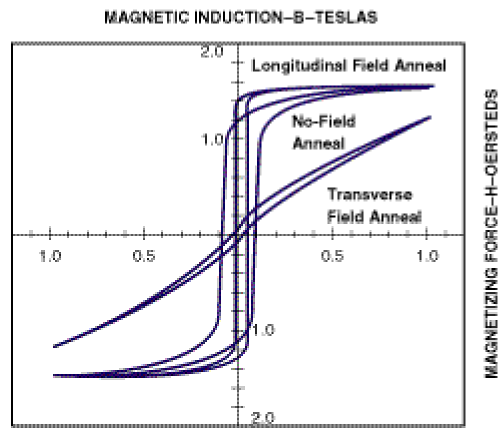
MICROLITE® XP Toroidal Cores are manufactured with METGLAS® amorphous alloy 2605SA1 ribbon. Their unique combination of high saturation flux density and low loss make them the first choice for all energy storage applications, enabling the designer to achieve both size and system cost reduction.



Applications

- SMPS output inductors
- Flyback transformers
- Differential input inductors
- PVC inductors
- VRM inductors

Benefits

- High saturated flux density
- Significant size reduction
- Low core loss
- Extended bias capability
- Fewer turns due to higher permeability

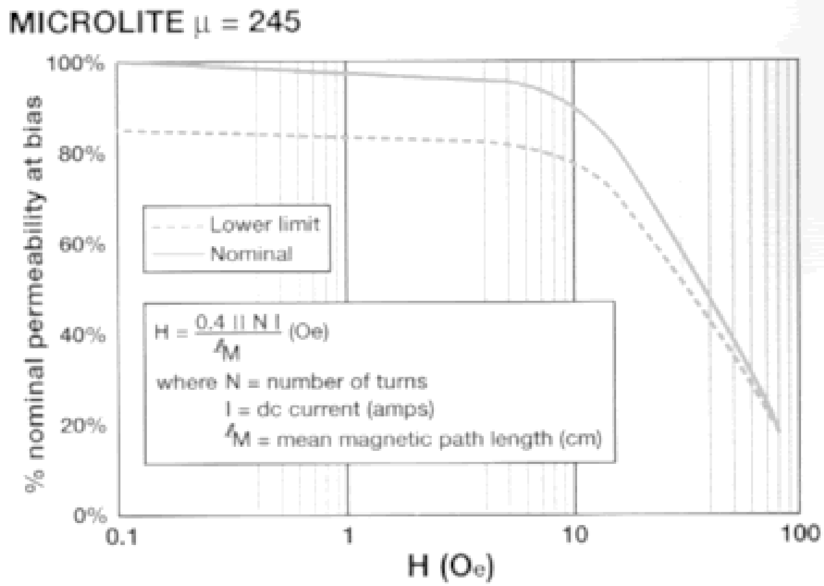
Physical Properties METGLAS MICROLITE XP Cores

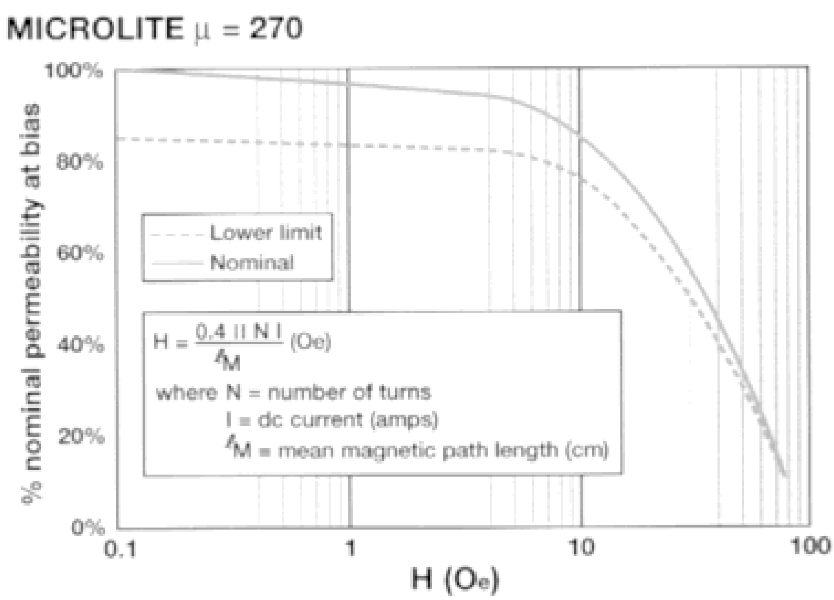
Ribbon Thickness (µm) 22
Density (g/cm3) 7.18
Thermal Expansion (ppm/°C) 7.6
Crystallization Temperature (°C) 510
Curie Temperature (°C) 395
Continuous Service Temperature (°C) 150

Magnetic Properties METGLAS MICROLITE XP Cores

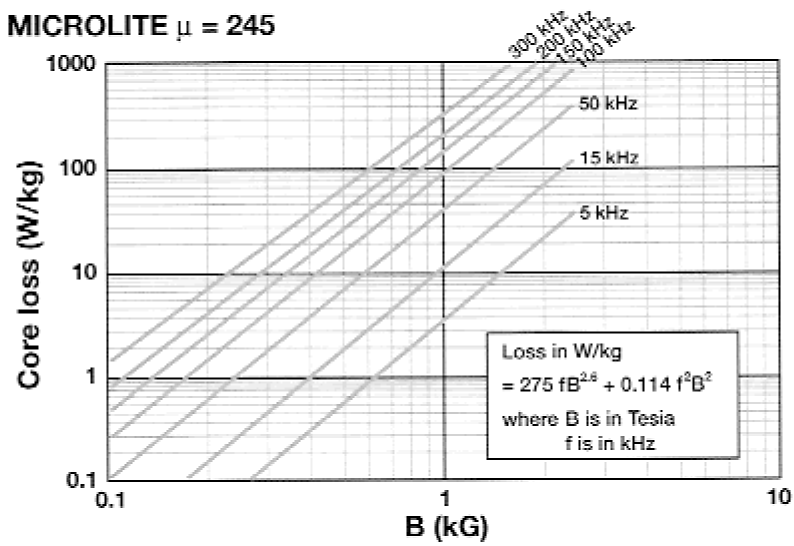
Saturation Flux Density (Tesla) 1.56
Permeability (depending on core size) 245/270

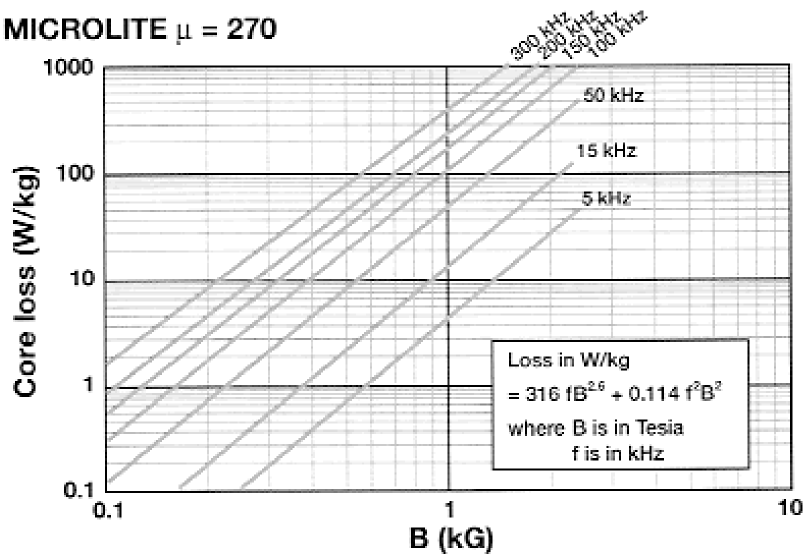
Percent Permeability vs. DC Bias @ 25°C

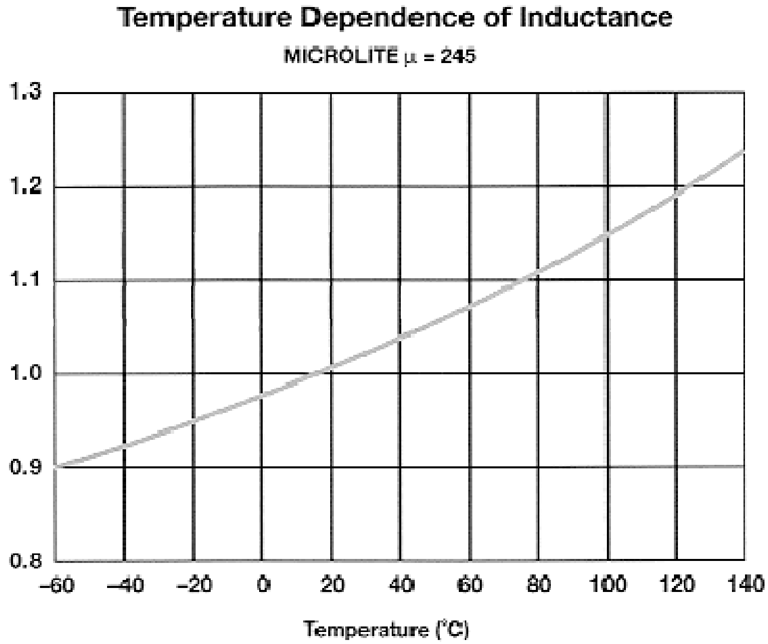


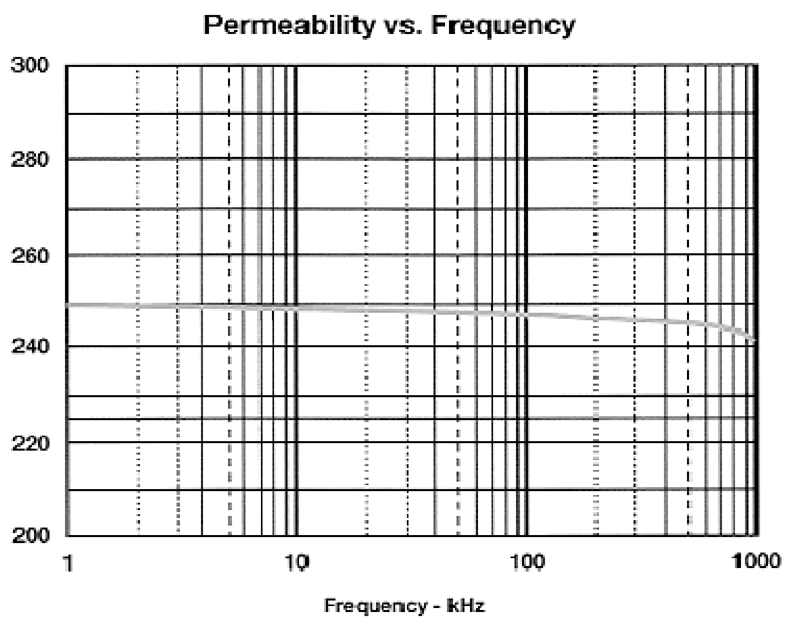


Core Loss vs. Flux Density @ 25°C






Temperature Dependence of Inductance
MICROLITE μ = 245
1.3
1.2
1.1
1.0
0.9
0.8
–60
–40
–20
0
20
40
60
80
100
120
140
Temperature (°C)


Permeability vs. Frequency
300
280
260
240
220
200
1
10
100
1000
Frequency - kHz

Inductor Design

The following formulae can be used to design inductors given these parameters: inductance, DC current,switching frequency and ripple current.

Step 1: Ip = Idc + (.I/2) ,where Idc is the DC current in Amps(A), .I is the ripple current in Amps and Ip is the peak current in Amps.

Step 2: Energy stored in an inductor,W(watt-sec) = (1/2)LIp
2,where L is the inductance in Henries(H).

Step 3: Area product,WaAc (cm4) = [2W/(BmKJ)]x104, where Bm is the magnetic induction in Tesla (maximum recommended is 1.2 T),K is the window fill factor(typically 0.4) and J is the current density in A/cm2 (typically 400).

Step 4: Choose a core with an area product closest to the value computed in step 3.

Step 5: Use the AL (nH/turns2) value for the chosen core to calculate the number of turns.
N = [L/(ALx10-9)]0.5

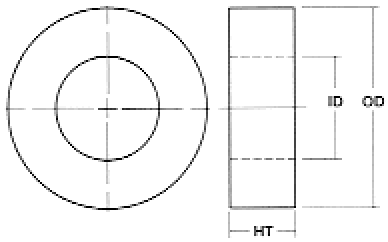
Step 6: Compute the magnetizing field, H, using
H(Oe) = 0.4□NIdc/lm, where lm is the magnetic path length in cm.

Step 7: Calculate the permeability, µN for any value of H using the following expression.
µN = µi[(1 + a1µiH + a2µi
2H2)/(1 + a3µiH + a4µi
2H2)]0.5
(µi = 245, a1 = 5.390x10-5, a2 = - 4.121x10-9, a3 = 7.530x10-5, a4 = 3.600x10-8)

Step 8: The inductance, LH at the magnetizing field of H is given by,
LH = (0.4□N2AcµN/lm)x10-8,Ac is core cross-sectional area in cm2.

Step 9: If the above calculated inductance does not meet the required inductance value under load condition, repeat the above calculations by changing the number of turns or by changing the core size.

Step 10: Impedance of the inductor = 2□fL, where f is the frequency in Hz.
Voltage(V) across the inductor,V = 2□fL..I
Flux density due to ripple current, B.I (T) = [Vton/(AcN)]x104, where ton is the on time (sec).
AC flux density, B = B.I/2
Core loss(W/kg) = 275(f/1000)B2.6 + 0.114(f/1000)2B2,where B is in T and f is frequency in Hz
Core loss in watts = (core loss in W/kg)(mass of core in kg)



Ordering Information

Example:

MP1710XDGC

METGLAS Products
Outside Diameter (OD)
Height (HT)
Distributed Gap Core

Case Material

Box Type (X)	DuPont Material	UL File No.	Flam. Rating UL 94	Elec. Rel. Temp. Index (UL746B)	Rec. Temp.
P	Zytel® 70G33L	E41938	HB	120	
L	Zytel® FR50	E41938	V-O	130	
V	Rynite® FR530L	E69578	V-O	150	
M	Epoxy EFB534SO	E206123	—	—	Class B, F

Encapsulated cores are available upon request.

MICROLITE® XP Torridal Cores										
	CORE DIMENSION			Performance Parameters						
Core No.	O.D.Max (mm)	I.D.Min (mm)	Ht. Max (mm)	lm (cm)	A_c (cm^2)	Vol (cm^3)	W_a (cm^2)	W_aA_c (cm^4)	Initial Perm	A_L* (nH/N^2)
MP7050MDGC	13.233	7.463	6.121	3.14	0.080	0.250	0.437	0.035	245	78.20
MP7089MDGC	46.549	28.951	15.718	11.65	0.937	10.918	6.583	6.170	245	247.72
MP7109MDGC	57.212	37.435	15.316	14.64	1.034	15.127	11.006	11.376	245	217.42
MP7120MDGC	17.307	10.460	7.874	4.24	0.138	0.586	0.859	0.119	245	100.33
MP7195MDGC	54.316	26.970	16.523	12.49	1.599	19.978	5.713	9.136	245	394.14
MP7206MDGC	21.408	13.457	7.874	5.35	0.167	0.893	1.422	0.238	245	96.16
MP7254MDGC	39.379	24.862	15.646	9.91	0.753	7.460	4.855	3.656	245	234.09
MP7310MDGC	23.487	13.457	7.874	5.66	0.222	1.254	1.422	0.315	245	120.65
MP7324MDGC	36.993	23.008	11.049	9.24	0.487	4.505	4.158	2.026	245	162.28
MP7350MDGC	23.533	14.219	9.906	5.79	0.268	1.549	1.588	0.425	245	142.34
MP7380MDGC	18.303	10.232	7.874	4.35	0.170	0.742	0.822	0.140	245	120.59
MP7438MDGC	46.608	25.218	18.987	11.05	1.430	15.795	4.995	7.141	245	398.43
MP7548MDGC	33.250	19.731	11.049	8.15	0.469	3.824	3.058	1.435	245	177.37
MP7585MDGC	34.867	23.948	9.906	9.08	0.322	2.927	4.504	1.452	245	109.27
MP7715MDGC	51.532	32.457	13.894	12.97	0.892	11.567	8.274	7.379	245	211.73
MP7930MDGC	27.179	13.457	11.049	6.21	0.479	2.975	1.422	0.681	245	237.32