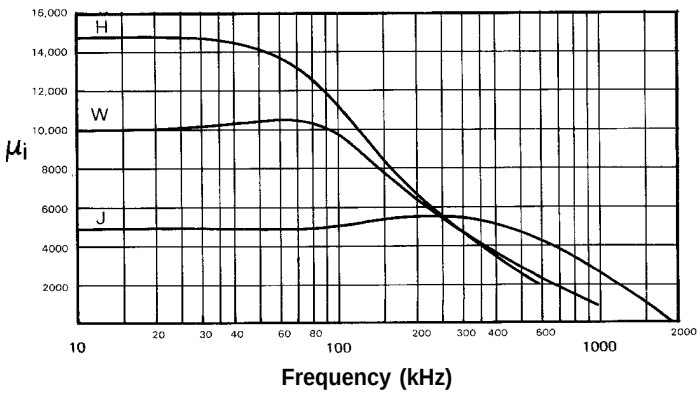
Graph 3A — Frequency Response Curves



Graph 3B — Frequency Response Curves



Graph 3C — Frequency Response Curves



P Material

μ_i 2500 ± 25%

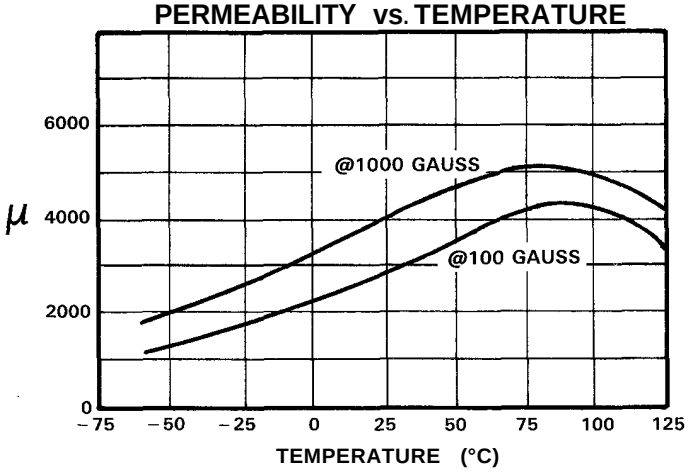
Saturation Flux Density - gausses 5000 (at 15 oersted, 25° C) (500 mT)

Coercive Force - oersted 0.18 (14A/m)

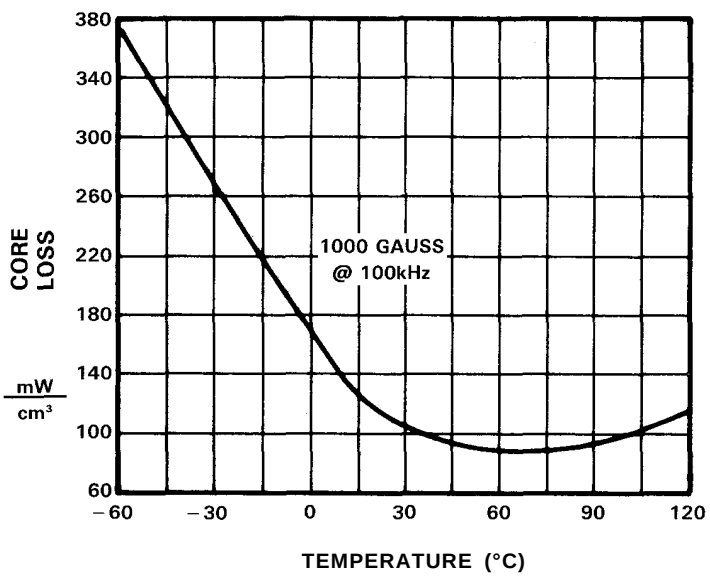
Curie Temperature . . . . . 230°C

Note: The core loss curves are developed from empirical data. For best results and highest accuracy, use them. The formula on page 2.11 yields a fair approximation and can be useful in computer programs.

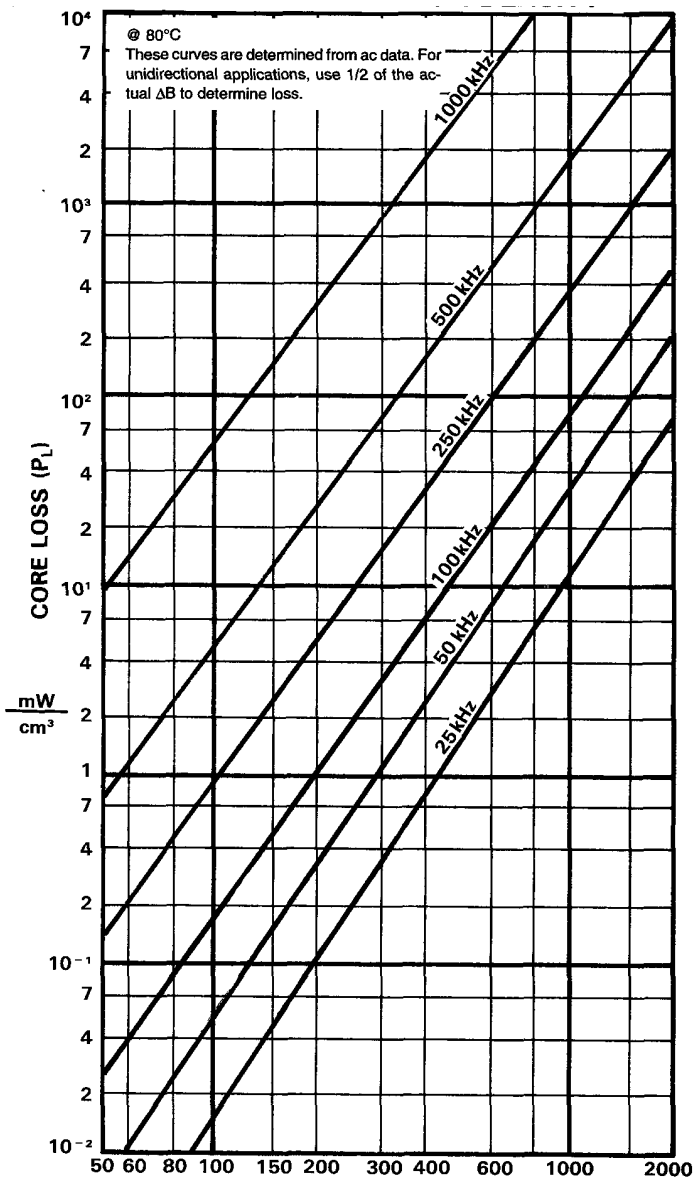
PERMEABILITY vs. TEMPERATURE



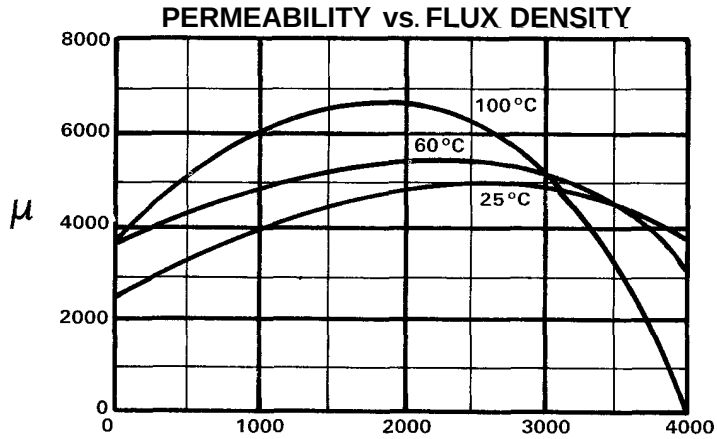
CORE LOSS vs. TEMPERATURE



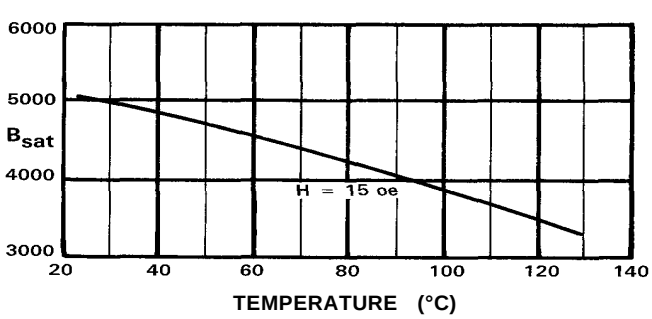
CORE LOSS vs FLUX DENSITY



PERMEABILITY vs. FLUX DENSITY

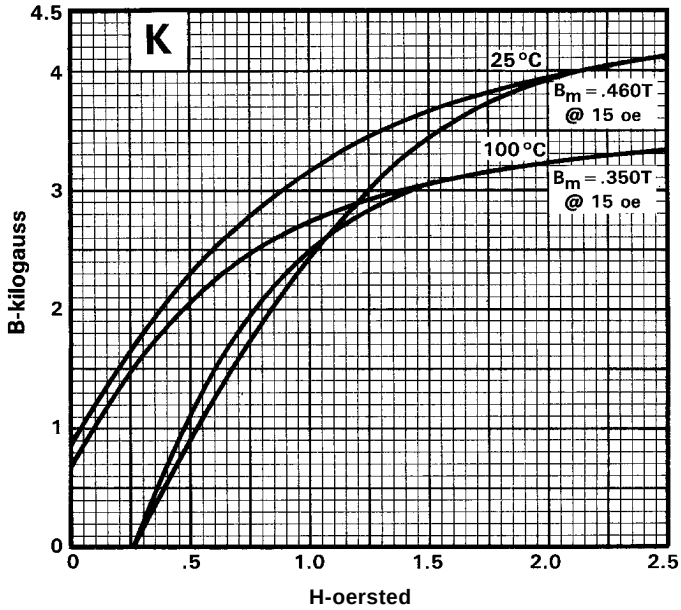


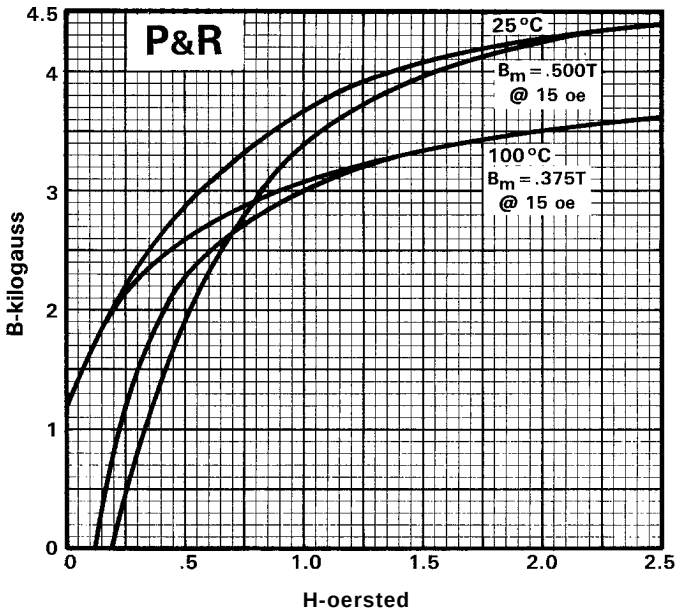
FLUX DENSITY vs. TEMPERATURE

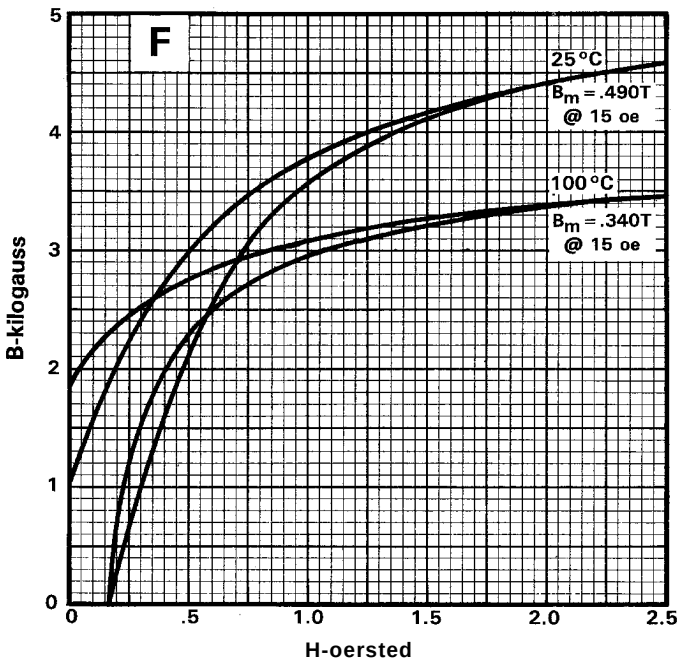


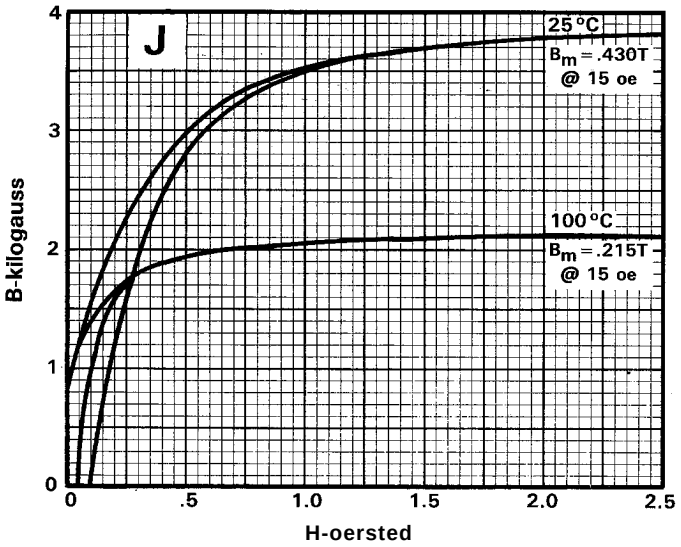
See page 2.12 for B-H Data

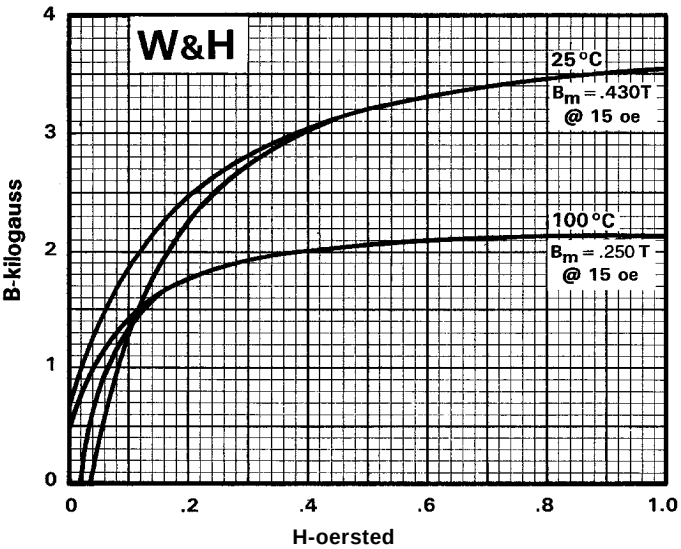
B vs. H Curves (dc)











CONVERSION TABLE

Multiply number of	by	to obtain
Oersteds	79.5	A/m
Oersteds	.795	A/cm
Gausses	.1	milli Teslas
Gausses	10^{-4}	Teslas
Teslas	10^{4}	Gausses