Magnetic Powder Cores

HTC200® Iron Powder Cores

Iron Powder Cores

Issue L 2015

MAGNETIC POWDER CORES

■Sendust ■Si-Fe® ■High Flux ■MPP ■Neu Flux® ■Nanodust™
■Low Cost Si-Fe ■Super Sendust ■Iron Powder

公司简介

浙江东睦科达磁电有限公司位于中国 浙江省德清县莫干山经济技术开发区，距杭州约30公里，上海150公里。公司成立于2000年9月，是中国最具规模的金属磁粉芯专业制造商，国家高新技术企业。

- 2002年公司通过了ISO9001:2000国际质量体系认证。我们将秉着“以质量为本，以科技取胜，求持续发展，使顾客满意”的经营理念，使我们的产品和服务不断完善，以满足我们客户的要求。
- 2003年我们设立了磁材技术中心，该实验室与浙江大学、中国计量学院等国内知名大专院校合作，主要研发磁性材料新产品，为公司作技术储备，使公司的技术在磁性材料领域中处于世界的前列。
- 2004年开始，我们对产品的原料有害物质进行管控，使我们的产品都能符合欧盟限制有害物质2002/95/EC的规范(RoHS)。
- 2008年我们通过了ISO14001:2004环境管理体系认证，使我们的产品不管在生产过程中和产品本身都能符合环境保护的要求。
- 2010年我们成立了粉末事业部，致力于合金软磁粉末的研发和制造。
- 2014年9月与东睦新材料集团股份有限公司展开合作，正式加入东睦集团。

在这本样本手册中，汇集了本公司生产的**铁粉芯**和**耐高温铁粉芯**；除了以上产品，KDM还生产合金磁粉芯，如有需要请联系我们索取合金磁粉芯样本手册（Issue K 2015）。

我们是用客户的满意度来判断公司的业绩，同时用客户对我们的信任程度来最终达到我们的成功。感谢您选择了我们的产品。

Brief Introduction

Zhejiang NBTM KeDa Magnetoelectricity Co.,Ltd.(KDM)was founded in Sept.2000 and is the biggest magnetic powder core manufacturer in China. KDM is located in Zhejiang Deqing Economic Development Zone, which is only 150km away from Shanghai.

- In 2002 KDM obtained the ISO9001:2000 quality management system certificate.
- In 2003 KDM established a R&D Center to develop new magnetic material products.
- Dated from 2004, all our products are in conformity to standards of the European Union's Executive Directive 2002/95/EC (ROHS).
- In 2008 KDM obtained the ISO14001:2004 environmental management system certificate.
- In 2010 KDM established a Powder Division, focusing on developing and manufacturing alloy magnetic powder.
- In 2014 KDM joined NBTM Group (NBTM New Materials Group Co., Ltd.).

In this catalogue,you will find detailed information about **Iron Powder Cores** and **HTC200® Iron Powder Cores**. In addition to Iron Powder Cores,KDM produce Magnetic Alloy Powder Cores.Please contact us to obtain catalogue (Issue K 2015).

We always focus on offering our customers with the excellent service and the products of high quality.

Company Honor
公司荣誉


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材质性能 Material Properties

材质编号 Material Mix Number	有效磁导率(μ₀) Reference Permeability	磁导率温度系数 Temp. Coef. Of Perm(+ppm/℃)	线性膨胀系数 Coef. of in Expan(+ppm/℃)	颜色 Color Code	
-2	10	100	10	Red/Clear	红/透明
-8	35	285	10	Yellow/Red	黄/红
-14	14	155	10	Black/Red	黑/红
-18	55	385	11	Green/Red	绿/红
-19	55	650	11	Red/Green	红/绿
-26	75	825	12	Yellow/White	黄/白
-28	22	510	11	Gray/Green	灰/绿
-30	22	510	11	Green/Gray	绿/灰
-33	33	665	11	Gray/Yellow	灰/黄
-34	33	565	11	Gray/Blue	灰/蓝
-35	33	665	11	Yellow/Gray	黄/灰
-38	85	955	12	Gray/Black	灰/黑
-40	60	950	11	Green/Yellow	绿/黄
-45	100	1045	12	Black/Black	黑/黑
-52	75	650	12	Green/Blue	绿/蓝

磁芯损耗对照表 Core Loss Comparison(mW/cm³)

Material Mix No.	60Hz @5000Gs	1kHz @1500Gs	10kHz @500Gs	50kHz @225Gs	100kHz @140Gs	500kHz @50Gs	在DC偏流下的磁导率 Permeability With DC Bias HDC=50Oe@10kHz	
							% μ_0	$\mu_{effective}$
-2	–	–	–	28	19	12	100	10.0
-8	45	64	59	50	35	28	91	31.9
-14	–	–	–	29	21	17	100	14.0
-18	48	72	70	63	46	37	74	40.7
-19	31	60	72	71	54	49	74	40.7
-26	32	60	75	89	83	139	51	38.3
-28	38	80	120	164	158	247	91	20.0
-30	37	80	120	149	129	129	91	20.0
-33	37	80	126	182	180	291	84	27.7
-34	29	61	87	100	82	78	84	27.7
-35	33	73	109	137	119	123	84	27.7
-38	31	57	72	99	103	217	51	43.4
-40	29	62	93	130	127	223	62	37.7
-45	26	49	60	69	61	92	46	46.0
-52	30	56	68	72	58	63	59	44.3

温度特性 Temperature Characteristics

铁粉芯一般适用-65℃~+125℃的温度范围，当磁芯处于较高的温度环境中，会使电感和品质因数(Q)永久性的降低，这是由于其在制造过程中使用了有机粘结剂，如环氧树脂等；当使用温度超过150℃时，其材料内部的树脂会恶化，使磁芯的损耗增大，降低铁粉芯的使用寿命。这种特性的偏离程度取决于时间、温度、磁芯大小、频率和磁通密度等。

Typical operating temperature for iron powder core is between -65℃~+125℃. If the operating temperature is above 150℃, the organi epoxy-resin binder starts to decompose, resulting in characteristics degradation in terms of temperature rise (watt losses), DC bias as well as life time. Such pheomon really depends on operating time period, temperature, core size, switching frequency and the flux density.

表面涂层 Surface Coating

本公司生产的环形磁芯由环氧树脂涂层，涂层可抵抗大多数清洗剂的擦洗，但过度接触某些溶剂会产生不良影响，E型和U型磁芯均经过防锈处理，以防止锈蚀。表面涂层绝缘强度的测试是：将两片导电板分别放在磁粉芯的两个端面，用50Hz，1250V（AC有效电压）的测试电压，时间为5秒钟。也可以根据客户的要求提高电解质强度。

The toroidal and bus bar cores listed in this catalogue are epoxy-coated. All finishes can resist most cleaning solvents. Extended exposures to certain solvents may have detrimental effects. The E Cores and the U cores are treated to resist corrosion. Coating is tested at 50Hz,1250Vrms for 5 seconds to meet the minimum dielectric strength (Hi-pot test). The toroidal cores can be double or triple coated for greater dielectric strength.

磁性偏差 Magentic Tolerance

Matorial (Mix No.)	-2	-8	-14	-18	-19	-26	-28	-30	-33	-34	-35	-38	-40	-45	-52
A_L Tolerance	0-15%	±10%	±10%	±10%	±10%	±10%	±10%	±10%	±10%	±10%	±10%	±10%	±10%	±10%	±10%

磁芯是按列出的A_L值制造的，每种材料的磁导率仅作参考。在任何情况下，A_L值均以在10kHz的频率下及10高斯（1mT)的AC通量密度峰值为依据。环型磁芯是以均匀分隔的完全单层线组作测试的，以尽量降低漏磁的影响。以非均匀分布而少圈数的铁粉磁芯作测试会产生比预期要大的电感读数。E型磁芯以100圈作为测试标准。磁力特性曲线，均有±10%的典型宽限度，而磁芯损耗特征的曲线就有±15%的典型宽限度。

Cores are manufactured based on their A_L values within certain tolerance. The permeability of each material is only for reference. A_L value is tested under 10kHz and 10G (or 1mT) at all time. For toroids, winding should be fully and evenly distributed throughout the core to minimize the leakage inductance. Iron powder toroidal cores will always have higher inductance measurement reading than expected if the number of turns is low resulting in winding not evenly distributed throughout the core. For E-cores, 100 turns will be used as the standard testing criteria. The typical tolerance of A_L value shown above is ±10% while the tolerance of core loss curve for the above listed materials is ±15%.

Products Characteristics
产品特性

材质说明 Material Description

材料-2/-14：这种材料的磁导率低，比其他没有附加空隙损耗的材料更能降低操作时的AC通量密度。

材料-8：这种材料在高偏流的情况下，磁芯损耗低，兼且线性良好，是良好的高频材料，也是最贵的材料。

材料-18：这种材料跟材料-8一样，磁芯损耗低，但磁导率高而成本较低，有良好的DC饱和特性。

材料-19：是一种可代替材料-18，但不昂贵的选择，而磁导率与材料-18相同，磁芯损耗略高于材料-18。

材料-26：最为通行的材料，是一种成本效益高的一般用途材料，适合功率转换和线路滤波等各种广泛用途。

材料-28/-30：这种材料的良好线性、低成本和相对低的磁导率，是其广泛应用于大尺寸的高功率UPS抗流器。

材料-33/-34/-35：是一种可代替材料-8，但不昂贵的选择，适用于高频率时磁芯损耗不重要的情况，高偏流时线性良好。

材料-38：是一种高磁导率、可代替材料-26的低成本选择，最适合线性频率的应用。

材料-40：最便宜的材料，其特征与最通用的材料-26颇相似，普遍应用于较大的尺寸。

材料-45：一种磁导率最高的材料。可代替材料-52，但磁芯损耗较高。

材料-52：这种材料在高频率下磁芯损耗较低，而磁导率与材料-26相同，在新型的高频抗流器上应用广泛。

Material description

-2/-14 Materials: The low permeability of these materials will result in lower operating AC fiux density than other materials with no additional gap-loss. The-14 Material is similar to -2 Material with slightly higher permeability.

-8/Material: This material has low core loss and good linearity under high bias conditions. A good high frequency material. The highest cost material.

-18Material: This material has low core loss similar to the -8 Material with higher permeability and a lower cost. Good DC saturation characteristics.

-19Material: An inexpensive alternate to the -18 Material with the same permeability and somewhat higher core losses.

-26Material: The most popular material. It is a cost effective general purpose material that is useful in a wide variety of power conversion and line filter applications.

-28/-30Materials: The good linearity, low cost, and relatively low permeability of this material make it popular in large sizes for high power UPS chokes.

-33/-34/-35 Materials: An inexpensive alternate to the -8 Material for applications where high frequency core loss is not critical. Good linearity with high bias.

-38Material:with its high magnetic permeability, is a low budget alternate of -26 Material. It is the best choice for linear frequency application.

-40Material: The least expensive material. It has characteristics quite similar to the very popular -26 Material. Popular in large sizes.

-45Material: The highest permeability Material. A high permeability alternate to -52 Material with slightly higher core losses.

-52Material: This Material has lower core loss at high frequency and the same permeability as the -26 Material. It is very popular for high frequency choke designs.

材料用途 Material Applications

Typical Application	-2	-8	-14	-18	-19	-26	-28	-30	-33	-34	-35	-38	-40	-45	-52
Light Dimmer Chokes						X						X	X	X	
60 Hz Differential-mode EMI Line Chokes						X						X	X	X	X
DC Chokes: < 50kHz or low Et/N(Buck/Boost)						X	X	X	X	X	X	X	X	X	
DC Chokes: ≥50kHz or higher Et/N(Buck/Boost)		X	X	X	X		X	X	X	X	X				X
Power Factor Correction Chokes: < 50kHz						X	X	X	X	X	X		X		
Power Factor Correction Chokes: ≥50kHz	X	X	X	X	X		X	X	X	X	X				
Resonant Inductors: ≥50kHz	X		X												

尺寸公差 Core Tolerance(mm)

环型磁芯 Toroidal Cores	KDM Part No.	OD	ID	HT	KDM Part No.	OD	ID	HT
	KT14 – KT20	± 0.25	± 0.25	± 0.25	KT150– KT225	± 0.63	± 0.63	± 0.75
	KT22 – KT38	± 0.38	± 0.38	± 0.50	KT249 – KT400	± 0.75	± 0.75	± 0.75
	KT40 – KT72	± 0.50	± 0.50	± 0.50	KT520 – KT650	± 1.25	± 1.25	± 1.25
	KT80 – KT141	± 0.50	± 0.50	± 0.63				

公差包括涂层 Tolerance includes coating

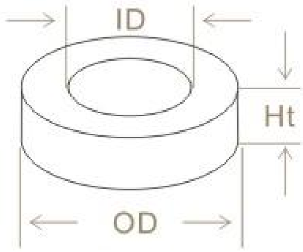
E型磁芯 E Cores	KDM Part No.	A	B	C	D	F	G	MAX GAP*
	KE13 – KE30	± 0.25	± 0.25	± 0.12	± 0.17	± 0.12	± 0.17	± 0.038
	KE32 – KE41	± 0.38	± 0.38	± 0.17	± 0.25	± 0.17	± 0.25	± 0.038
	KE43 – KE57	± 0.38	± 0.38	± 0.25	± 0.25	± 0.17	± 0.25	± 0.05
	KE77 – KE114	± 0.75	± 0.75	± 0.38	± 0.50	± 0.38	± 0.50	± 0.07
	KE155	± 1.0	± 1.0	± 0.63	± 0.75	± 0.63	± 0.75	± 0.12

单个磁芯气隙 Gap per piece

TYPICAL PART NO . KT 50-52 B

环型磁芯KDM Toroidal Cores
规格特称OD in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度 (Mean Magnetic Path Length)
A_e :横截面积(Cross Section Area)
V :磁芯体积(Core Volume)



KDM Part No.	A_L nH/N^2	OD in/mm	ID in/mm	Ht in/mm	ℓ_e cm	A_e cm^2	V cm^3
KT14-26A	12.5	.135/3.43	.067/1.70	.060/1.52	.810	.012	.0098
KT14-45A	16.5						
KT14-52A	11.5						
KT16-2	2.2	.160/4.06	.078/1.98	.060/1.52	.930	.015	.014
KT16-8	6.0						
KT16-18	9.5						
KT16-26	14.5						
KT16-40	12.5						
KT16-45	17.0						
KT16-52	13.5						
KT20-2	2.5	.200/5.08	.088/2.24	.070/1.78	1.15	.023	.026
KT20-8	7.8						
KT20-18	13.0						
KT20-26	18.5						
KT20-40	16.0						
KT20-45	22.5						
KT20-52	17.5						
KT22-26	38.5	.223/5.66	.097/2.46	.143/3.63	1.28	.052	.067
KT22-52	38.5						
KT25-2	3.4	.225/6.48	.120/3.05	.096/2.44	1.50	.037	.055
KT25-8	10.0						
KT25-18	17.0						
KT25-26	24.5						
KT25-40	20.5						
KT25-52	31.0						
KT25-52	23.0						
KT26-8	24.0	.265/6.73	.105/2.67	.190/4.83	1.47	.090	.133
KT26-18	41.5						
KT26-26	57.0						
KT26-45	77.0						
KT26-52	56.0						
KT27-2	3.3	.280/7.11	.151/3.84	.128/3.25	1.71	.047	.080
KT27-8	11.5						
KT27-18	18.5						
KT27-26	27.5						
KT27-52	25.5						
KT30-2	4.3	.307/7.80	.151/3.84	.128/3.25	1.84	.060	.110
KT30-8	14.0						
KT30-18	22.0						
KT30-26	33.5						
KT30-40	28.0						
KT30-45	40.5						
KT30-52	30.5						

TYPICAL PART NO . KT 50-52 B

环型磁芯KDM Toroidal Cores
规格特称OD in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

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A_e :横截面积(Cross Section Area)
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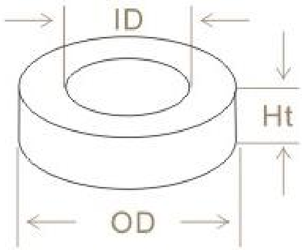

KDM Part No.	A_L nH/N²	OD in/mm	ID in/mm	Ht in/mm	ℓ_e cm	A_e cm²	V cm³
KT32-52	35.0	.327/8.31	.169/4.29	.158/4.01	1.96	.073	.144
KT37-2	4.0	.375/9.53	.205/5.21	.128/3.25	2.31	.064	.147
KT37-8	12.0						
KT37-18	19.0						
KT37-19	19.0						
KT37-26	28.5						
KT37-40	24.5						
KT37-45	34.0						
KT37-52	26.0						
KT38-2	7.4	.375/9.53	.175/4.45	.190/4.83	2.18	.114	.248
KT38-8	20.0						
KT38-18	36.0						
KT38-19	36.0						
KT38-26	49.0						
KT38-40	41.5						
KT38-45	65.0						
KT38-52	49.0						
KT40-26	36.0	.400/10.2	.205/5.21	.163/4.14	2.41	.093	.223
KT40-52	36.0						
KT44-2	5.2	.440/11.2	.229/5.82	.159/4.04	2.68	.099	.266
KT44-8	18.0						
KT44-14	6.2						
KT44-18	25.5						
KT44-19	25.5						
KT44-26	37.0						
KT44-40	31.0						
KT44-45	46.5						
KT44-52	35.0						
KT44-52C	55.0	.440/11.2	.229/5.82	.250/6.35	2.68	.157	.419
KT44-52D	70.0	.440/11.2	.229/5.82	.338/8.59	2.68	.212	.567
KT50-2	4.9	.500/12.7	.303/7.70	.190/4.83	3.19	.112	.358
KT50-8	17.5						
KT50-14	5.9						
KT50-18	24.0						
KT50-19	24.0						
KT50-26	33.0						
KT50-38	37.5						
KT50-40	29.5						
KT50-45	44.0						
KT50-52	33.0						

Toroidal Cores
环型磁芯

TYPICAL PART NO . KT 50−52 B

环型磁芯KDM Toroidal Cores
规格特称OD in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度（Mean Magnetic Path Length)
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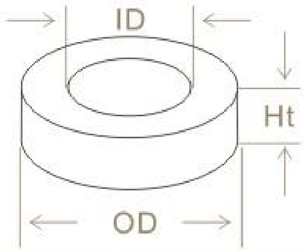
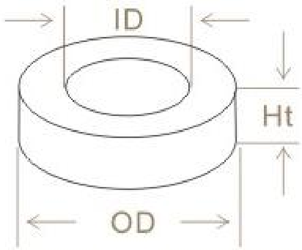


KDM Part No.	A_L nH/N^2	OD in/mm	ID in/mm	Ht in/mm	ℓ_e cm	A_e cm^2	V cm^3
KT50-8B	23.0	.500/12.7	.303/7.70	.250/6.35	3.19	.148	.471
KT50-18B	32.0						
KT50-19B	32.0						
KT50-26B	43.5						
KT50-38B	49.5						
KT50-40B	38.5						
KT50-45B	58.0						
KT50-52B	43.5						
KT50-8C	28.3	.500/12.7	.303/7.70	.335/8.51	3.19	.200	.637
KT50-26C	61.0						
KT50-26D	72.0	.500/12.7	.303/7.70	.375/9.53	3.19	.223	.711
KT50-40D	59.0						
KT50-52D	66.0						
KT51-8C	37.0	.500/12.7	.200/5.08	.250/6.35	2.79	.223	.622
KT51-18C	55.0						
KT51-26C	83.0						
KT51-40C	67.0						
KT51-52C	75.0						
KT57-45	67.0	.573/14.6	.273/6.93	.196/4.98	3.38	.178	.601
KT57-52	49.5						
KT57-45A	88.0	.573/14.6	.273/6.93	.263/6.68	3.38	.239	.805
KT57-52A	66.0						
KT60-2	6.5	.600/15.2	.336/8.53	.234/5.94	3.74	.187	.699
KT60-8	19.0						
KT60-14	8.3						
KT60-18	34.5						
KT60-19	34.5						
KT60-26	50.0						
KT60-40	41.5						
KT60-52	47.0						
KT60-26D	97.0	.600/15.2	.336/8.53	.470/11.9	3.74	.374	1.400
KT60-52D	94.0						
KT68-2	5.7	.690/17.5	.370/9.40	.190/4.83	4.23	.179	.759
KT68-8	19.5						
KT68-14	7.0						
KT68-18	29.0						
KT68-19	29.0						
KT68-26	43.5						
KT68-38	45.0						
KT68-40	35.0						
KT68-45	53.0						
KT68-52	40.0						

TYPICAL PART NO . KT 50-52 B

环型磁芯KDM Toroidal Cores
规格特称OD in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度（Mean Magnetic Path Length)
A_e :横截面积(Cross Section Area)
V :磁芯体积(Core Volume)



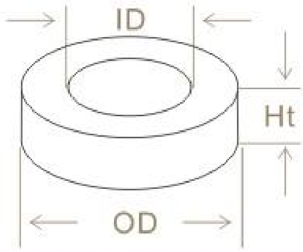
KDM Part No.	A_L nH/N²	OD in/mm	ID in/mm	Ht in/mm	ℓ_e cm	A_e cm²	V cm³
KT68-2A	7.0	.690/17.5	.370/9.40	.250/6.35	4.23	.242	1.03
KT68-8A	26.0						
KT68-14A	9.5						
KT68-18A	39.5						
KT68-19A	39.5						
KT68-26A	58.0						
KT68-38A	61.0						
KT68-40A	47.0						
KT68-45A	71.0						
KT68-52A	54.0						
KT68-2D	11.4	.690/17.5	.370/9.40	.375/9.53	4.23	.358	1.52
KT68-14D	14.2						
KT68-26D	87.0						
KT68-40D	70.0						
KT68-52D	80.0	.690/17.5	.336/8.53	.367/9.32	4.09	.394	1.61
KT69-45	120.0						
KT72-2	12.8	.720/18.3	.280/7.11	.260/6.60	4.01	.349	1.40
KT72-8	36.0						
KT72-18	60.0						
KT72-26	90.0						
KT72-40	71.0						
KT72-52	82.0						
KT80-2	5.5	.795/20.2	.495/12.6	.250/6.35	5.14	.231	1.19
KT80-8	18.0						
KT80-14	7.4						
KT80-18	31.0						
KT80-19	31.0						
KT80-26	46.0						
KT80-38	48.0						
KT80-40	39.5						
KT80-45	56.0						
KT80-52	42.0						
KT80-8B	29.5	.795/20.2	.495/12.6	.375/9.53	5.14	.347	1.78
KT80-14B	11.0						
KT80-18B	46.5						
KT80-19B	46.5						
KT80-26B	71.0						
KT80-38B	72.0						
KT80-40B	59.0						
KT80-45B	84.0						
KT80-52B	63.0						
KT80-26D	92.0	.795/20.2	.495/12.6	.500/12.7	5.14	.453	2.33
KT80-40D	79.0						
KT80-52D	83.0						

Toroidal Cores
环型磁芯

TYPICAL PART NO . KT 50−52 B

环型磁芯KDM Toroidal Cores
规格特称OD in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度 (Mean Magnetic Path Length)
A_e :横截面积(Cross Section Area)
V :磁芯体积(Core Volume)

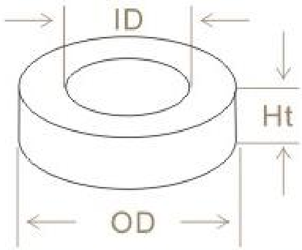


KDM Part No.	A_L nH/N^2	OD in/mm	ID in/mm	Ht in/mm	ℓ_e cm	A_e cm^2	V cm^3
KT90−8	30.0	.900/22.9	.550/14.0	.375/9.53	5.78	.395	2.28
KT90−18	47.0						
KT90−19	47.0						
KT90−26	70.0						
KT90−38	73.0						
KT90−40	57.0						
KT90−45	85.0						
KT90−52	64.0						
KT94−2	8.4	.942/23.9	.560/14.2	.312/7.92	5.97	.362	2.16
KT94−8	25.0						
KT94−14	10.0						
KT94−18	42.0						
KT94−19	42.0						
KT94−26	60.0						
KT94−38	65.0						
KT94−40	49.0						
KT94−45	76.0						
KT94−52	57.0						
KT95−26B	84.0	.942/23.9	.495/12.6	.375/9.53	5.72	.510	2.91
KT95−52B	84.0						
KT106−2	13.5	1.060/26.9	.570/14.5	.437/11.1	6.49	.659	4.28
KT106−8	45.0						
KT106−14	17.0						
KT106−18	70.0						
KT106−19	70.0						
KT106−26	93.0						
KT106−28	30.0						
KT106−30	30.0						
KT106−33	40.0						
KT106−34	40.0						
KT106−35	40.0						
KT106−38	108.0						
KT106−40	81.0						
KT106−45	125.0						
KT106−52	95.0						
KT106−18A	49.0	1.060/26.9	.570/14.5	.312/7.92	6.49	.461	3.00
KT106−26A	67.0						
KT106−40A	58.0						
KT106−52A	67.0						
KT106−18B	91.0	1.060/26.9	.570/14.5	.575/14.6	6.49	.858	5.57
KT106−19B	91.0						
KT106−26B	124.0						
KT106−40B	106.0						
KT106−52B	124.0						
KT124−26	58.0	1.245/31.6	.710/18.0	.280/7.11	7.75	.459	3.55
KT130−2	11.0	1.300/33.0	.780/19.8	.437/11.1	8.28	.698	5.78
KT130−8	35.0						
KT130−14	14.0						
KT130−18	58.0						
KT130−19	58.0						

TYPICAL PART NO . KT 50-52 B

环型磁芯KDM Toroidal Cores
规格特称OD in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度（Mean Magnetic Path Length)
A_e :横截面积(Cross Section Area)
V :磁芯体积(Core Volume)



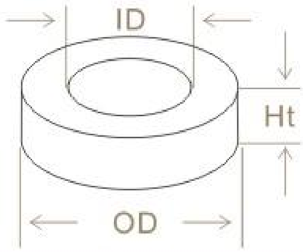
KDM Part No.	A_L nH/N²	OD in/mm	ID in/mm	Ht in/mm	ℓ_e cm	A_e cm²	V cm³
KT130-26	81.0	1.300/33.0	.780/19.8	.438/11.1	8.28	.698	5.78
KT130-28	25.0						
KT130-30	25.0						
KT130-33	33.5						
KT130-34	33.5						
KT130-35	33.5						
KT130-38	90.0						
KT130-40	69.0						
KT130-45	105.0						
KT130-52	79.0						
KT130-26A	41.0	1.300/33.0	.780/19.8	.225/5.72	8.28	.361	2.99
KT130-40A	34.0						
KT131-8	52.5	1.300/33.0	.640/16.3	.437/11.1	7.72	.885	6.84
KT131-18	79.0						
KT131-19	79.0						
KT131-26	116.0						
KT131-33	46.5						
KT131-34	46.5						
KT131-35	46.5						
KT131-40	93.0						
KT131-52	108.0						
KT132-26	103.0	1.300/33.0	.700/17.8	.437/11.1	7.96	.805	6.41
KT132-40	83.0						
KT132-52	95.0						
KT141-8	32.0	1.415/35.9	.880/22.4	.412/10.5	9.14	.674	6.16
KT141-26	75.0						
KT141-40	60.0						
KT141-52	69.0						
KT150-18	65.0	1.510/38.4	.845/21.5	.437/11.1	9.38	.887	8.31
KT150-26	96.0						
KT150-40	78.0						
KT150-52	89.0						
KT150-26A	66.0	1.510/38.4	.845/21.5	.325/8.26	9.38	.657	6.16
KT150-38A	74.5						
KT150-45A	84.0						
KT157-2	14.0	1.570/39.9	.950/24.1	.570/14.5	10.1	1.06	10.7
KT157-8	42.0						
KT157-14	17.5						
KT157-18	73.0						
KT157-19	73.0						
KT157-26	100.0						
KT157-28	31.5						
KT157-30	31.5						
KT157-33	43.5						
KT157-34	43.5						
KT157-35	43.5						
KT157-38	112.0						
KT157-40	86.0						
KT157-45	130.0						
KT157-52	99.0						

Toroidal Cores
环型磁芯

TYPICAL PART NO . KT 50−52 B

环型磁芯KDM Toroidal Cores
规格特称OD in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度 (Mean Magnetic Path Length)
A_e :横截面积(Cross Section Area)
V :磁芯体积(Core Volume)



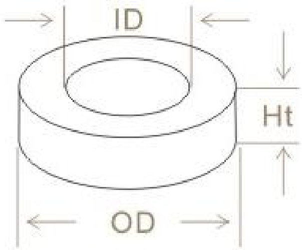
KDM Part No.	A_L nH/N²	OD in/mm	ID in/mm	Ht in/mm	ℓ_e cm	A_e cm²	V cm³
KT175−2	15.0	1.750/44.5	1.070/27.2	.650/16.5	11.2	1.34	15.0
KT175−8	48.0						
KT175−18	82.0						
KT175−26	105.0						
KT175−40	90.0						
KT175−52	105.0						
KT184−2	24.0	1.840/46.7	.950/24.1	.710/18.0	11.2	1.88	21.0
KT184−8	72.0						
KT184−14	28.0						
KT184−18	116.0						
KT184−19	116.0						
KT184−26	169.0						
KT184−28	51.0						
KT184−30	51.0						
KT184−33	70.0						
KT184−34	70.0						
KT184−35	70.0						
KT184−40	143.0						
KT184−52	159.0						
KT200−2	12.0	2.000/50.8	1.250/31.8	.550/14.0	13.0	1.27	16.5
KT200−8	42.5						
KT200−18	67.0						
KT200−19	67.0						
KT200−26	92.0						
KT200−33	37.0						
KT200−34	37.0						
KT200−35	37.0						
KT200−40	79.0						
KT200−52	92.0						
KT200−2B	21.8	2.000/50.8	1.250/31.8	1.000/25.4	13.0	2.32	30.00
KT200−8B	78.5						
KT200−18B	120.0						
KT200−19B	120.0						
KT200−26B	160.0						
KT200−30B	51.0						
KT200−35B	74.0						
KT200−40B	142.0						
KT200−52B	155.0						
KT201−8	104.0	2.000/50.8	.950/24.1	.875/22.2	11.8	2.81	33.2
KT201−18	164.0						
KT201−26	224.0						
KT201−40	194.0						
KT201−52	224.0						
KT224−26C	155.0	2.250/57.2	1.250/31.8	.750/19.1	14.0	2.31	32.2
KT224−52C	155.0						
KT225−2	12.0	2.250/57.2	1.405/35.7	.550/14.0	14.6	1.42	20.7
KT225−8	42.5						
KT225−18	67.0						
KT225−19	67.0						

Toroidal Cores
环型磁芯

TYPICAL PART NO . KT 50-52 B

环型磁芯KDM Toroidal Cores
规格特称OD in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度 (Mean Magnetic Path Length)
A_e :横截面积(Cross Section Area)
V :磁芯体积(Core Volume)



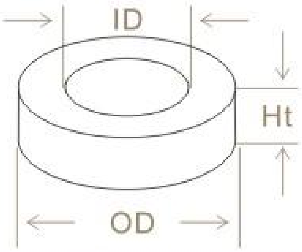
KDM Part No.	A_L nH/N²	OD in/mm	ID in/mm	Ht in/mm	ℓ_e cm	A_e cm²	V cm³
KT225-26	98.0	2.250/57.2	1.405/35.7	.550/14.0	14.6	1.42	20.7
KT225-28	28.0						
KT225-30	28.0						
KT225-33	37.0						
KT225-34	37.0						
KT225-35	37.0						
KT225-40	78.0						
KT225-52	92.0						
KT225-2B	21.5	2.250/57.2	1.405/35.7	1.000/25.4	14.6	2.59	37.8
KT225-14B	28.0						
KT225-26B	160.0						
KT225-34B	67.0						
KT225-52B	155.0						
KT249-26	203.0	2.500/63.5	1.405/35.7	1.000/25.4	15.6	3.36	52.3
KT249-34	89.0						
KT249-52	203.0						
KT250-8	113.0	2.500/63.5	1.250/31.8	1.000/25.4	15.0	3.84	57.4
KT250-14	43.0						
KT250-18	177.0						
KT250-19	177.0						
KT250-26	242.0						
KT250-30	71.0						
KT250-34	106.0						
KT250-40	194.0						
KT250-52	242.0						
KT260-18	128.0	2.670/67.9	1.600/40.7	1.000/25.4	17.1	3.45	59.0
KT260-26	175.0						
KT260-28	51.0						
KT260-30	51.0						
KT260-33	76.5						
KT260-34	76.5						
KT260-35	76.5						
KT260-40	140.0						
KT260-52	175.0						
KT300-2	11.4	3.040/77.2	1.930/49.0	.500/12.7	19.8	1.68	33.4
KT300-8	37.0						
KT300-18	58.0						
KT300-19	58.0						
KT300-26	80.0						
KT300-28	23.0						
KT300-30	23.0						
KT300-33	34.5						
KT300-34	34.5						
KT300-35	34.5						
KT300-40	71.0						
KT300-52	80.0						

Toroidal Cores
环型磁芯

TYPICAL PART NO . KT 50–52 B

环型磁芯KDM Toroidal Cores
规格特称OD in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度（Mean Magnetic Path Length)
A_e :横截面积(Cross Section Area)
V :磁芯体积(Core Volume)

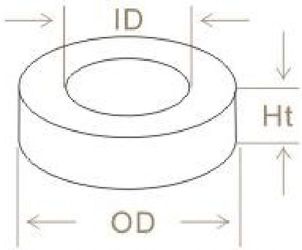


KDM Part No.	A_L nH/N^2	OD in/mm	ID in/mm	Ht in/mm	ℓ_e cm	A_e cm^2	V cm^3
KT300–2D	22.8	3.040/77.2	1.930/49.0	1.000/25.4	19.8	3.38	67.0
KT300–14D	28.0						
KT300–18D	116.0						
KT300–19D	116.0						
KT300–26D	160.0						
KT300–28D	46.0						
KT300–30D	46.0						
KT300–33D	69.0						
KT300–34D	69.0						
KT300–35D	69.0						
KT300–40D	142.0						
KT300–52D	160.0						
KT350–18	125.0	3.500/89.0	2.140/54.4	1.000/25.4	22.5	4.39	98.0
KT350–26	171.0						
KT350–28	50.0						
KT350–30	50.0						
KT350–33	75.0						
KT350–34	75.0						
KT350–35	75.0						
KT350–40	137.0						
KT350–52	171.0						
KT400–2	18.0	4.000/102	2.250/57.2	.650/16.5	25.0	3.46	86.4
KT400–8	60.0						
KT400–18	96.0						
KT400–19	96.0						
KT400–26	131.0						
KT400–28	40.5						
KT400–30	40.5						
KT400–33	55.0						
KT400–34	55.0						
KT400–35	55.0						
KT400–40	115.0						
KT400–52	131.0						
KT400–26B	205.0	4.000/102	2.250/57.2	1.000/25.4	25.0	5.35	133

TYPICAL PART NO . KT 50-52 B

环型磁芯KDM Toroidal Cores
规格特称OD in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度（Mean Magnetic Path Length)
A_e :横截面积(Cross Section Area)
V :磁芯体积(Core Volume)



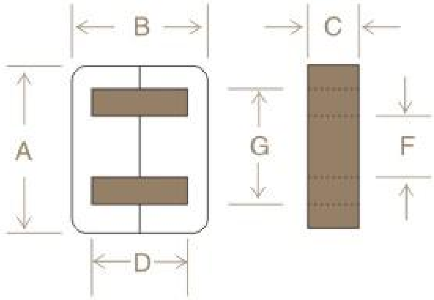
KDM Part No.	A_L nH/N²	OD in/mm	ID in/mm	Ht in/mm	ℓ_e cm	A_e cm²	V cm³
KT400-2D	36.0	4.000/102	2.250/57.2	1.300/33.0	25.0	6.85	171
KT400-14D	45.5						
KT400-26D	262.0						
KT400-28D	81.0						
KT400-30D	81.0						
KT400-33D	110.0						
KT400-34D	110.0						
KT400-35D	110.0						
KT400-40D	230.0						
KT520-2	20.0	5.200/132	3.080/78.2	.800/20.3	33.1	5.24	173
KT520-8	65.0						
KT520-26	149.0						
KT520-28	45.0						
KT520-30	45.0						
KT520-33	65.0						
KT520-34	65.0						
KT520-35	65.0						
KT520-40	119.0						
KT520-52	137.0						
KT520-28D	90.0	5.200/132	3.080/78.2	1.600/40.6	33.1	10.5	347
KT520-30D	90.0						
KT520-33D	130.0						
KT520-34D	130.0						
KT520-35D	130.0						
KT520-40D	240.0						
KT650-2	58.0	6.500/165	3.500/88.9	2.000/50.8	39.9	18.4	734
KT650-8	200.0						
KT650-26	434.0						
KT650-28	127.0						
KT650-30	127.0						
KT650-33	191.0						
KT650-34	191.0						
KT650-35	191.0						
KT650-40	376.0						
KT650-52	405.0						

E Cores
E型磁芯

TYPICAL PART NO . KE 25-26 A

E 型磁芯KDM E Cores
规格特称A Size
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度 (Mean Magnetic Path Length)
A_e: 横截面积(Cross Section Area)
V : 磁芯体积(Core Volume)
W : 窗口面积(Window Area)

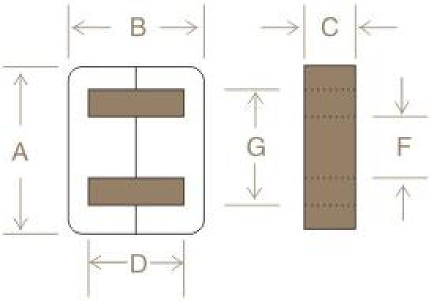


KDM Part No.	Micrometals Part No .	A_L nH/N²	A in/mm	B in/mm	C in/mm	D in/mm	F in/mm	G in/mm	ℓ_e cm	A_e cm²	V cm³	W cm²
KE13-8	E49-8	20.5	.500/12.7	.437/11.1	.125/3.18	.312/7.93	.125/3.18	.375/9.53	2.86	.101	.288	.252
KE13-18	E49-18	29.0										
KE13-26	E49-26	38.0										
KE13-52	E49-52	38.0										
KE16-8	E65-8	30.5	.645/16.4	.640/16.3	.182/4.62	.471/12.0	.182/4.62	.445/11.3	3.98	.224	.861	.399
KE16-26	E65-26	58.0										
KE16-40	E65-40	51.0										
KE16-52	E65-52	56.0										
KE19-2	E75-2	14.5	.750/19.1	.635/16.1	.187/4.75	.455/11.6	.187/4.75	.562/14.3	4.20	.226	.936	.551
KE19-8	E75-8	33.5										
KE19-26	E75-26	64.0										
KE19-40	E75-40	55.0										
KE19-52	E75-52	59.0										
KE20-26	E79-26	49.0	.793/20.1	.884/22.5	.140/3.56	.634/16.1	.250/6.35	.546/13.9	5.24	.225	1.18	.605
KE20-8A	E80-8	38.0	.795/20.2	.784/19.9	.230/5.84	.550/14.0	.230/5.84	.575/14.6	4.84	.333	1.63	.613
KE20-26A	E80-26	73.0										
KE20-52A	E80-52	73.0										
KE25-8	E99-8	51.0	1.000/25.4	1.000/25.4	.287/7.29	.690/17.5	.287/7.29	.695/17.7	6.08	.548	3.38	.908
KE25-26	E99-26	96.0										
KE25-52	E99-52	96.0										
KE25-2A	E100-2	21.0	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
KE25-8A	E100-8	48.0										
KE25-18A	E100-18	65.0										
KE25-26A	E100-26	92.0										
KE25-40A	E100-40	81.0										
KE25-52A	E100-52	85.0										
KE26-2	E101-2	53.0	1.020/25.9	.750/19.1	.555/14.1	.350.8.89	.250/6.35	.765/19.4	3.93	.895	2.36	.581
KE26-8	E101-8	116.0										
KE30-26	E118-26	90.0	1.185/30.1	1.185/30.1	.278/7.06	.782.19.9	.278/7.06	.782/19.9	7.14	.498	4.60	1.27
KE30-40	E118-40	80.0										
KE30-52	E118-52	90.0										
KE32-26	E125-26	134.0	1.255/31.8	1.215/30.8	.378/9.60	.835/21.2	.378/9.60	.885/22.5	7.45	.922	6.82	1.37
KE32-33	E125-33	63.5										
KE32-40	E125-40	113.0										
KE35-2	E137-2	32.0	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
KE35-8	E137-8	67.0										
KE35-18	E137-18	100.0										
KE35-26	E137-26	134.0										
KE35-40	E137-40	113.0										
KE35-52	E137-52	131.0										

TYPICAL PART NO . KE 25-26 A

E 型磁芯KDM E Cores
规格特称A Size
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度 (Mean Magnetic Path Length)
A_e: 横截面积(Cross Section Area)
V : 磁芯体积(Core Volume)
W : 窗口面积(Window Area)



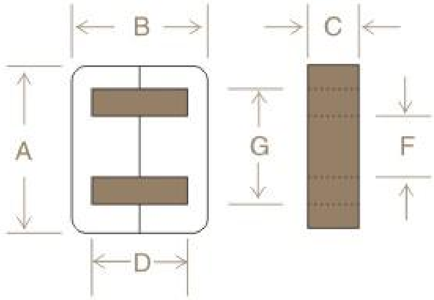
KDM Part No.	Micrometals Part No.	A_L nH/N²	A in/mm	B in/mm	C in/mm	D in/mm	F in/mm	G in/mm	ℓ_e cm	A_e cm²	V cm³	W cm²
KE37-18	E145-18	112.0	1.455/37.0	1.370/34.8	.425/10.8	.950/24.1	.425/10.8	1.035/26.3	8.50	1.17	9.89	1.84
KE37-26	E145-26	146.0										
KE37-52	E145-52	146.0										
KE41-8	E162-8	105.0	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
KE41-18	E162-18	149.0										
KE41-26	E162-26	210.0										
KE41-40	E162-40	175.0										
KE41-52	E162-52	199.0										
KE43-2	E168-2	43.5	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
KE43-8	E168-8	97.0										
KE43-18	E168-18	135.0										
KE43-26	E168-26	195.0										
KE43-40	E168-40	163.0										
KE43-52	E168-52	179.0										
KE43-2A	E168-2A	55.0	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
KE43-8A	E168-8A	116.0										
KE43-18A	E168-18A	170.0										
KE43-26A	E168-26A	232.0										
KE43-40A	E168-40A	196.0										
KE43-52A	E168-52A	230.0										
KE47-8	E187-8	144.0	1.865/47.4	1.552/39.4	.620/15.7	.952/24.2	.620/15.7	1.250/31.8	9.53	2.48	23.3	1.93
KE47-18	E187-18	213.0										
KE47-26	E187-26	265.0										
KE47-40	E187-40	240.0										
KE47-52	E187-52	265.0										
KE56-2	E220-2	69.0	2.210/56.1	2.180/55.4	.820/20.8	1.510/38.3	.680/17.3	1.520/38.6	13.2	3.60	47.7	4.09
KE56-8	E220-8	143.0										
KE56-18	E220-18	196.0										
KE56-26	E220-26	275.0										
KE56-30	E220-30	107.0										
KE56-34	E220-34	136.0										
KE56-40	E220-40	240.0										
KE56-52	E220-52	262.0										
KE57-2	E225-2	76.0	2.240/56.9	1.875/47.6	.745/18.9	1.140/29.0	.745/18.9	1.500/38.1	11.5	3.58	40.8	2.78
KE57-8	E225-8	173.0										
KE57-18	E225-18	240.0										
KE57-26	E225-26	325.0										
KE57-40	E225-40	290.0										
KE57-52	E225-52	325.0										

E Cores
E型磁芯

TYPICAL PART NO . KE 25-26 A

E 型磁芯KDM E Cores
规格特称A Size
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度（Mean Magnetic Path Length)
A_e: 横截面积(Cross Section Area)
V : 磁芯体积(Core Volume)
W : 窗口面积(Window Area)



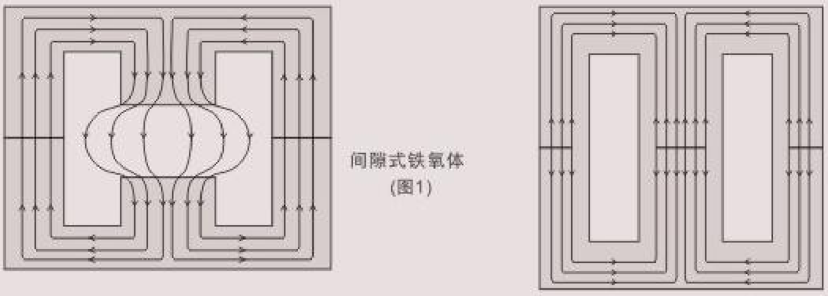
KDM Part No.	Micrometals Part No.	A_L nH/N²	A in/mm	B in/mm	C in/mm	D in/mm	F in/mm	G in/mm	ℓ_e cm	A_e cm²	V cm³	W cm²
KE77-2	E305-2	75.0	3.051/77.5	3.051/77.5	.933/23.7	2.118/53.8	.933/23.7	2.118/53.8	18.5	5.62	104	8.10
KE77-8	E305-8	156.0										
KE77-18	E305-18	222.0										
KE77-26	E305-26	287.0										
KE77-30	E305-30	124.0										
KE77-34	E305-34	150.0										
KE77-40	E305-40	255.0										
KE77-52	E305-52	287.0										
KE77-8A	E305-8A	208.0	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
KE77-18A	E305-18A	280.0										
KE77-26A	E305-26A	382.0										
KE77-30A	E305-30A	165.0										
KE77-40A	E305-40A	339.0										
KE77-52A	E305-52A	382.0										
KE114-2	E450-2	132.0	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
KE114-8	E450-8	260.0										
KE114-18	E450-18	400.0										
KE114-26	E450-26	540.0										
KE114-30	E450-30	235.0										
KE114-34	E450-34	300.0										
KE114-40	E450-40	480.0										
KE114-52	E450-52	500.0										
KE114-8H	E450-8H	140.0	4.500/114	3.636/92.4	.688/17.5	2.250/57.2	1.375/34.9	3.120/79.3	22.9	6.1	140	12.7
KE114-18H	E450-18H	200.0										
KE114-52H	E450-52H	270.0										
KE155-2	E610-2	163.0	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
KE155-26	E610-26	588.0										
KE155-34	E610-34	314.0										

铁粉芯E型与铁氧体E型的性能对比

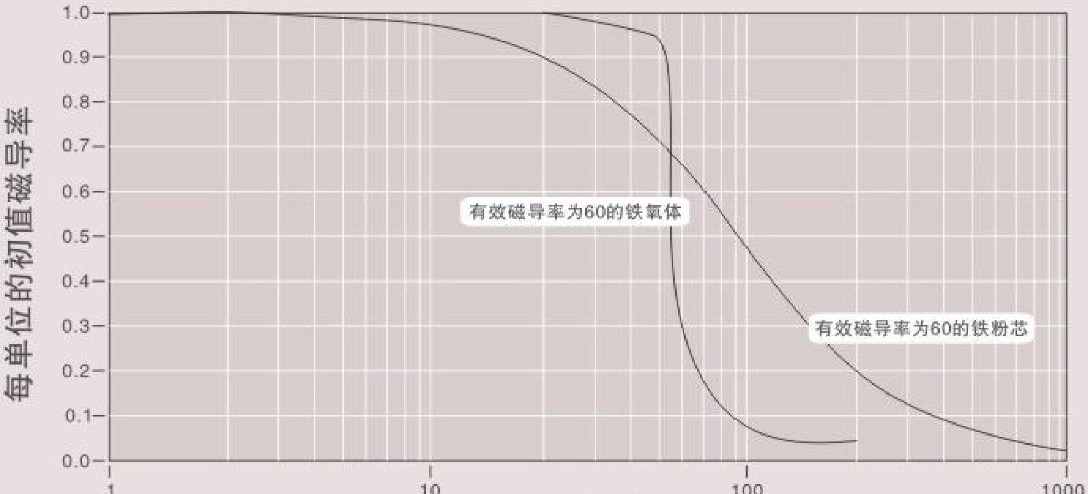
虽然高级铁氧体磁芯的损耗比铁粉芯磁芯损耗低，但高电平时铁氧体通常需要较低的有效磁导率才能阻止饱和。而铁氧体的初始磁导率又很高，这样就需要相对较大的气隙才能获得较低的有效磁导率。而这种气隙可以造成严重的局部气隙损耗问题，简单来说，由于气隙周围存在边缘通量，气隙损耗会大幅增加损耗量（图1）。边缘通量与铜线圈相交，会在导线中产生过量涡流。当频率高于100kHz时，尤其显著，在很多的例子里，气隙损耗都会超过磁芯损耗。由于铁芯粉里的气隙是均分布的，所以这种局部化气隙基本上是不存在的。

由于铁芯粉的磁通量比铁氧体的多近三倍，铁粉芯的直流偏流特性明显比后者好（图2）。这样，在通常衰减50%的情况下，如图设计方案使用适度饱和的铁粉芯，那么就可以再磁芯体积减少35%的情况下获得更佳性能。高温时二者的磁通量差异会更加明显，因为铁氧体的磁通量会随温度升高而降低，而铁粉芯则保持相对稳定。

与铁粉芯E型相比，间隙式铁氧体磁芯也具有自己的优点。间隙式铁氧体有更多的尺寸和形状供您选择。另外，由于铁氧体材料的间隙有效磁导率更高些，因此非常使用于低偏压应用（如前馈变压器和低偏压电感器）。



(图1)



（图2）

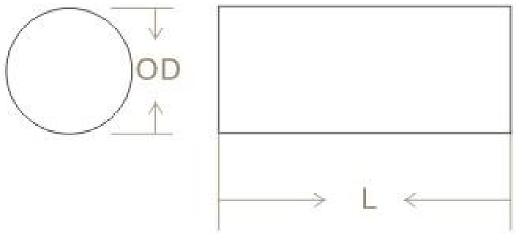
外部漏磁场

磁芯形状影响外部漏磁场，因为对E型磁芯而言，磁芯的大部分都围绕着线圈，而对环型磁芯而言线圈围绕磁芯，所以前者的外部漏磁场大于后者。使用铁粉芯E型磁芯时，必须考虑其外部漏场。铁粉芯E型磁芯不能用金属支架安装，因为漏磁通常会在支架中集中，导致总损耗增加。布置电路板式一定要考虑漏磁场。易于受漏磁场影响的组件应当远离铁粉芯E型磁芯，该距离近似于其与间隙式铁氧体的间距。

Plain Cores
管状磁芯

TYPICAL PART NO . KP 3.45×19.7

管状磁芯KDM Plain Cores — KP
外径尺寸OD(mm) — 3.45
长度尺寸L(mm) — 19.7



KDM Part No.	A_L nH/N²	OD in/mm	L in/mm
KP3.45×19.7	7.6	.136/3.45	.775/19.7
KP4.83×19.1	12.5	.190/4.83	.750/19.1
KP6.35×19.1	16.0	.250/6.35	.750/19.1
KP6.35×25.4	16.0	.250/6.35	1.000/25.4
KP6.48×31.8	15.0	.255/6.48	1.250/31.8
KP6.48×38.1	14.5	.255/6.48	1.500/38.1
KP7.95×25.4	20.0	.313/7.95	1.000/25.4
KP7.95×31.8	20.0	.313/7.95	1.250/31.8
KP7.95×47.6	18.0	.313/7.95	1.875/47.6
KP9.53×25.4	25.5	.375/9.53	1.000/25.4
KP9.53×31.8	26.5	.375/9.53	1.250/31.8
KP9.53×38.1	25.0	.375/9.53	1.500/38.1
KP9.53×44.5	22.5	.375/9.53	1.750/44.5
KP12.7×25.4	30.0	.500/12.7	1.000/25.4
KP12.7×31.8	34.5	.500/12.7	1.250/31.8
KP12.7×38.1	33.0	.500/12.7	1.500/38.1
KP12.7×44.5	32.0	.500/12.7	1.750/44.5
KP12.7×50.8	31.0	.500/12.7	2.000/50.8
KP15.9×31.8	37.5	.625/15.9	1.250/31.8
KP15.9×38.1	41.5	.625/15.9	1.500/38.1
KP19.1×38.1	45.0	.750/19.1	1.500/38.1
KP19.1×60.3	49.5	.750/19.1	2.375/60.3
KP25.4×50.8	80.0	1.000/25.4	2.000/50.8

A_L近似值仅作参考 A_L Value Listed is approximate and is for indication only.

尺寸公差 Size Tolerance(mm)

KDM Part No.	OD	L
KP3.45–KP25.4	+0.00 –0.15	±0.5

圆柱形磁芯的应用 Cylindrical Core Applications

从下面的公式,可大致计算出管状磁芯的电感和所需线圈匝数:
The inductance and required number of turns for cylindrical shapes as plain and hollow cores can be closely approximated from the following equations:

单层缠绕 Single–Layer Coil

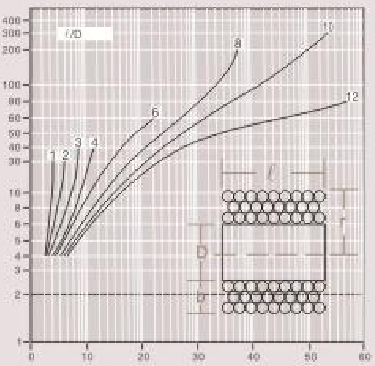
$$L=\frac{\mu_e (rN)^2}{9r+10\ell}$$

$$N=\frac{1}{r}\left[\frac{L(9r+10\ell)}{\mu_e}\right]^{1/2}$$

多层缠绕 Multi–Layer Coil

$$L=\frac{(0.8)(\mu_e)(rN)^2}{6r+9\ell+10b}$$

$$N=\frac{1}{r}\left[\frac{L(6r+9\ell+10b)}{(0.8)(\mu_e)}\right]^{1/2}$$



式中
L: 电感 μH
μ_e: 磁芯有效磁导率
N: 线圈匝数
r: 线圈半径(英寸)
D: 磁芯直径(英寸)
ℓ: 线圈长度/磁芯(英寸)
b: 线圈缠绕高度

In formula
Inductance(μH)
Effective permeability of core
Number of turns
Radius of coil(inches)
Diameter of core(inches)
Length of coil/core(inches)
Coil build

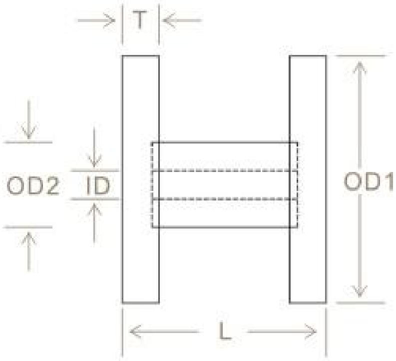
上图曲线族显示出，一个圆柱形缠绕磁芯的有效磁导率(μ_e)，除了是磁芯线圈长度与直径比的函数(ℓ/D)外，也是物料磁导率(μ_o)的函数。从这些曲线可见，在大多数情况下，线圈的长度/直径比的变化量，对有效导率的影响，较增加磁芯物料的磁导率重要。曲线族的计算方法，是以线圈单层缠绕95%的圆柱行磁芯长度所得，多层缠绕的磁芯也可以求得相似的有效磁导率。

The family of curves to the top shows how the effective permeability(μ_e) of a wound cylindrical core is a function of the core's wound length to diameter ratio(ℓ/D) as well as the initial material permeability(μ_o). These curves indicate that in many cases variations in the length / diameter ratio will more significantly affect the effective permeability than increases in permeability of the core material. This group of curves was calculated using a cylindrical core with a single layer winding closely wound over 95% of its length. It is also possible to use as a fair approximation of the effective permeability for multi–layer windings.

I Cores
I 型磁芯

TYPICAL PART NO .KI 36.1 × 33.3 × 12.7

I 型磁芯KDM I Cores
外径尺寸OD1(mm)
高度尺寸L(mm)
OD2尺寸(mm)



KDM Part No.	A_L nH/N²	OD1 mm	OD2 mm	ID mm	T mm	L mm	Window cm³
KI36.1 x 23.8 x 12.7	85	36.10	12.70	4.37	3.96	23.80	1.84
KI36.1 x 33.3 x 12.7	60	36.10	12.70	4.37	3.96	33.30	2.95
KI46.9 x 31.8 x 15.9	100	46.90	15.90	5.56	4.75	31.80	3.43
KI46.9 x 41.3 x 15.9	80	46.90	15.90	5.56	4.75	41.30	4.90
KI63.5 x 34.9 x 19.1	130	63.50	19.10	6.60	4.75	34.90	5.66
KI63.5 x 47.6 x 19.1	95	63.50	19.10	6.60	4.75	47.60	8.49

尺寸公差 Size Tolerance(mm)

KDM Part No.	OD1	OD2	ID	L	T
KI36.1–KI63.5	±0.5	+0.00 –0.15	+0.15 –0.00	±0.50	±0.20

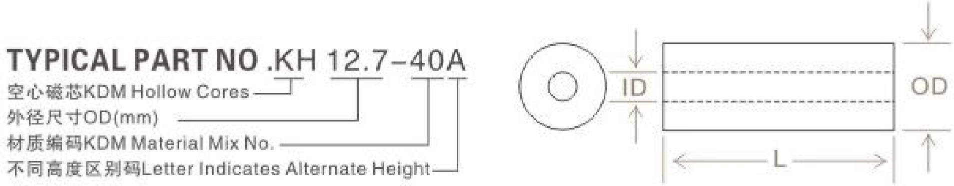
A_L 近似值仅作参考 A_L Value Listed is approximate and is for indication only.

I 型磁芯对那些能抵受少量电磁辐射的高电流抗流器提供了另一种形状，而用在高功率扬声器的交接圈也有非常好的效果。

These I Cores provide an alternative shape for high current choke applications which can tolerate some electro –magnetic radiation. This configuration can be especially effective for high power speaker crossover coils.

Hollow Cores
空心磁芯

TYPICAL PART NO .KH 12.7-40A



KDM Part No.	Micrometals Part No .	OD in/mm	ID in/mm	L in/mm
KH7.95-26	H512-1026	.312/7.95	.137/3.48	.750/19.1
KH12.7-40	H811-1140	.500/12.7	.172/4.37	.688/17.5
KH12.7-40A	H817-1140	.500/12.7	.172/4.37	1.064/27.0
KH12.7-40B	H822-1140	.500/12.7	.172/4.37	1.375/34.9
KH15.9-40	H1014-1040	.625/15.9	.219/5.56	.900/22.9
KH15.9-40A	H1015-1040	.625/15.9	.219/5.56	.955/24.3
KH15.9-40B	H1020-1040	.625/15.9	.219/5.56	1.250/31.8
KH15.9-40C	H1021-1040	.625/15.9	.219/5.56	1.330/33.8
KH19.1-40	H1217-1040	.750/19.1	.260/6.60	1.080/27.4
KH19.1-33A	H1224-1033	.750/19.1	.260/6.60	1.500/38.1
KH19.1-40B	H1225-1040	.750/19.1	.260/6.60	1.580/40.1
KH25.4-40	H1616-1040	1.000/25.4	.250/6.35	1.000/25.4

尺寸公差 Size Tolerance(mm)

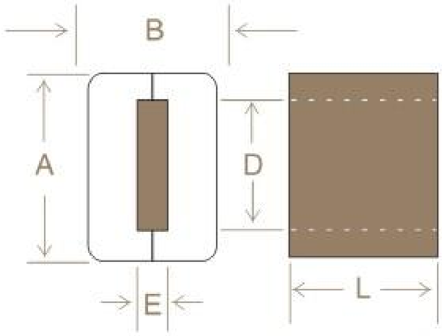
KDM Part No.	OD	ID	L
KH7.95-KH25.4	+0.00 -0.10	+0.10 -0.00	±0.25

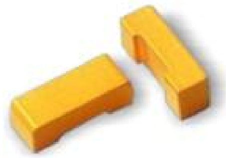
Bus Bar Cores
汇流棒型磁芯

TYPICAL PART NO . KHS 300-26 A

- KDM汇流棒型磁芯KDM Bus Bar Cores
- 规格特称Code to Indicate Max Current
- 材质编码KDM Material Mix No.
- 不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度（Mean Magnetic Path Length)
A_e: 横截面积(Cross Section Area)
V : 磁芯体积(Core Volume)





KDM Part No.	A_L nH/N^2	A in/mm	B in/mm	L in/mm	D in/mm	E in/mm	ℓ_e cm	A_e cm^2	V cm^3
KHS300-8	68	1.02/25.9	0.65/16.5	0.5/12.7	0.52/13.2	0.14/3.56	5.92	.806	4.61
KHS300-26	147								
KHS300-52	147								
KHS300-8A	83	1.02/25.9	0.65/16.5	0.63/15.9	0.52/13.2	0.14/3.56	5.92	1.01	5.77
KHS300-26A	179								
KHS300-52A	179								
KHS300-8B	95	1.02/25.9	0.65/16.5	0.75/19.1	0.52/13.2	0.14/3.56	5.92	1.21	6.92
KHS300-26B	208								
KHS300-52B	208								
KHS300-8C	107	1.02/25.9	0.65/16.5	0.87/22.2	0.52/13.2	0.14/3.56	5.92	1.41	8.06
KHS300-26C	232								
KHS300-52C	232								
KHS400-26	221	1.5/38.1	0.96/24.4	0.75/19.1	0.76/19.4	0.21/5.21	8.71	1.78	15.1
KHS400-26A	286			1/25.4				2.37	20.1
KHS400-26B	335			1.25/31.8				2.96	25.2
KHS400-26C	371			1.5/38.1				3.56	30.2

Al值是以25匝线圈作测试条件Based on 25 turns test winding

尺寸公差 Size Tolerance(mm)

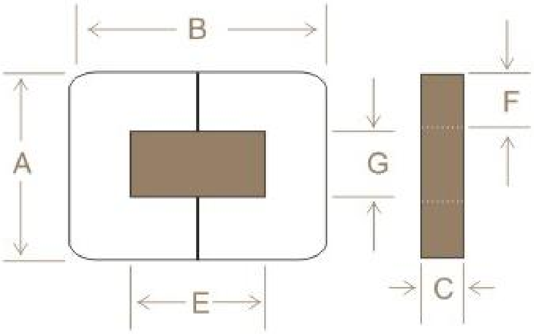
KDM Part No.	A	B	D	E	L
KHS300-KHS400	±0.35	±0.35	±0.10	±0.10	±0.50

所列公差包括涂层 The listed tolerance includes coating

TYPICAL PART NO. KU 80-26 A

U型磁芯KDM U Cores
规格特称A in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height

ℓ_e: 平均磁路长度（Mean Magnetic Path Length）
A_e: 横截面积(Cross Section Area)
V : 磁芯体积(Core Volume)

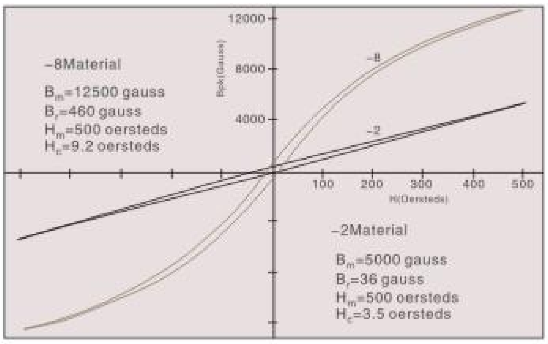


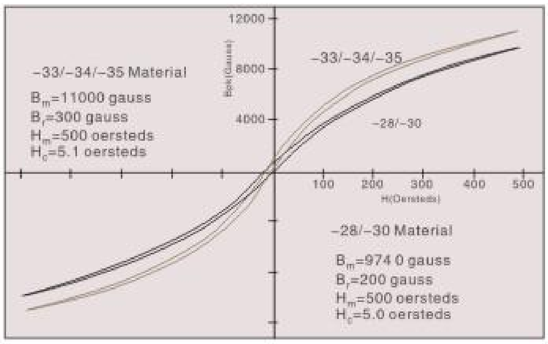
KDM Part No.	A_L nH/N²	A in/mm	B in/mm	C in/mm	E in/mm	F in/mm	G in/mm	ℓ_e cm	A_e cm²	V cm³
KU61-26	71.0	0.61/15.5	0.9/22.9	0.25/6.35	0.51/13.0	0.19/4.95	0.21/5.33	5.66	.315	1.81
KU80-8	42.4	0.80/20.3	1.25/31.8	0.25/6.35	0.75/19.1	0.25/6.35	0.3/7.62	7.87	.403	3.18
KU80-26	71.0									
KU80-40	64.0									
KU80-52	70.0									
KU350-2	59.0	3.5/88.9	5.75146	1/25.4	3.25/82.6	1/25.4	1.5/38.1	35.6	6.45	250
KU350-40	235.5									

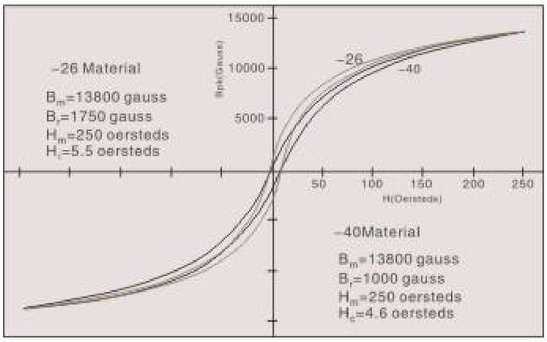
尺寸公差 Size Tolerance(mm)

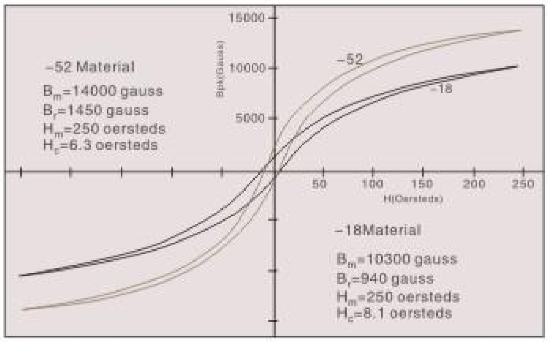
KDM Part No.	A	B	C	E	F	G
KU61-KU80	±0.25	±0.25	±0.25	±0.25	±0.25	±0.25
KU350	±0.50	±0.50	±0.35	±0.50	±0.35	±0.75

B-H曲线图 B-H Curves

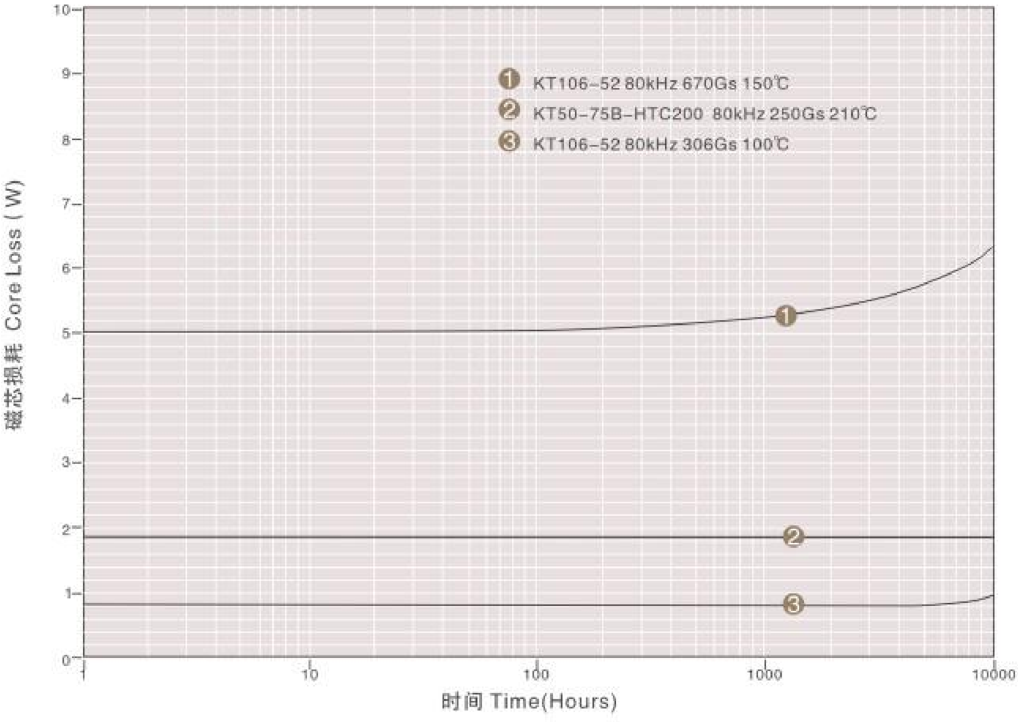




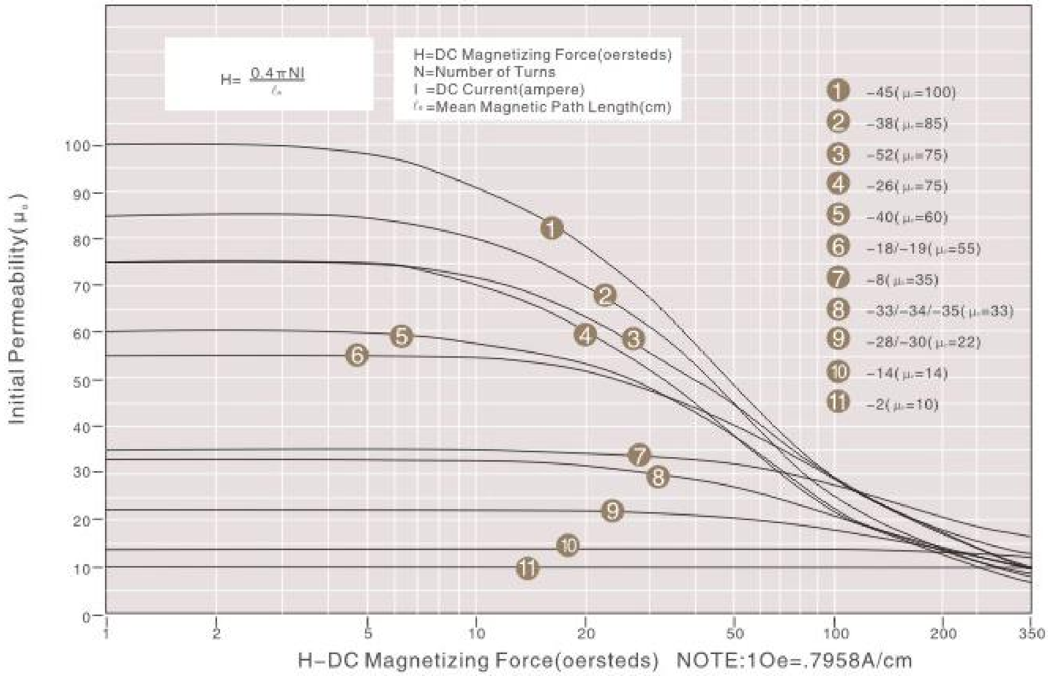




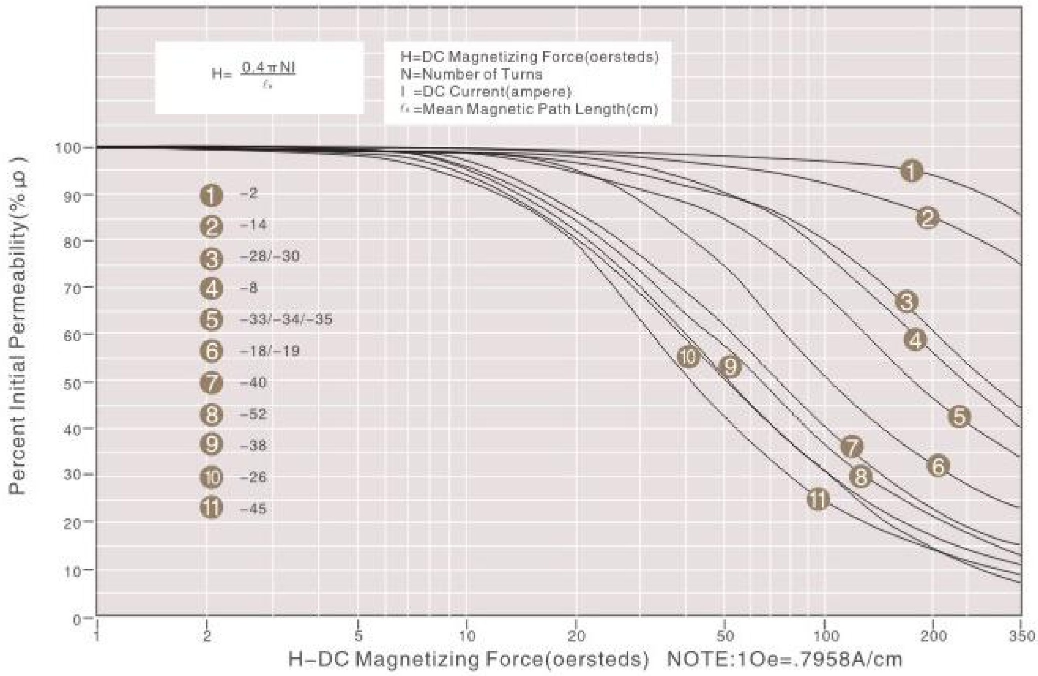
磁芯损耗与时间关系曲线 Core Loss vs Time



磁导率初值与DC磁化力关系曲线 Initial Permeability(μ_0) vs DC Magnetizing Force

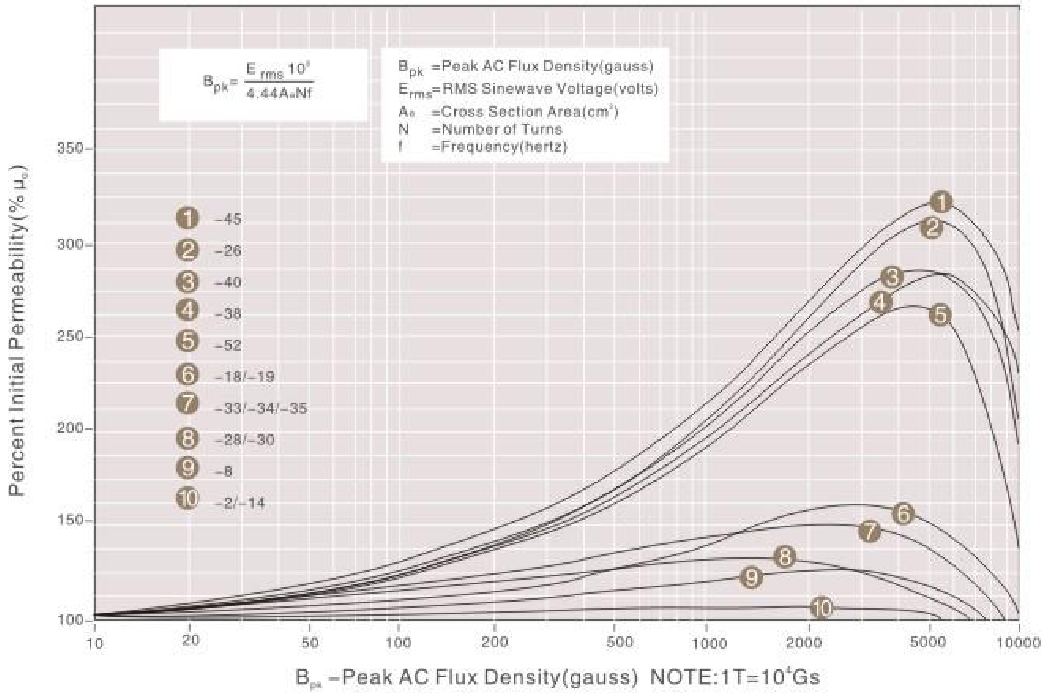


磁导率初值百分率与DC磁化力关系曲线 Percent Initial Permeability(%μ_0) vs DC Magnetizing Force

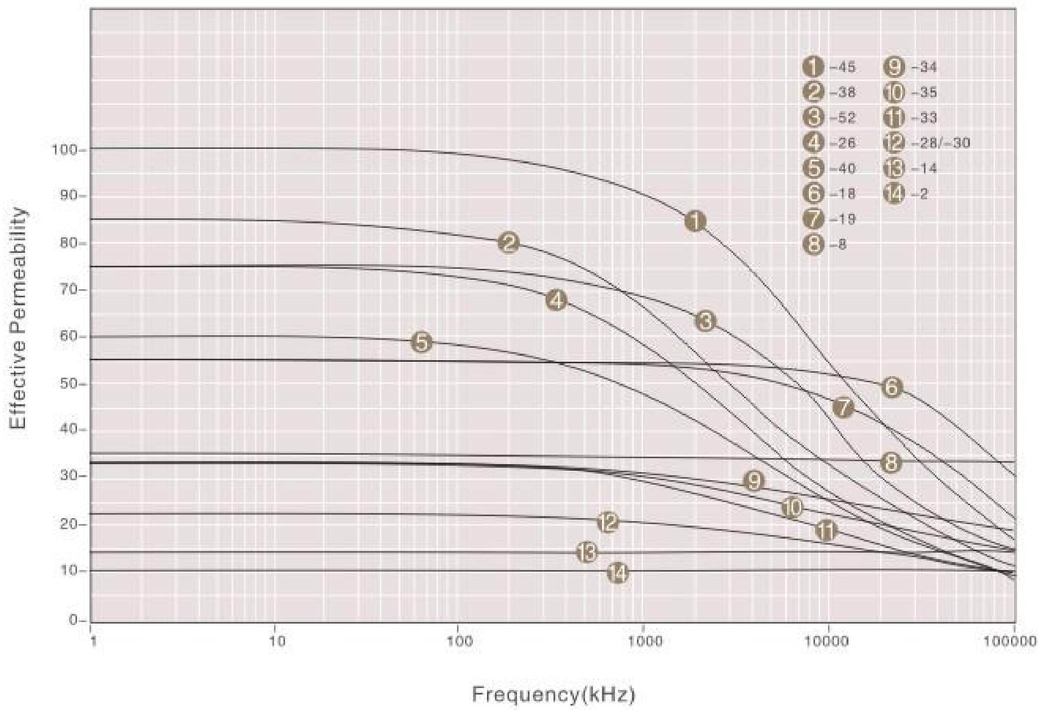


Magnetic Characteristics
磁力特性

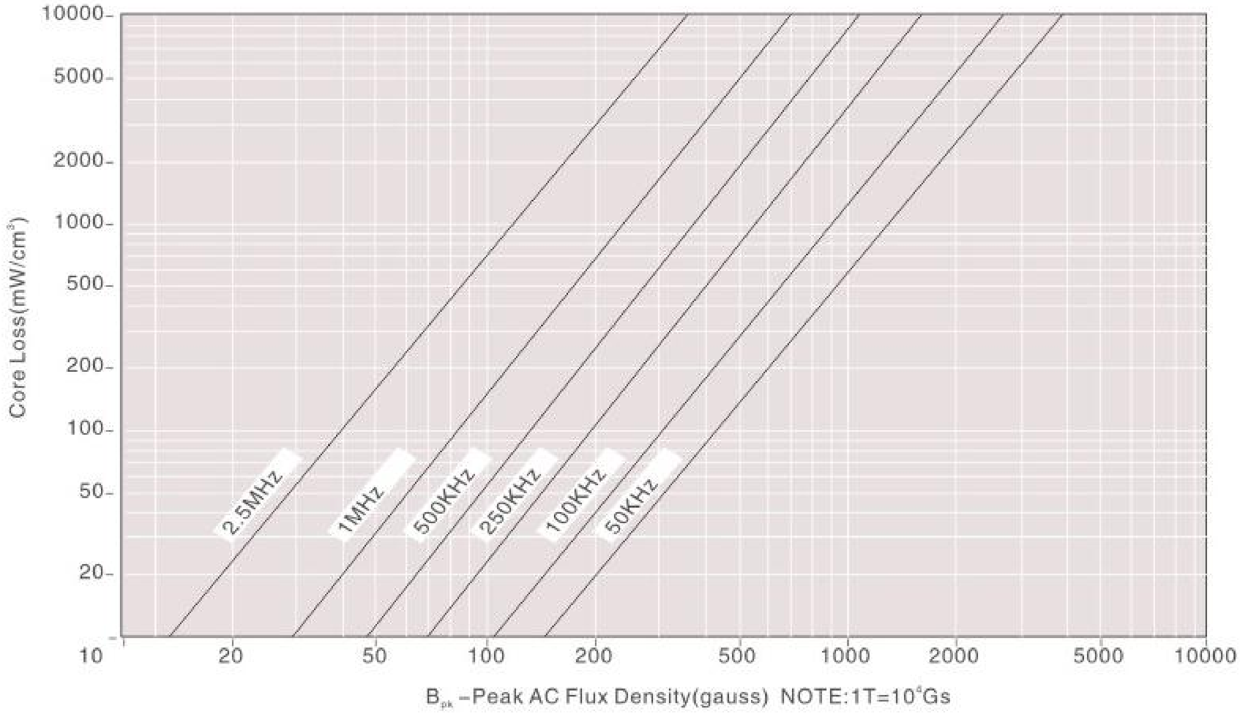
磁导率初值百分率与AC通量密度峰值关系曲线 Percent Initial Permeability(%μ_o) vs Peak AC Flux Density



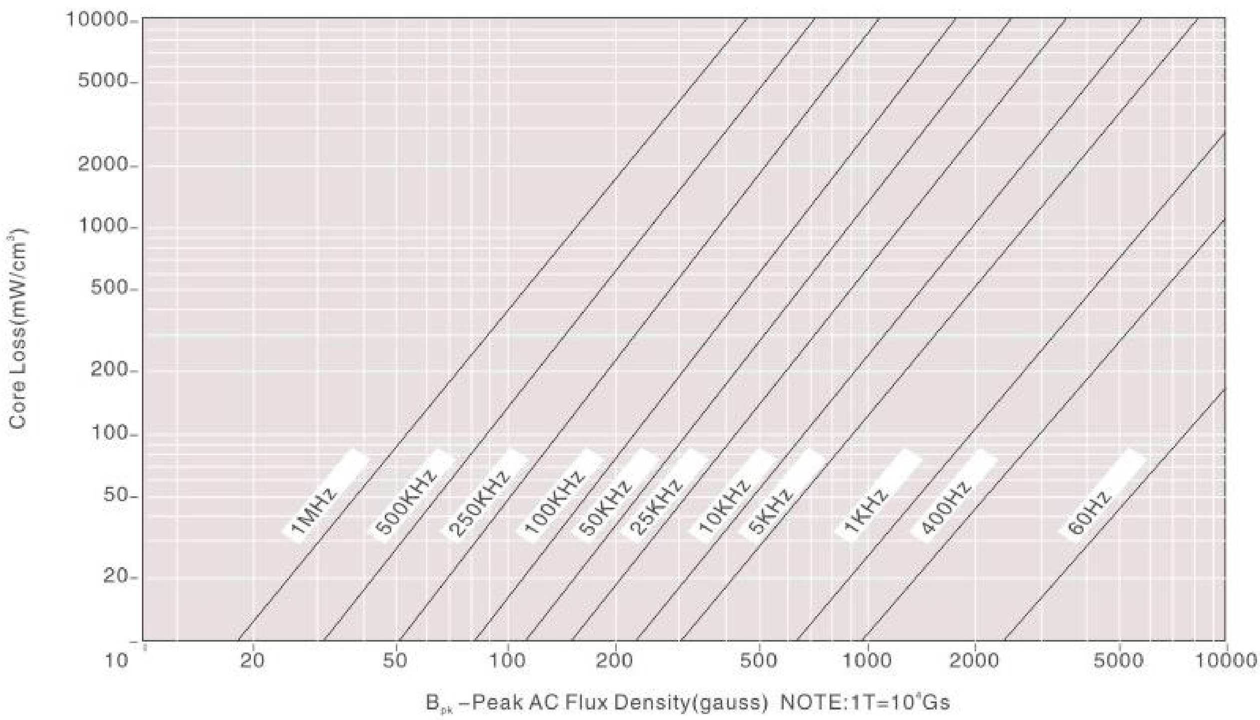
有效磁导率与频率关系曲线 Effective Permeability vs Frequency



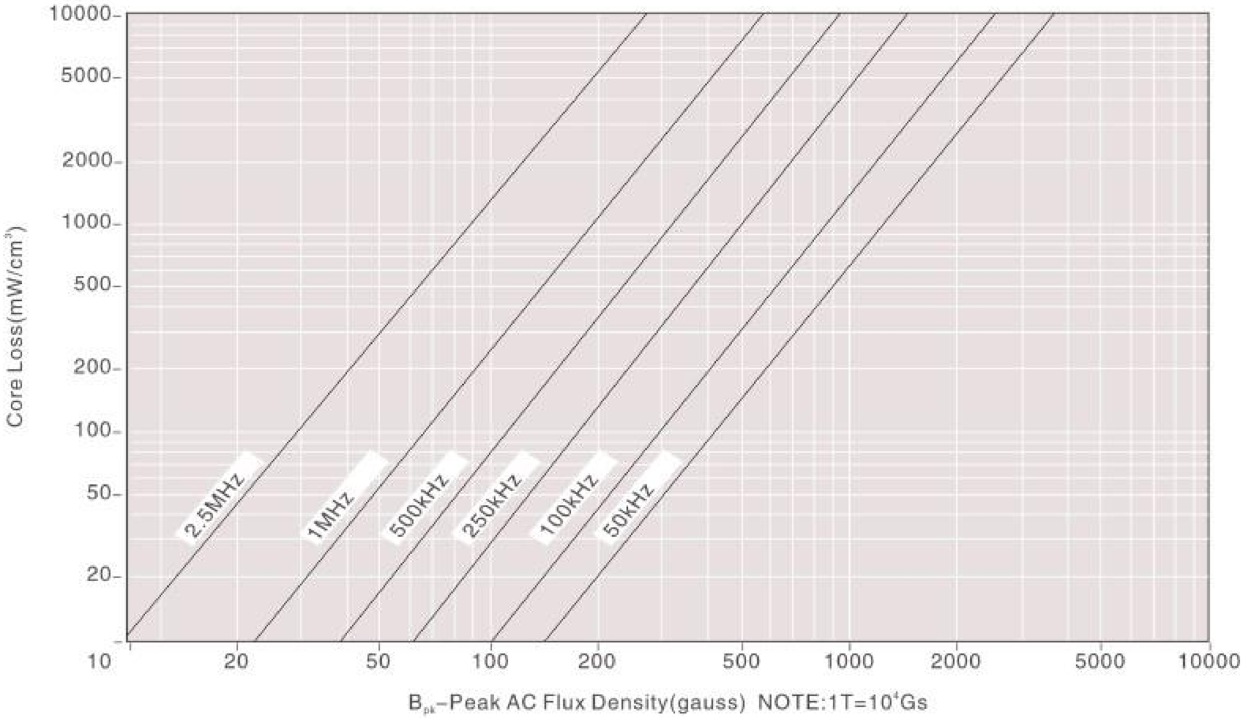
-2材磁芯损耗与AC峰值磁通密度关系曲线 -2Material μe=10 Core Loss vs Peak AC Flux Density



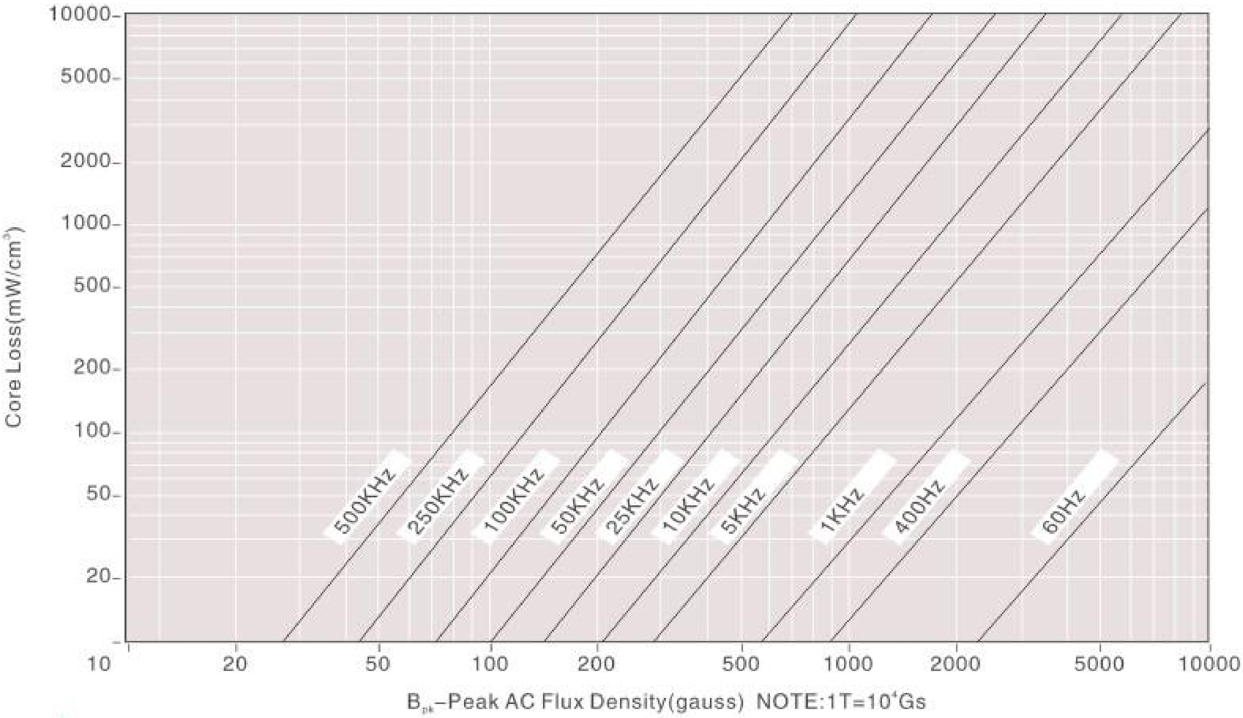
-8材磁芯损耗与AC峰值磁通密度关系曲线 -8Material μe=35 Core Loss vs Peak AC Flux Density



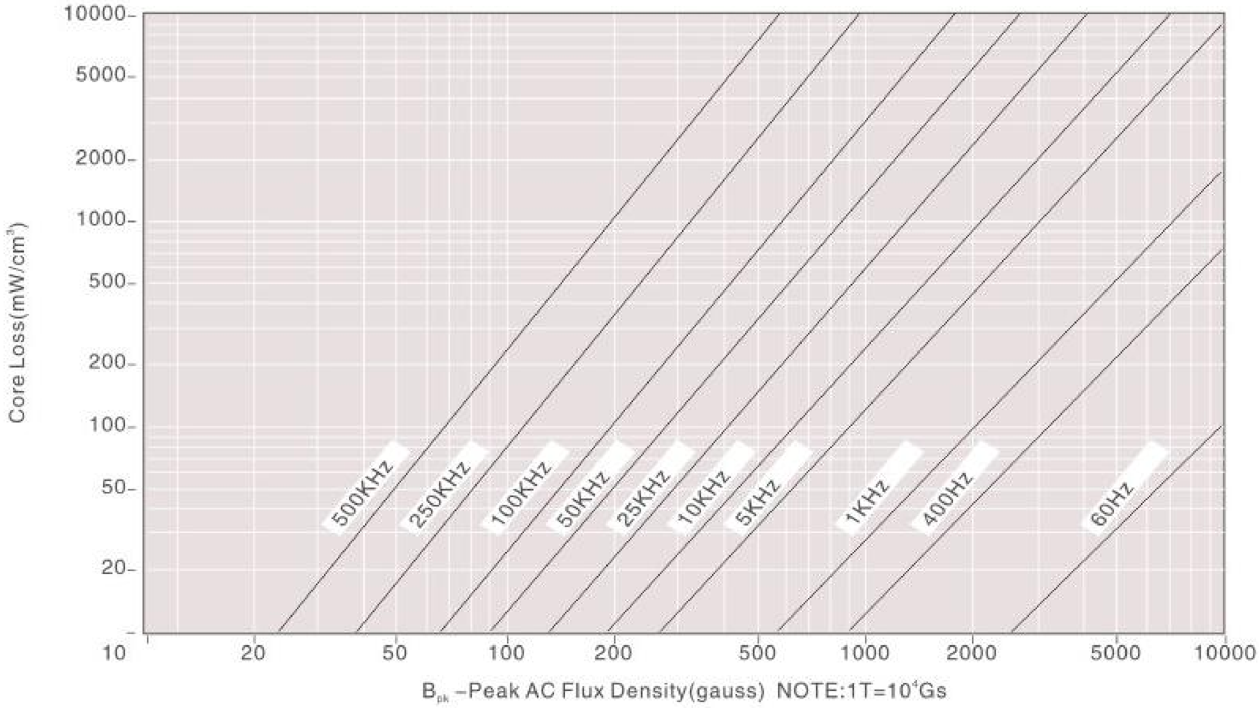
-14材磁芯损耗与AC峰值磁通密度关系曲线-14Material μ_e=14 Core Loss vs Peak AC Flux Density



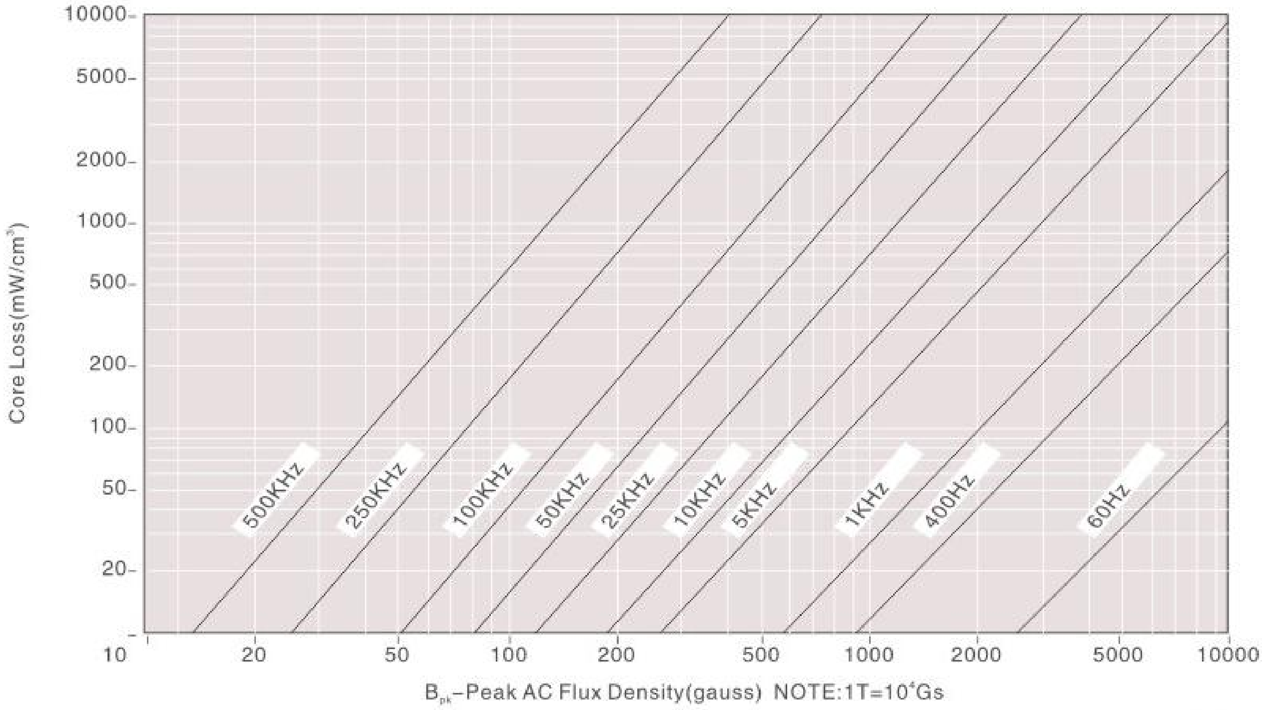
-18材磁芯损耗与AC峰值磁通密度关系曲线-18Material μ_e=55 Core Loss vs Peak AC Flux Density



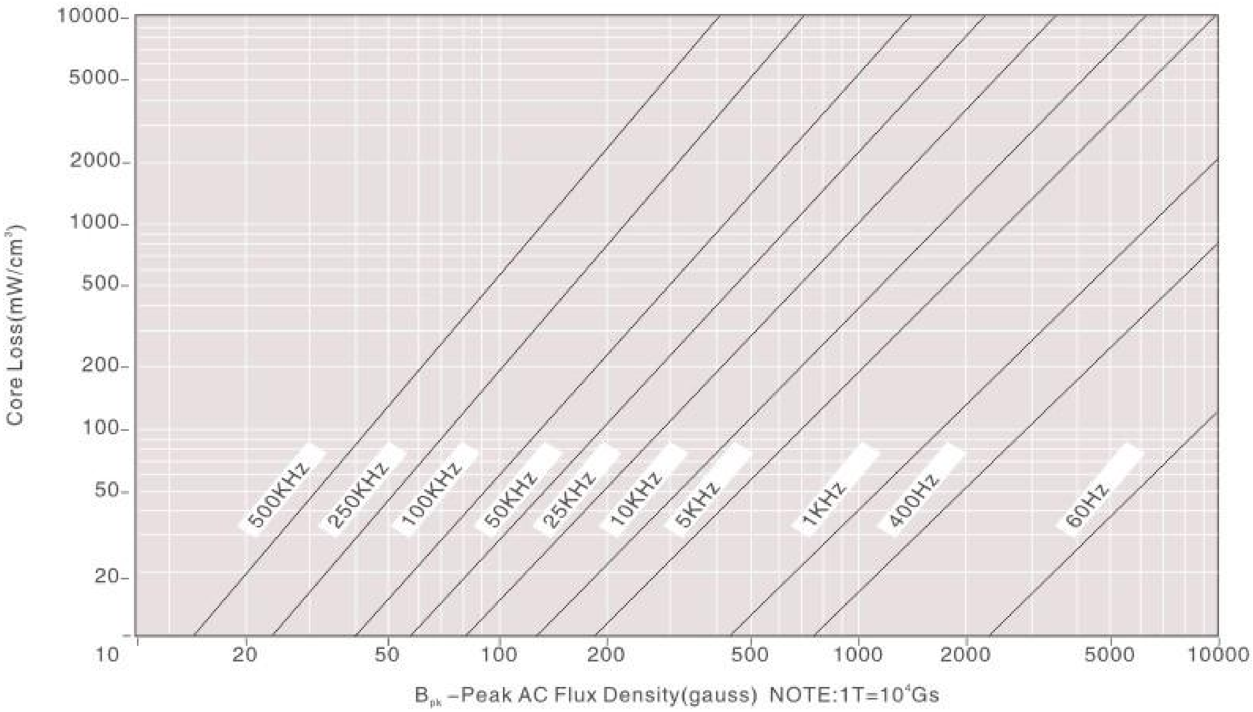
-19材磁芯损耗与AC峰值磁通密度关系曲线 -19Material μ_e=55 Core Loss vs Peak AC Flux Density



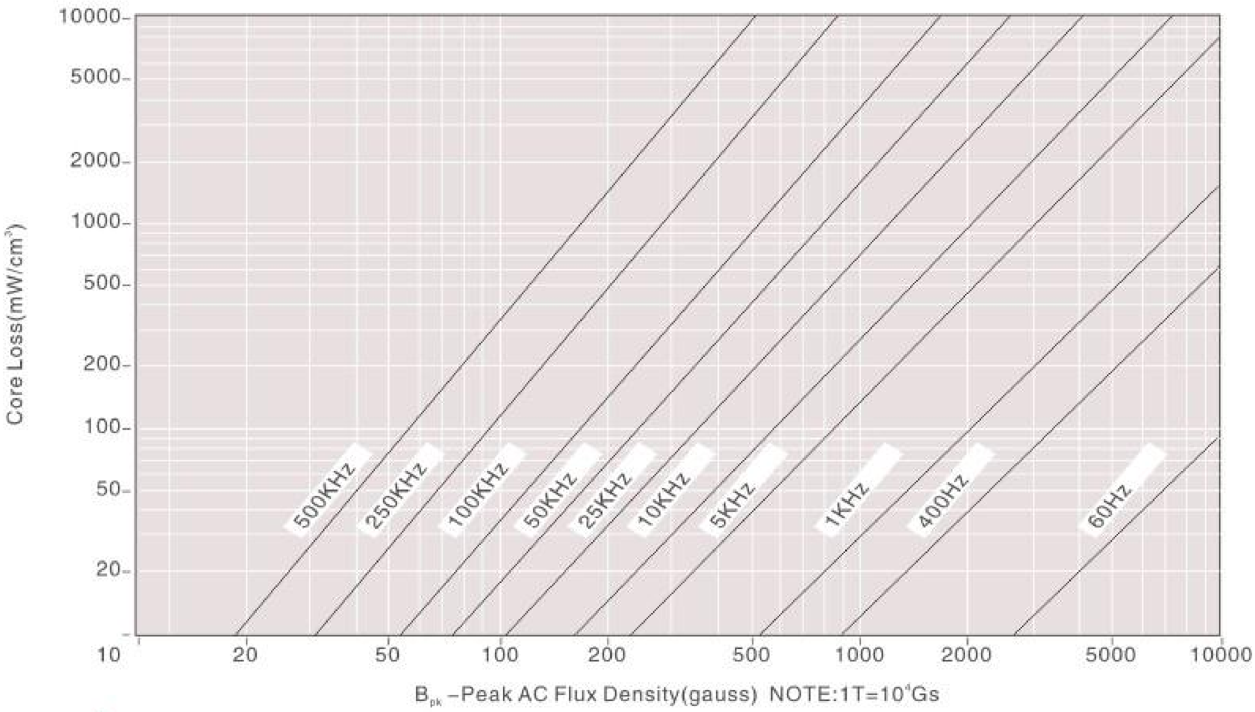
-26材磁芯损耗与AC峰值磁通密度关系曲线 -26Material μ_e=75 Core Loss vs Peak AC Flux Density



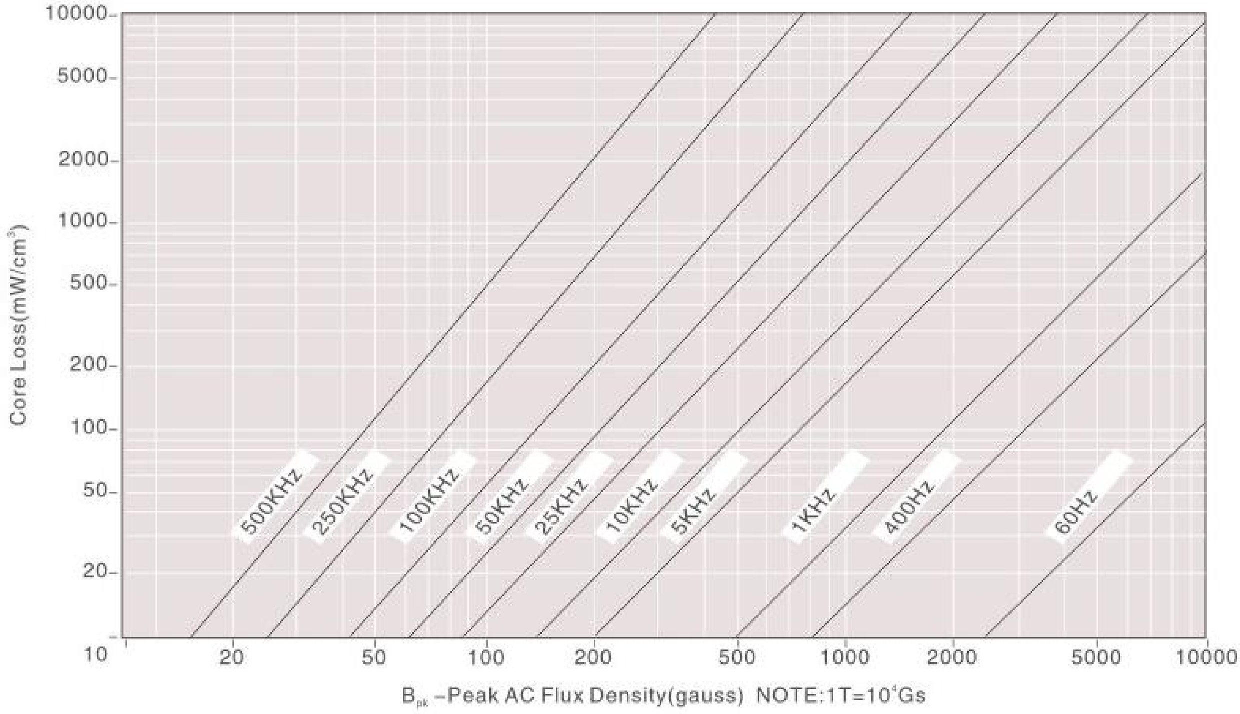
-30材磁芯损耗与AC峰值磁通密度关系曲线 -30Material μ_e=22 Core Loss vs Peak AC Flux Density



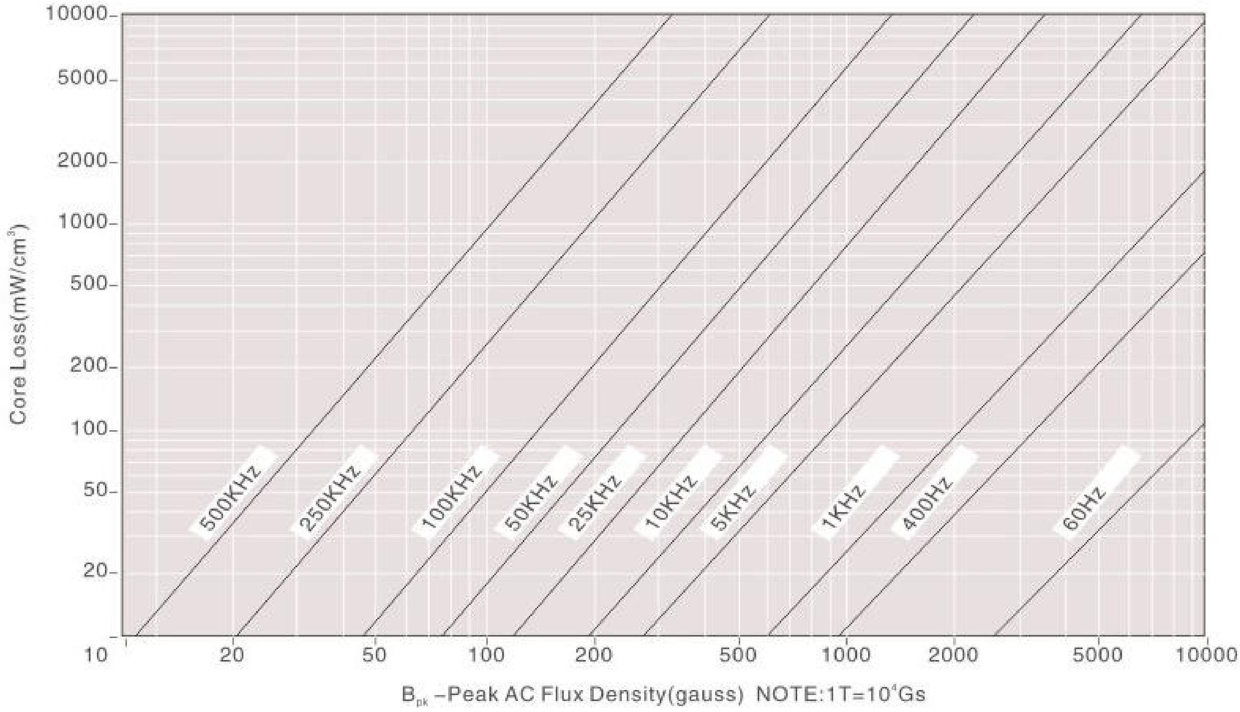
-34材磁芯损耗与AC峰值磁通密度关系曲线 -34Material μ_e=33 Core Loss vs Peak AC Flux Density



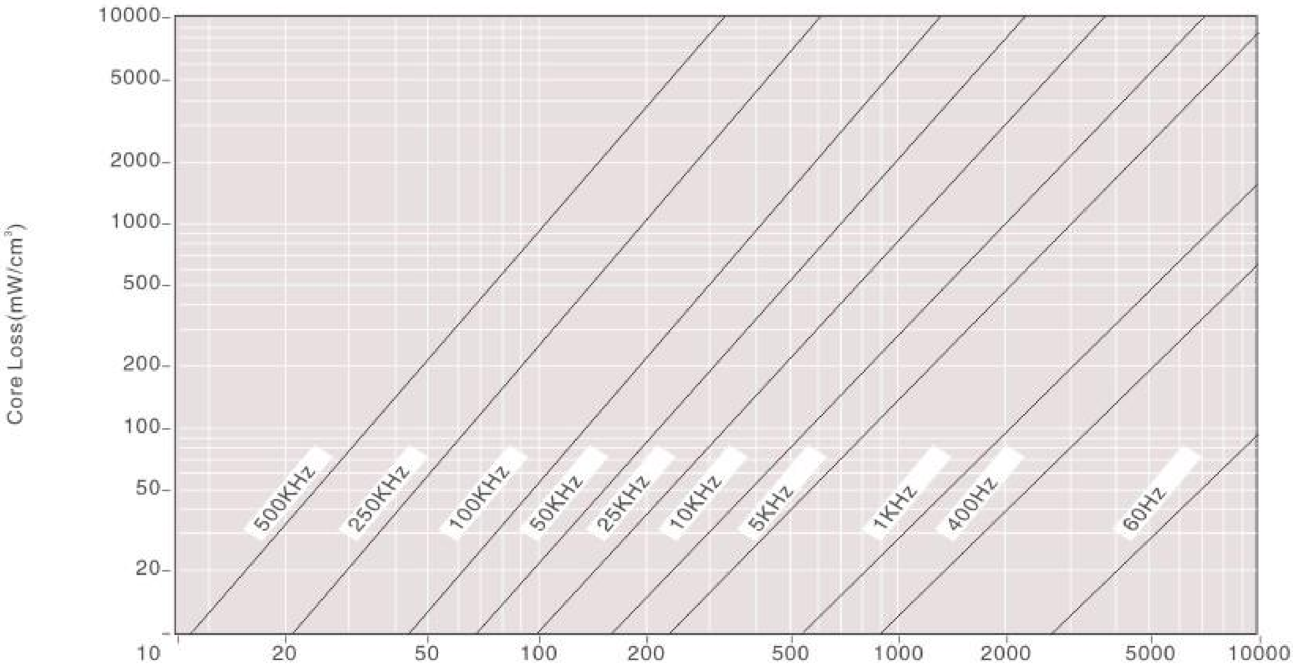
-35材磁芯损耗与AC峰值磁通密度关系曲线 -35Material μ_e=33 Core Loss vs Peak AC Flux Density



-38材磁芯损耗与AC峰值磁通密度关系曲线 -38Material μ_e=85 Core Loss vs Peak AC Flux Density

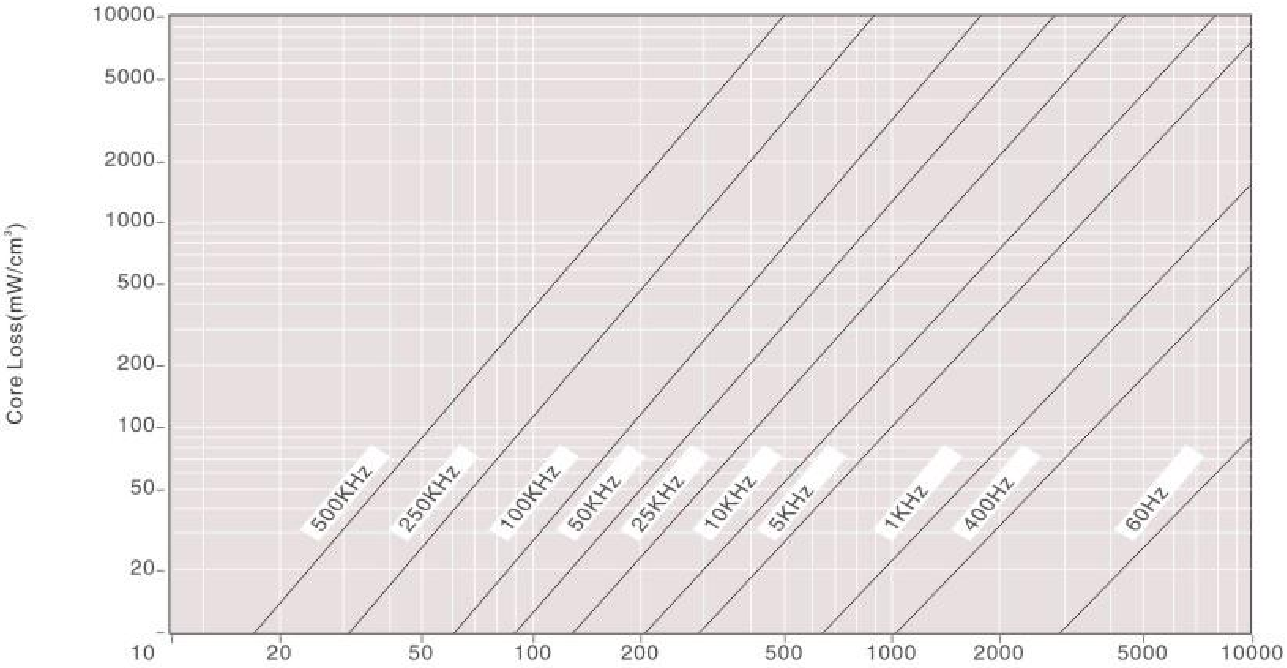


-40材磁芯损耗与AC峰值磁通密度关系曲线 -40Material μ_e=60 Core Loss vs Peak AC Flux Density



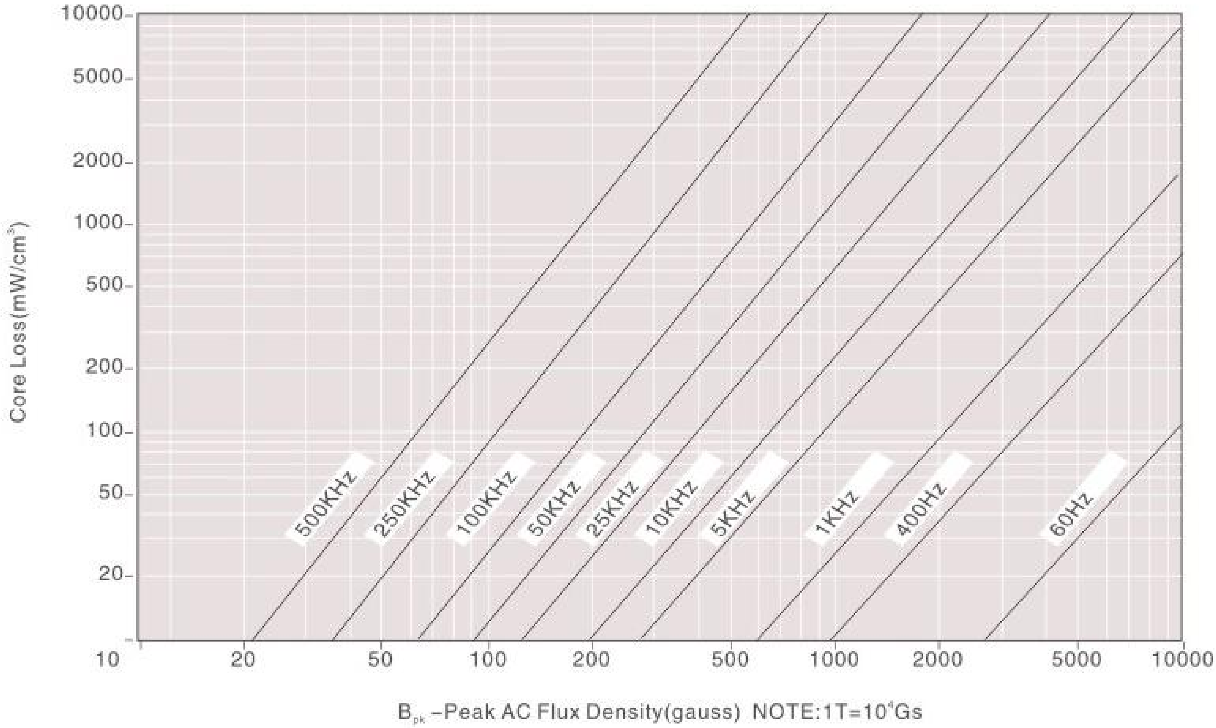
B_{pk}-Peak AC Flux Density(gauss) NOTE:1T=10^4Gs

-45材磁芯损耗与AC峰值磁通密度关系曲线 -45Material μ_e=100 Core Loss vs Peak AC Flux Density



B_{pk}-Peak AC Flux Density(gauss) NOTE:1T=10^4Gs

-52材磁芯损耗与AC峰值磁通密度关系曲线 -52Material μ_e=75 Core Loss vs Peak AC Flux Density



2

耐高温铁粉芯

HTC200® Iron Powder Cores

HTC200® Iron Powder Cores
耐高温铁粉芯

产品介绍 Introduction of products

铁粉芯的热老化问题传统铁粉芯一般是采用有机材料（如环氧树脂等）作粘合剂，由于有机材料其耐温等级较低，一般仅达到125℃左右，最大的也在150℃以下，所以采用这类粘合剂的铁粉芯做应力退火处理时，其退火温度一般都在150℃以下，故其应力消除不彻底，会造成磁性能的缺陷；同时，随着电子工业的不断发展，对高功率和高磁场强度的要求不断提高，其使用环境也越来越恶劣，元器件长时间暴露在高温环境下，这导致传统铁粉芯在使用很短一段时间后就会产生热老化的问题，磁芯的涡流损耗会加剧，从而使磁芯过热，最终导致磁芯的永久性损坏。

Thermal Aging problem of Iron Powder Cores In general,conventional iron powder cores use the organic material as binder, such as epoxy. Due to the organic material's low resistance to high temperature, the general resin breakdown temperature is only about 125℃ to 150℃. Iron powder cores using these binders will have their annealing temperature below 150℃. The stress force has not been eliminated completely and the cores' performance is affected. In the meantime, the demanding requirement of power and board density by electronics industry worsen the working environment. The elevated temperature operating environment causes the conventional iron powder cores to age in very short period of time. The eddy current loss will increase during the thermal aging process and cause overheating which eventually leads to the permanent damage of the core.

HTC200® 铁粉芯系列是采用KDM专属的耐高温材料作粘合剂，专为在200℃的情况下不产生热老化问题设计的新一代铁粉芯；由于采用了耐高温粘合剂，在做磁芯应力退火处理时，其退火温度最高可达500℃，应力也得到更好的消除，对磁芯的性能也有显著的提高，使我们的铁粉芯在200℃的情况下使用也不会产生热老化问题。当工程设计人员在选择我们HTC200® 铁粉芯系列产品时，他们可以有更多的自由和空间去设计他们的产品。

KDM HTC200® Iron Powder Cores Series are designed to be thermal aging free up to 200℃ using KDM's state-of-the-art proprietary high temperature resistance binder. With the use of the high temperature resistance binder, core's annealing temperature can reach 500℃.The stress force can be better eliminated and the cores' property is improved. This enables our HTC200 ®cores to operate up to 200℃without breakdown. Design engineers can have more flexibility and peace of mind when they select KDM's HTC200® Iron Powder Cores Series for their power supply designs.

HTC200® 是浙江东睦科达磁电有限公司的注册商标
HTC200® is registered trademark of Zhejiang NBTM KeDa Magnetoelectricity Co.,Ltd.

HTC200® Iron Powder Cores
耐高温铁粉芯

材质性能 Material Properties

KDM Mix No.	Perm. (μ_e)	Core Loss(mW/cm^3)		DC-Bias(% μ_o)		Color Code	Micrometals Mix No.	CURIE（居磁）Mix No.
		100kHz 140Gs	250kHz 300Gs	HDC=50 Oe	HDC=100 Oe			
HTC200®-76	75	58	950	59	36	全蓝/ Blue	/	75H-TAF200
HTC200®-75	75	83	1200	51	31	全黄/ Yellow	/	75-TAF200
HTC200®-55	55	46	650	75	50	全绿/ Green	-60	55-TAF200 SF53-TAF200
HTC200®-35	35	82	1500	85	68	全灰/ Gray	-61	33-TAF200
*KW-35μi	35	30	490	92	77	全蓝/ Blue	-63	35-TAF200 SF36Q-TAF200
*KW-45μi	45	28	390	85	70	全蓝/ Blue	/	SF49Q-TAF200
*KW-55μi	55	28	480	80	63	全蓝/ Blue	/	SF56Q-TAF200
*KW-66μi	66	21	440	65	40	全蓝/ Blue	-66	/

* KW是KDM生产的低成本铁硅材料，请联系我公司R&D部门获取更多信息。
KW is a low cost Si-Fe material produced by KDM, please contact R&D department to get more information.

表面涂层 Surface Coating

本公司生产的HTC200® 铁粉芯环型磁芯，其表面均涂有改良型的环氧树脂涂层并符合欧盟RoHS环保要求，其涂层耐温可达H级，涂层可抵抗大多数清洗剂的擦洗，但过度接触某些溶剂会产生不良影响，各种涂层在50Hz下的最小介电强度为600Vrms。

表面涂层绝缘强度的测试是，将两片导电板分别放在磁粉芯的两个端面,用50Hz，1250V（AC有效电压）测试电压，时间为5秒。

KDM HTC200® Iron Powder Cores Series are coated by improved epoxy that can resist high temperature up to H grade. The coating also complies with the requirement of environmental protection and RoHS. The finishing has a minimum dielectric strength of 600Vrms at 50Hz and can resist most cleaning solvents. However, extended exposures to certain solvents may have detrimental effects.
The method of testing the insulation strength of the surfacing coating: put two electroplates on the corners of the cores' two surfaces, applies 50Hz, 1250Vrms and last for 5 seconds.

尺寸公差 Size Tolerance(mm)

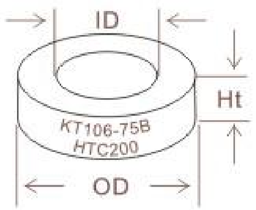
环型磁芯 Toroidal Cores	KDM Part No.	OD	ID	Ht	KDM Part No.	OD	ID	Ht
	KT16 – KT20	±0.25	±0.25	±0.25	KT150– KT225	±0.63	±0.63	±0.75
	KT25 – KT38	±0.38	±0.38	±0.50	KT249 – KT400	±0.75	±0.75	±0.75
	KT40 – KT72	±0.50	±0.50	±0.50	KT520 – KT650	±1.25	±1.25	±1.25
	KT80 – KT141	±0.50	±0.50	±0.63				

公差包括涂层 Tolerance includes coating

HTC200® Iron Powder Cores
耐高温铁粉芯

TYPICAL PART NO. KT106-75B-HTC200

环型磁芯KDM Toroidal Cores
规格特称OD in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height
耐高温铁粉芯HTC200® Iron Powder Cores



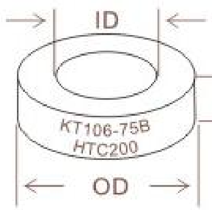
ℓ_e:平均磁路长度（Mean Magnetic Path Length)
A_e:横截面积(Cross Section Area)
V :磁芯体积(Core Volume)

KDM Part No.	OD in/mm	ID in/mm	Ht in/mm	ℓ_e cm	A_e cm^2	V cm^3	A_L (nH/N^2) ± 10%			
							76	75	55	35
KT16	.160/4.06	.078/1.98	.060/1.52	.930	.015	.014	13.5	14.5	9.5	6.0
KT20	.200/5.08	.088/2.24	.070/1.78	1.15	.023	.026	17.5	18.5	13.0	7.8
KT25	.225/6.48	.120/3.05	.096/2.44	1.50	.037	.055	23.0	24.5	17.0	10.0
KT26	.265/6.73	.105/2.67	.190/4.83	1.47	.090	.133	56.0	57.0	41.5	24.0
KT27	.280/7.11	.151/3.84	.128/3.25	1.71	.047	.080	25.5	27.5	18.5	11.5
KT30	.307/7.80	.151/3.84	.128/3.25	1.84	.060	.110	30.5	33.5	22.0	14.0
KT37	.375/9.53	.205/5.21	.128/3.25	2.31	.064	.147	26.0	28.5	19.0	12.0
KT38	.375/9.53	.175/4.45	.190/4.83	2.18	.114	.248	49.0	49.0	36.0	20.0
KT40	.400/10.2	.205/5.21	.163/4.14	2.41	.093	.223	36.0	36.0	26.0	16.5
KT44	.440/11.2	.229/5.82	.159/4.04	2.68	.099	.266	35.0	37.0	25.5	18.0
KT44D	.440/11.2	.229/5.82	.338/8.59	2.68	.212	.567	70.0	72.0	51.5	33.0
KT50	.500/12.7	.303/7.70	.190/4.83	3.19	.112	.358	33.0	33.0	24.0	17.5
KT50B	.500/12.7	.303/7.70	.250/6.35	3.19	.148	.471	43.5	43.5	32.0	23.0
KT50C	.500/12.7	.303/7.70	.335/8.51	3.19	.200	.637	59.0	61.0	43.0	28.3
KT50D	.500/12.7	.303/7.70	.375/9.53	3.19	.223	.711	66.0	72.0	48.5	31.0
KT51C	.500/12.7	.200/5.08	.250/6.35	2.79	.223	.622	75.0	83.0	55.0	37.0
KT60	.600/15.2	.336/8.53	.234/5.94	3.74	.187	.699	47.0	50.0	34.5	19.0
KT60D	.600/15.2	.336/8.53	.470/11.9	3.74	.374	1.400	94.0	97.0	69.0	44.0
KT68	.690/17.5	.370/9.40	.190/4.83	4.23	.179	.759	40.0	43.5	29.0	19.5

HTC200® Iron Powder Cores
耐高温铁粉芯

TYPICAL PART NO. KT106-75B-HTC200

环型磁芯KDM Toroidal Cores
规格特称OD in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height
耐高温铁粉芯HTC200® Iron Powder Cores



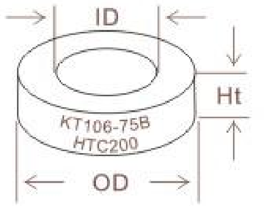
ℓ_e:平均磁路长度（Mean Magnetic Path Length)
A_e:横截面积(Cross Section Area)
V :磁芯体积(Core Volume)

KDM Part No.	OD in/mm	ID in/mm	Ht in/mm	ℓ_e cm	A_e cm^2	V cm^3	A_L (nH/N^2) ± 10%			
							76	75	55	35
KT68A	.690/17.5	.370/9.40	.250/6.35	4.23	.242	1.03	54.0	58.0	39.5	26.0
KT68D	.690/17.5	.370/9.40	.375/9.53	4.23	.358	1.52	80.0	87.0	59.0	38.0
KT72	.720/18.3	.280/7.11	.260/6.60	4.01	.349	1.40	82.0	90.0	60.0	36.0
KT80	.795/20.2	.495/12.6	.250/6.35	5.14	.231	1.19	42.0	46.0	31.0	18.0
KT80B	.795/20.2	.495/12.6	.375/9.53	5.14	.347	1.78	63.0	71.0	46.5	29.5
KT80D	.795/20.2	.495/12.6	.500/12.7	5.14	.453	2.33	83.0	92.0	61.0	44.0
KT90	.900/22.9	.550/14.0	.375/9.53	5.78	.395	2.28	64.0	70.0	47.0	30.0
KT94	.942/23.9	.560/14.2	.312/7.92	5.97	.362	2.16	57.0	60.0	42.0	25.0
KT106	1.060/26.9	.570/14.5	.437/11.1	6.49	.659	4.28	95.0	93.0	70.0	45.0
KT106A	1.060/26.9	.570/14.5	.312/7.92	6.49	.461	3.00	67.0	67.0	49.0	31.5
KT106B	1.060/26.9	.570/14.5	.575/14.6	6.49	.858	5.57	124.0	124.0	91.0	58.0
KT124	1.245/31.6	.710/18.0	.280/7.11	7.75	.459	3.55	56.0	58.0	41.0	26.0
KT130	1.300/33.0	.780/19.8	.437/11.1	8.28	.698	5.78	79.0	81.0	58.0	35.0
KT130A	1.300/33.0	.780/19.8	.225/5.72	8.28	.361	2.99	41.0	41.0	30.0	19.0
KT131	1.300/33.0	.640/16.3	.437/11.1	7.72	.885	6.84	108.0	116.0	79.0	52.5
KT132	1.300/33.0	.700/17.8	.437/11.1	7.96	.805	6.41	95.0	103.0	70.0	44.5
KT141	1.415/35.9	.880/22.4	.412/10.5	9.14	.674	6.16	69.0	75.0	51.0	32.0
KT150	1.510/38.4	.845/21.5	.437/11.1	9.38	.887	8.31	89.0	96.0	65.0	41.5
KT150A	1.510/38.4	.845/21.5	.325/8.26	9.38	.657	6.16	66.0	66.0	48.5	31.0

HTC200® Iron Powder Cores
耐高温铁粉芯

TYPICAL PART NO. KT106-75B-HTC200

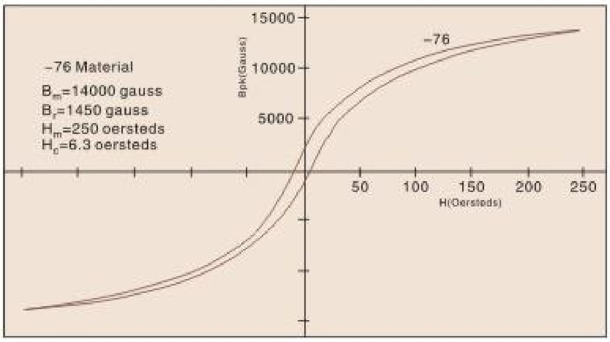
环型磁芯KDM Toroidal Cores
规格特称OD in 100th inches
材质编码KDM Material Mix No.
不同高度区别码Letter Indicates Alternate Height
耐高温铁粉芯HTC200® Iron Powder Cores

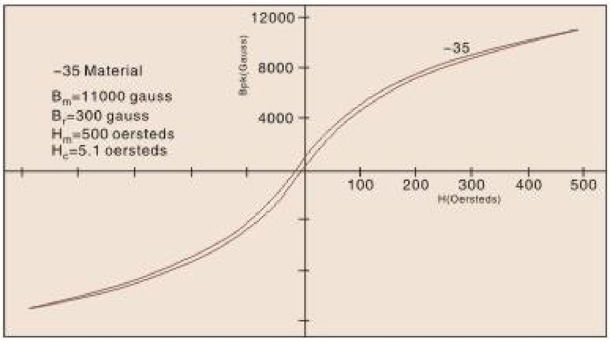


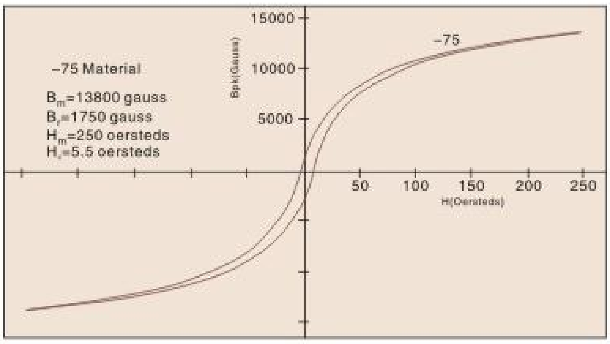
ℓ_e:平均磁路长度 (Mean Magnetic Path Length)
A_e:横截面积(Cross Section Area)
V :磁芯体积(Core Volume)

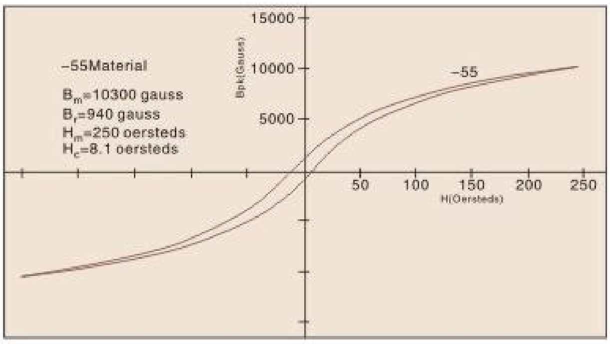
KDM Part No.	OD in/mm	ID in/mm	Ht in/mm	ℓ_e cm	A_e cm^2	V cm^3	A_L (nH/N^2) ± 10% 76	75	55	35
KT157	1.570/39.9	.950/24.1	.570/14.5	10.1	1.06	10.7	99.0	100.0	73.0	42.0
KT175	1.750/44.5	1.070/27.2	.650/16.5	11.2	1.34	15.0	105.0	105.0	82.0	48.0
KT184	1.840/46.7	.950/24.1	.710/18.0	11.2	1.88	21.0	159.0	169.0	116.0	72.0
KT200	2.000/50.8	1.250/31.8	.550/14.0	13.0	1.27	16.5	92.0	92.0	67.0	42.5
KT200B	2.000/50.8	1.250/31.8	1.000/25.4	13.0	2.32	30.0	155.0	160.0	120.0	78.5
KT201	2.000/50.8	.950/24.1	.875/22.2	11.8	2.81	33.2	224.0	224.0	164.0	104.0
KT224C	2.250/57.2	1.250/31.8	.750/19.1	14.0	2.31	32.2	155.0	155.0	114.0	72.0
KT225	2.250/57.2	1.405/35.7	.550/14.0	14.6	1.42	20.7	92.0	98.0	67.0	42.5
KT225B	2.250/57.2	1.405/35.7	1.000/25.4	14.6	2.59	37.8	155.0	160.0	114.0	72.0
KT249	2.500/63.5	1.405/35.7	1.000/25.4	15.6	3.36	52.3	203.0	203.0	149.0	95.0
KT250	2.500/63.5	1.250/31.8	1.000/25.4	15.0	3.84	57.4	242.0	242.0	177.0	113.0
KT300	3.040/77.2	1.930/49.0	.500/12.7	19.8	1.68	33.4	80.0	80.0	58.0	37.0
KT300D	3.040/77.2	1.930/49.0	1.000/25.4	19.8	3.38	67.0	160.0	160.0	116.0	74.0
KT350	3.500/89.0	2.140/54.4	1.000/25.4	22.5	4.39	98.0	171.0	171.0	125.0	79.0
KT400	4.000/102	2.250/57.2	.650/16.5	25.0	3.46	86.4	131.0	131.0	96.0	60.0
KT400D	4.000/102	2.250/57.2	1.300/33.0	25.0	6.85	171	262.0	262.0	192.0	120.0
KT520	5.200/132	3.080/78.2	.800/20.3	33.1	5.24	173	137.0	149.0	100.0	68.0
KT520D	5.200/132	3.080/78.2	1.600/40.6	33.1	10.5	347	274.0	298.0	200.0	130.0
KT650	6.500/165	3.500/88.9	2.000/50.8	39.9	18.4	734	405.0	434.0	310.0	200.0

B-H曲线图 B-H Curves

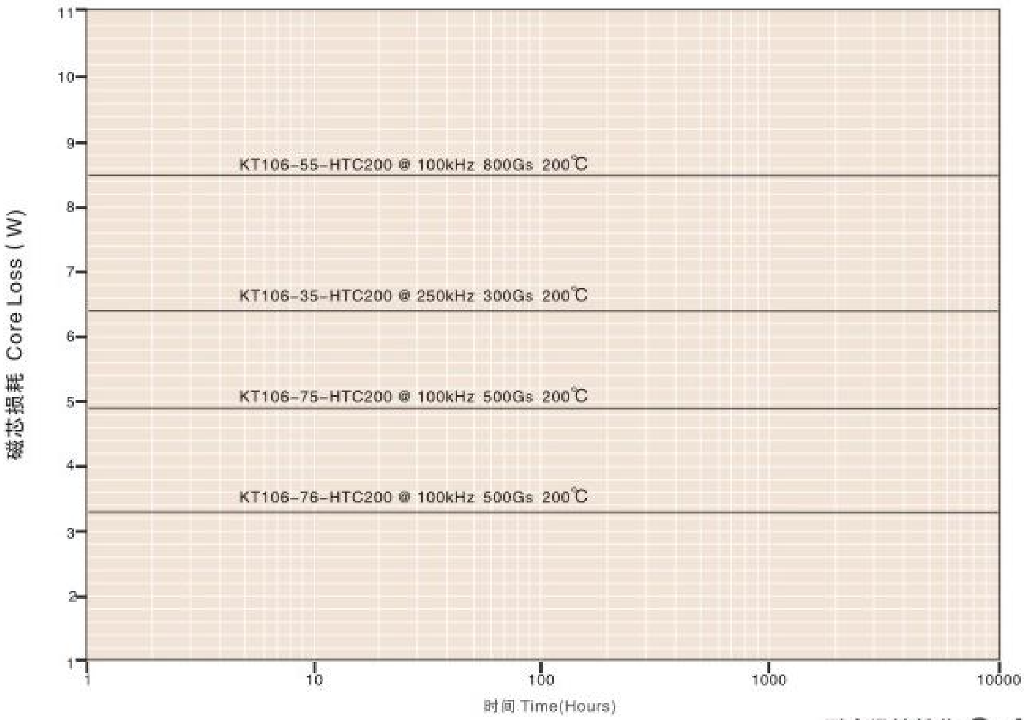




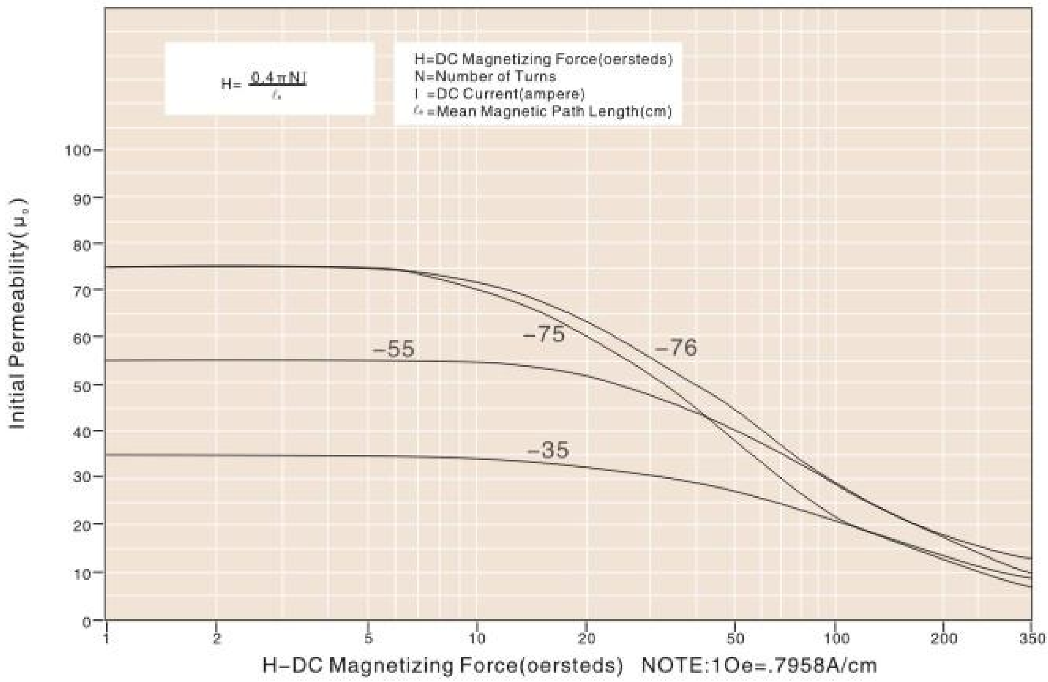




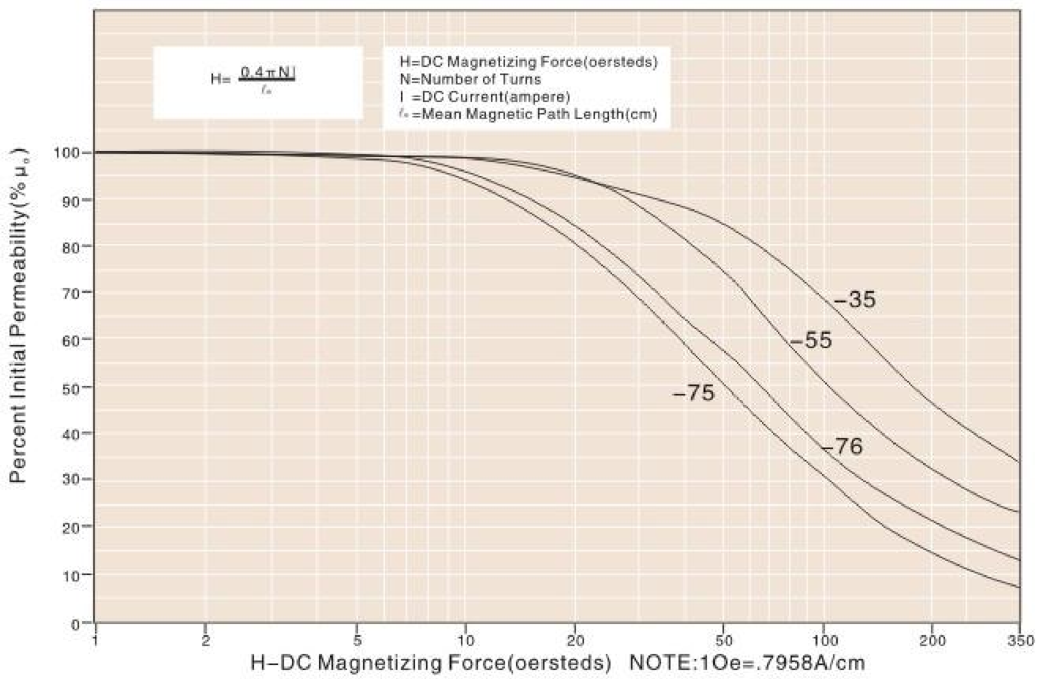
磁芯损耗与时间关系曲线 Core Loss vs Time



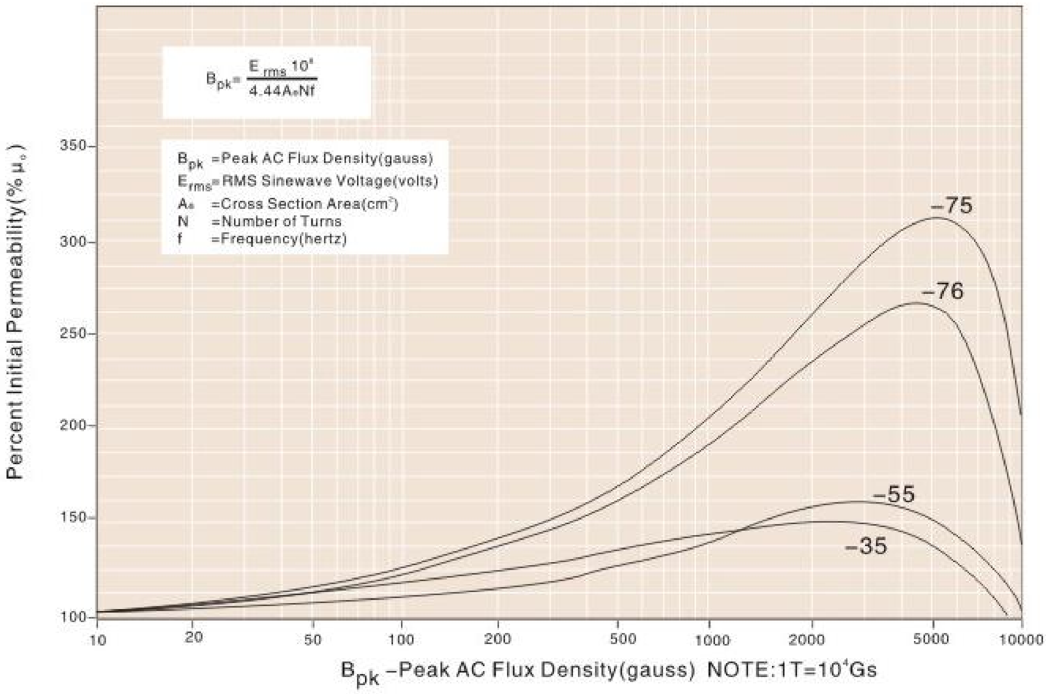
磁导率初值与DC磁化力关系曲线 Initial Permeability(μ₀) vs DC Magnetizing Force



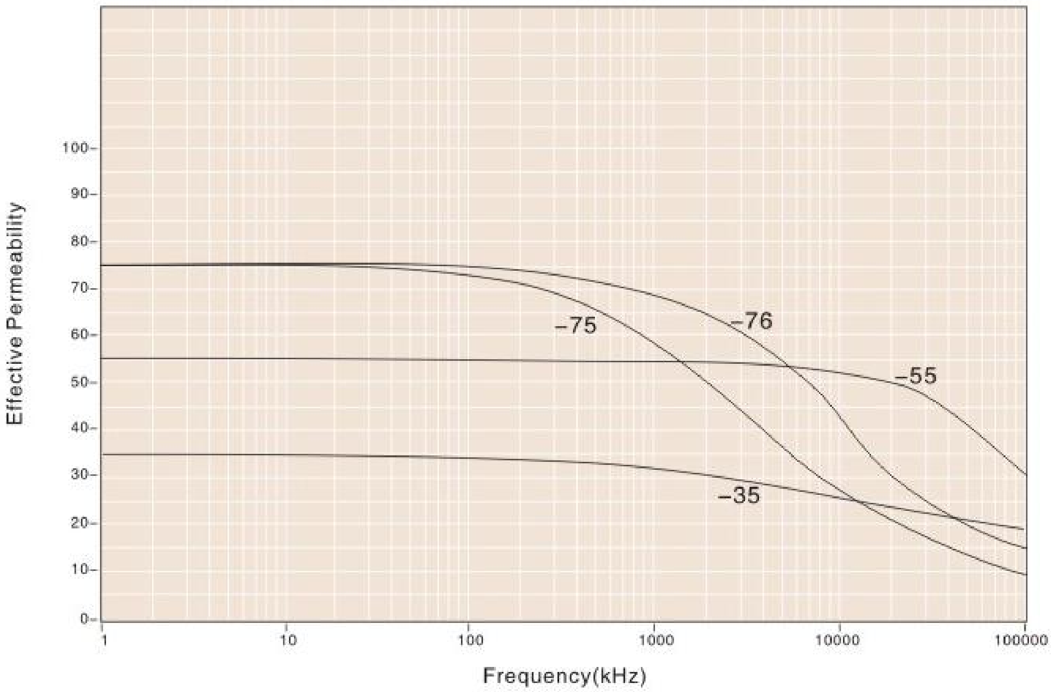
磁导率初值百分率与DC磁化力关系曲线 Percent Initial Permeability(% μ₀) vs DC Magnetizing Force



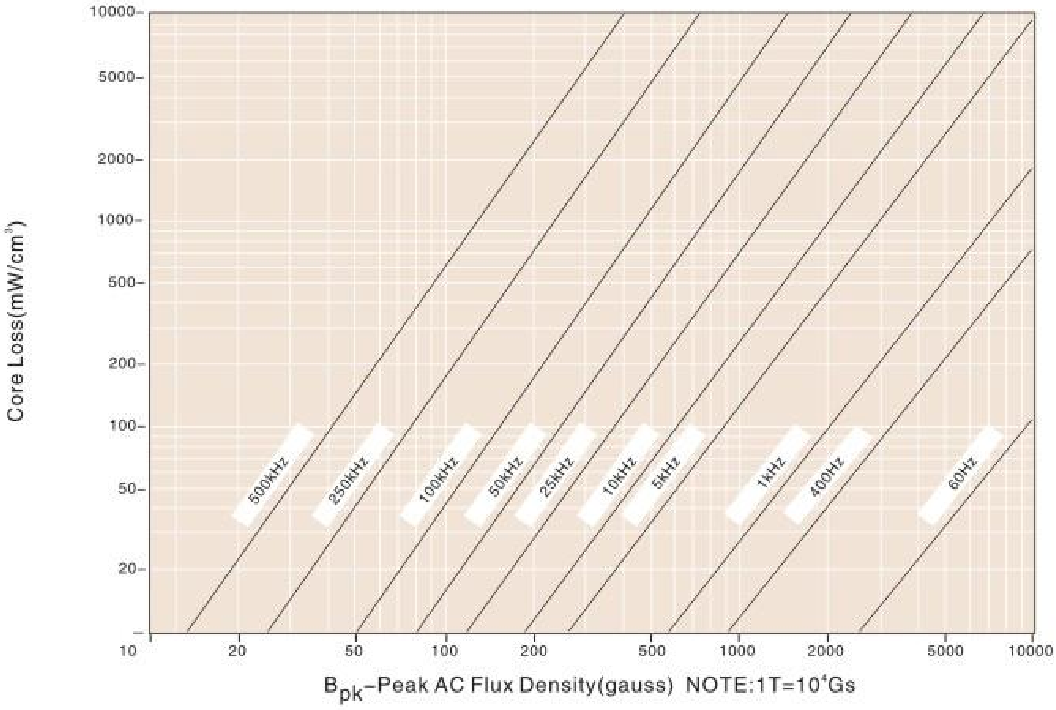
磁导率初值百分率与AC通量密度峰值关系曲线Percent Initial Permeability(%μo) vs Peak AC Flux Density



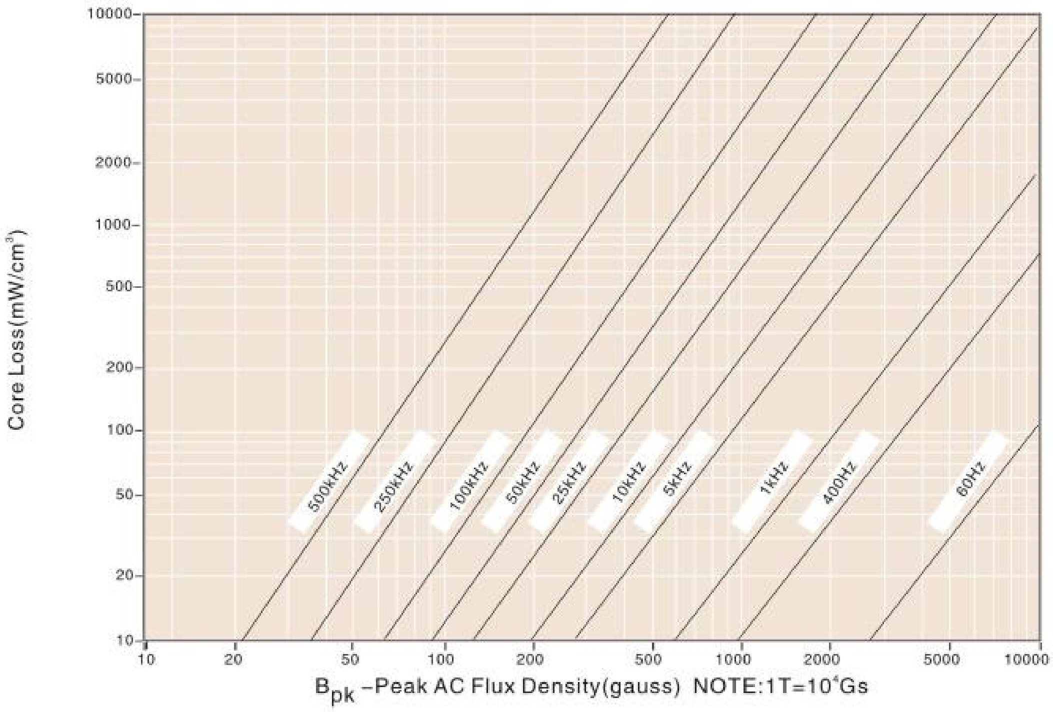
有效磁导率与频率关系曲线Effective Permeability vs Frequency



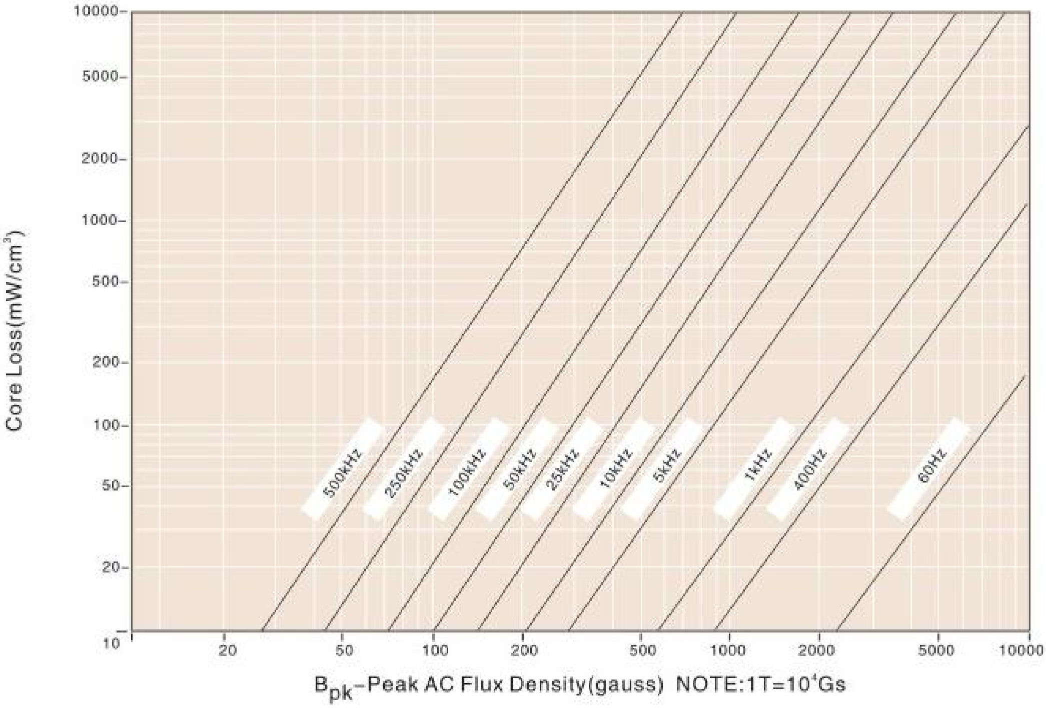
-75材磁芯损耗与AC峰值磁通密度关系曲线 -75Material μe=75 Core Loss vs Peak AC Flux Density



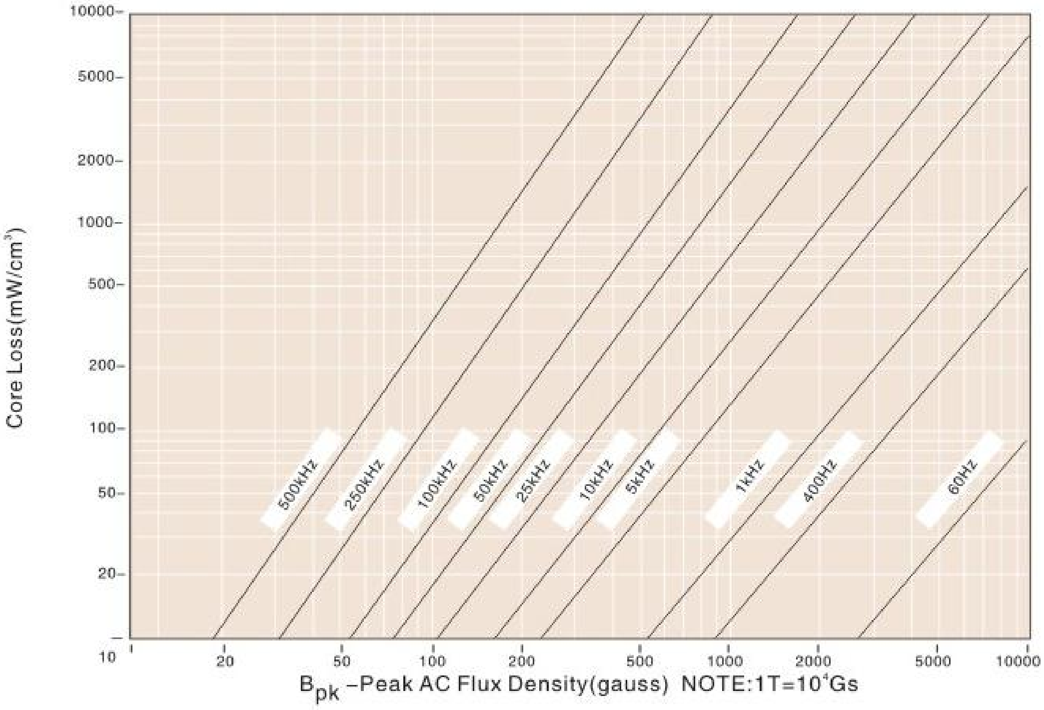
-76材磁芯损耗与AC峰值磁通密度关系曲线 -76Material μe=75 Core Loss vs Peak AC Flux Density



–55材磁芯损耗与AC峰值磁通密度关系曲线 -55Material μe =55 Core Loss vs Peak AC Flux Density



–35材磁芯损耗与AC峰值磁通密度关系曲线 -35Material μe =35Core Loss vs Peak AC Flux Density



3

基础知识 Basic Information

Classification and Characteristics of Magnetic Materials
磁性材料特点与分类

磁性材料主要分为永磁材料与软磁材料。永磁材料又称硬磁材料，磁体经过外加磁场磁化以后能长期保留其强磁性，特点是矫顽力（Hc)高。一般其矫顽力Hc≥10^4A/m。磁能积（BH）max大。软磁材料是加磁场后即容易磁化，也 容易退磁的磁性材料，特点是矫顽力小，一般其矫顽

力Hc≤10^3A/m。

永磁材料（硬磁材料）的特点和主要分类

永磁材料四种主要磁特性

（1）高的最大的磁能积

最大磁能积（BH）max是永磁材料单位体积存储和可利用的最大磁能量密度的量度。

（2）高的矫顽力

矫顽力（Hc)是永磁材料磁和非磁的干扰而保持其永磁性的量度。

（3）高的剩余磁通密度（Br)和高的剩余磁化强度（Mr)

它们是具有空气隙的永磁材料的气隙中磁场强度的量度。

（4）高的稳定性

即对外加干扰磁场和温度、震动等环境因素的变化的高稳定性。

永磁材料的主要分类

（1）**金属永磁材料**：这是一种发展和应用都较早的以铁和铁元素（如镍、钴等）为重要元素组成的合金永磁材料，主要有稀土永磁（如钕铁硼稀土合金永磁），铝镍钴（AlNiCo)系和铁铬钴(FeCrCo)系三大永磁合金。

（2）**铁氧体永磁材料**：这是以Fe_2O_3为主要元素组成的复合氧化物的强磁材料，其特点是电阻率高，特别有利于在高频和微波使用。如钡铁氧体永磁材料，锶铁氧体永磁材料等。

（3）**其它永磁材料**：如微粉永磁材料，纳米永磁材料，胶塑永磁材料等。

软磁材料的特点和主要分类

软磁材料的主要特点

（1）**低的矫顽力Hc**：显示磁性材料即容易受外加磁场磁化，又容易受到加磁场或其他因素退磁，而且磁损耗也低。

（2）**高的饱和磁通密度Bs和高的饱和磁化强度Ms**：这样容易得到高的磁导率μ和低的矫顽力Hc，也可以提高磁通密度。

（3）**低的磁损耗和电损耗**：这就要求低的矫顽力Hc和高的电阻率。

（4）**高的稳定性**：对温度、震动等环境因素的变化具有高的稳定性。

Formulas and Glossary
术语与公式

软磁材料的主要分类

（1）**铁氧体软磁材料**：是一系列含有氧化铁的复合氧化物材料（或称为陶瓷材料），特点是饱和磁感应强度低（0.5T以下）但磁导率比较高电阻率也很高，一般使用在高频下。如锰锌铁氧体（Mn-Zn Cores)、镍锌铁氧体(Ni-Zn Cores)、镁锌铁（Mg-Zn Cores)。

（2）**金属软磁材料**：与铁氧体软磁材料相比具有高的饱和磁感应强度低的矫顽力。主要有铁系类软磁如工业纯铁、铁粉芯（Iron Powder Cores)；铁镍合金类软磁，如铁镍钼磁粉芯（MPP Cores)、高磁通铁镍磁粉芯（High Flux Cores)等；铁硅合金类软磁，如铁硅铝磁粉芯（Sendust Cores）、硅钢片等。

（3）**非晶软磁材料和纳米晶软磁材料**：是20世纪后期发展起来的新软磁材料。

金属磁粉芯的主要特点

金属磁粉芯是由金属磁性粉粒，经表面绝缘包覆，与绝缘介质（有机或无机类黏合剂）混合压制而成的一种软磁材料。由于金属磁性粉粒很小，又被非磁性绝缘膜物质隔开，因此，一方面可以隔绝涡流，材料适用与较高频率，另一方面由于颗粒之间的间隙效应，导致材料具有低导磁率及恒导磁特性。同时磁粉芯内有天然的气隙分布特性，极其适合储能性电感器的使用，又由于磁性粉末颗粒尺寸小，基本上不会发生集肤效应，磁导率随频率的变化也就较为稳定。磁粉芯的磁电性能主要取决于粉粒材料的导磁率、颗粒大小和形状、它们的填充系数、绝缘介质的含量、成型压力及热处理工艺等。

在这本样本手册中，汇集了本公司生产的**铁粉芯**和**耐高温铁粉芯**；除了以上产品，KDM还生产合金磁粉芯，如有需要请联系我们索取合金磁粉芯样本手册（Issue K 2015)

磁性材料的术语

（1）**磁滞回线**：铁磁体从正向至反向，再至正向反复磁化至技术饱和一周，所得的B与H的闭合关系曲线称为磁滞回线，也称B-H曲线。

（2）**饱和磁感应强度**：（饱和磁通密度）磁性体被磁化到饱和状态时的磁感应强度。在实际应用中，饱和磁感应强度往往是指某一指定磁场（基本上达到磁饱和时的磁场）下的磁感应强度。

（3）**剩磁感应强度**：从磁性体的饱和状态，把（包括自退磁场）单调减小到0的磁感应强度。

（4）**磁通密度矫顽力**：它是从磁性体的饱和磁化状态，沿饱和磁滞回线单调改变磁场强度，使磁感应强度B减小到0时的磁场强度。

（5）**内禀矫顽力**：从磁性体的饱和磁化状态使磁化强度M减小到0的磁场强度。

（6）**磁能积**：在永磁体的退磁曲线上的任意点的磁感应强度和磁场强度的乘积称为磁能积；其中一点对应的B与H乘积的最大值称为最大磁能积（BH）max。

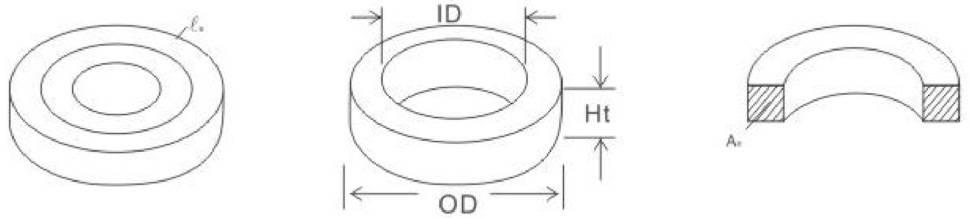
（7）**起始磁导率**：磁性体在磁中性状态下磁导率的极限值。

（8）**温度系数**：在两个给定温度之间，被测的变化量除以温度变化量。

（9）**磁导率的比温度系数**：磁导率的温度系数与磁导率的比值。

（10）**居里温度**：在此温度上，自发磁化强度为零，即铁磁性材料（或亚磁性材料）由铁磁状态（或亚铁磁状态）转变为顺磁状态的临界温度。

磁粉芯的有效面积与有效磁路长度



$$A_e = \frac{OD-ID}{2} \times Ht$$

$$\ell_e = \frac{OD-ID}{\ln\left(\frac{OD}{ID}\right)} \times \pi$$

$$V = \ell_e \times A_e$$

A_e: 有效磁粉芯面积（cm^2)与磁芯的横截面积相等

Ht: 磁芯高度（mm）

ℓ_e: 有效磁路长度或称平均磁路长度（cm)

W: 磁芯最小窗口面积（cm^2）

V：磁芯体积（cm^3）

1英寸（inches）=10^3 mil=25.4mm

OD: 磁芯外径 （mm）

ID: 磁芯内径 （mm）

电感量和额定电感量

每种尺寸磁粉芯的额定电流量都与其有效磁导率有关，有效磁导率仅作参考，环型磁芯的电感测试是依均匀分布的单层绕组作测试依据，以非均匀分布而少圈数的磁芯作测试会产生比预期要大的电感读数。

铁粉芯（Iron Powder Cores）的额定电感量均在10kHz的频率下及10高斯（1 m T）的AC磁通密度峰值为测试依据。

合金磁粉芯的电感系数值是以1000圈时为测试依据，其中电感系数偏差通常在±8%之间。

$$L = \frac{4\pi \mu_e A_e}{\ell_e} \times N^2$$

$$A_L = \frac{L}{N^2}$$

L: 电感量（H）1H=10^3mH=10^6μH=10^9nH
A_L: 额定电感量（nH/N^2）
μ_e: 有效磁导率
A_e: 有效磁芯截面积
ℓ_e: 有效磁路长度
N: 线圈匝数

磁场强度和安培定律

安培定律揭示了磁场强度（H）与电流、圈数和磁路长度之间的关系。

$$H = \frac{0.4\pi NI}{\ell}$$

H: 磁场强度（Oersteds）
N: 圈数
I：电流（A）
ℓ：磁路长度（cm）

根据安培定律，磁场的强度在靠近磁粉芯内位置强（因为磁路长度ℓ短），引入有效磁路长度（ℓ_e）可以提供穿过磁粉芯整个截面上磁场强度平均值（Haverage）

$$H_{average} = \frac{0.4\pi NI}{\ell_e}$$

$H_{average}$: 穿过磁粉芯（从内径到外径）整个截面的平均值磁场强度（Oersteds）
N: 圈数
ℓ_e: 有效磁路长度或称平均磁路长度（cm）
I: 电流（A）

除非另有说明，在本样本中使用的都是平均磁路长度及平均磁场强度

Formulas and Glossary
术语与公式

有效磁导率

$$\mu_e = \frac{B}{H}$$

μ_e：有效磁导率（无量纲）

B：磁通量密度（高斯 Gauss）

H：磁场强度（奥斯特 Oe）

直流绕线电阻（Rdc）的计算公式

$$R_{dc} = \frac{\ell_w N r}{1200}$$

ℓ_w: 平均绕线长度（英寸）

N: 圈数

r: 线的电阻（Ω/1000英尺）

除了绕线中的标准直流电阻外，还存在着由于交流电流趋肤效应而产生的绕线电阻增量，其之间关系式如下：

$$\frac{R_{ac}}{R_{dc}} = 0.96+0.0035x^2 - 0.00038x^3$$

$$X = d\sqrt{\frac{f}{1+0.00393(℃-20)}}$$

d: 线径（英寸）

f: 频率（Hz）

℃: 工作温度

Q值（品质因数）

Q值是指电感器电抗与有效电阻的比值，它反映了该电感的质量。对于电源滤波器而言，Q值提高就意味着截止更快，衰减比更高和谐振效果更好，Q值的大小主要由电感线圈的分布电容所决定。

如果忽略分布电容引起的自谐振效果，可以用以下公式计算电感器Q值。

$$Q = \frac{\omega L}{R_{dc}+R_{ac}+R_{cd}}$$

Q: 品质因数

L: 电感量（H）

ω: 2πf（Hz）

Rdc: 绕线直流电阻（Ω）

Rac: 由于磁粉芯损耗而产生的阻抗（Ω）

R_{cd}: 由于绕线中介电损耗而产生的阻抗（Ω）

磁通密度和法拉第定律

磁通密度的大小影响磁粉芯的损耗值和磁导率。除非另有说明，本样本中所列举的数据都是基于正弦波形和最大磁通密度（峰值）得出的。

$$B_{pk}=\frac{E_{rms}10^8}{4.44fA_eN}$$

B_{pk}：最大磁通密度峰值（高斯Gauss）
E_{rms}：通过绕线正弦电压有效值（Volts）
N：圈数
A_e：有效磁粉芯截面积（cm^2）
f：正弦波形电压频率（Hz）

Bpk指穿过磁粉芯横截面各部份平均磁通密度值的最大值。事实上，通过磁粉芯内径附近的磁通密度值高，而磁粉芯外径附近的磁通密度值低。

1特斯拉（T）=10^4 高斯（Gauss）=10^3mT

绕线介电损耗（Rcd）的计算公式

$$R_{cd}=d\omega^3L^2C_d$$

d：分布电容的功率因数

ω：2πf（Hz）

L：电感量（H）

Cd：分布电容（法拉）

磁芯损耗 Core Loss

磁芯损耗是磁芯材料内交替磁场引致的结果。磁芯损耗有三部分组成：磁滞损耗、剩磁损耗和涡流损耗。

$$\frac{R_{ac}}{\mu_e L}=aB_{pk}f+cf+ef^2$$

Rac：有磁芯损耗产生的有效电阻（Ω）
μ_e：有效磁导率
L：电感量（H）
a：磁滞损耗系数
B_{pk}：AC磁通密度峰值（高斯Gauss）
C：剩磁损耗系数
F：频率（Hz）
e：涡流损耗系数

在高温条件下，涡流损耗是主要损耗，而低频下磁滞损耗则是主要损耗。而各种损耗形式在总损耗中所占的比例也会受到磁通密度的影响，受到高温热老化影响的是磁芯损耗中的涡流部份。

Notes on Inductor Designs
电感器设计注意事项

电感器设计注意事项

电感器的频率特性主要由三个因数影响

A、磁芯材料损耗的影响是主要的，它导致Q值从最大值后呈现负斜率。

B、介电损耗也是影响的因素，特别是在高频段尤为明显。

C、第三个影响因素就是分布电容和电感的自谐振效应。

自谐振频率对电感器的性能起负面影响，自谐振频率是有分布电容和自感所决定，而分布电容是由绕线方法所决定的。尽量减少分布电容式绕线设计中非常重要的考虑成本。对于环型磁粉芯的绕线，它的有效电容式与电感并联的。这个分布电容是线与线之间，层与层之间和绕线本身与磁粉芯之间的电容之和。

好的绕线设计技术就是要尽量缩小圈数之间的电压，力求尽量减少分布电容。比如将绕线划分成几组，或者使用绕线排更可以有效减少电容量。在绕线和内部分段连接技术中，应尽量避免使用输入端与输出端靠的太近，因为在这两个部位具有圈与圈间最大的势能，并因此而分布最大的有效电容值。同时，湿度指标和灌封与封装材料的绝缘常数也会提高分布电容值。

对于精密绕线磁芯，要求时间稳定性高和温度重复性好。所以在其温度周期内，必须让线绕应力得到释放。在磁粉芯是绕制完的线圈必须要做尽量多的从室温到125℃的温度循环，这个温度循环不仅仅是为了释放应力，而且还有去除湿度的作用，当完成温度循环后，必须要对电感器进行电感量的最后调整。

绕线后磁芯必须保持干燥，尽快浸封，灌封或密封起来，应仔细选择灌封化合物材料，以避免有些材料随时间和温度收缩，而影响稳定性。在绕线后磁芯外面加上一些垫衬材料可以改善这种影响。

对于设计工程师而言，了解热老化引起磁芯损耗增加条件是十分重要。在高温条件下，涡流损耗是主要损耗，而低频下，磁滞损耗则是主要损耗。而各种损耗形式在总损耗中所占的比例也会受到磁通密度的影响。受到高温热老化影响是磁芯损耗的涡流部分。

在铁氧体磁芯内采用开气隙的方式，可降低磁芯的有效磁导率，从而降低工作的磁通密度，但这种气隙可以造成严重的局部化气隙损耗问题，当频率高于100kHz时，尤其显著，在很多的例子里，气隙损耗都会超过磁芯损耗，由于磁粉芯的气隙是均匀分布的，所以这类局部化气隙基本上是不存在的。

如果选用任何不适当的磁芯材料或小于指定尺寸的磁芯，磁芯会因为进行过高频率的磁芯损耗而产生温升，从而更可能导致热衰败。

在选择合适的磁芯材料前，必须确定电感器摆动的重要性。选取原则是保证磁粉芯不被磁饱和为前提。

判断磁粉芯温度的“过热点”的最佳方法是在磁芯打一个小的盲孔。并插入温差电偶丝。要求电偶丝与磁芯紧密接触才能得到精确结果，必须严密注意通风死角的温度情况，因为这些死角处的温度比冷风通道处的温度要高。建议单元组件在最恶劣条件下运行4–8小时，或运行到电感器达到热平衡为止。这样才能获得真正的磁粉芯的最高温度。要注意磁粉芯有不同的导热系数，会形成温度分级情况。

磁粉芯的原料磁粉有磁力格化现象，即是说当磁粉被磁化时，它们尺寸会发生轻微的变化，此情况在可听频率>20kHz以上应用中无关紧要，但在某些50Hz的用途中，磁芯会有蜂鸣噪音出现，这种情况在E型磁芯比在环型磁芯更明显，也会随着交流磁通密度的变化而改变。

Examples of Inductor Designs
电感器的设计例举

电感量的计算

在KT106-26的磁芯上均匀的绕上35Ts线圈，其电感量是多少？

A、先查KT106-26磁芯的额定电感量A_L值=93nH/N^2

B、依据$A_L = \frac{L}{N^2}$ 公式=>$L = A_L \times N^2$,则$L = 93nH/N^2 \times 35^2 = 113.9\mu H$

C、由于考虑到A_L值电感系数有±10%的偏差，则其电感量应在113.9±10%范围内。

电感系数圈数的计算

采用KT106-18磁芯的电感器，其电感量为142μH时其线圈有多少匝？

A、依据$A_L = \frac{L}{N^2}$ 公式⇒ $N=\sqrt{\frac{L}{A_L}}$，查KT106-18其电感系数A_L值=70nH/N^2,考虑到A_L值有±10%的偏差，

则A_L值应在63nH/N^2- 77nH/N^2之间。

B、当A_L=63nH/N^2时 $N=\sqrt{\frac{L}{A_L}}=\sqrt{\frac{142\times10^3nH}{63nH/N^2}}$ =47.5TS

C、当A_L=77nH/N^2时 $N=\sqrt{\frac{L}{A_L}}=\sqrt{\frac{142\times10^3nH}{77nH/N^2}}$ =43TS

从上面计算可知，当电感量为142μH的电感器时，绕线的匝数可选择43-47.5匝之间，具体的匝数可以根据磁芯的实际电感系数而定。本公司在实际制造过程中，其额定电感系数一般控制在±3%之间。

如何判断磁芯的有效磁导率μ_e

有一款不明其材料的磁芯，带涂层，经测量其外径OD=37mm,内径ID=14.5mm,Ht=11.3mm,

a、首先用φ0.29mm绕20TS，用CH3302LCR仪测出其电感L=59.0μH@10kHz/1V

b、计算出磁芯的A_e与ℓ_e

根据公式$A_e=\frac{OD-ID}{2} \times Ht=\frac{3.7cm-1.45cm}{2} \times 1.13cm = 1.271cm^2$

根据公式$\ell_e=\frac{OD+ID}{2} \times \pi=\frac{3.7cm+1.45cm}{2} \times 3.14 = 8.086cm$

C、根据公式$L=\frac{4\pi\mu_e A_e}{\ell_e} \times N^2 \Rightarrow \mu_e=\frac{L\ell_e}{4\pi A_e N^2}=\frac{59\times10^3nH\times8.086cm}{4\times3.14\times1.271cm^2\times20^2}$ =74.7

则该磁芯的磁导率在75左右。

如何判断所选铁芯是否满足其性能要求

已知条件：选KT50-8B铁芯，采用11#AWG线，N=9TS，L=1.86μH±10%，DC-Bias,I_1=20A时，L=1.50μH(Min)。其电感器是否能满足要求。

a、依据以上条件，可计算出其DC-Bias的磁场强度

$H=\frac{0.4\pi NI}{\ell_e}=\frac{0.4\times3.14\times9\times20A}{3.19cm}$ =70.8 O_e

（查KT50-8B其平均磁路长度ℓ_e=3.19cm）

B、依据I=0A时，L=186μH;I_1=20A时，L=1.50μH(Min)可计算出其下跌幅度1.50/1.86=80.6%.

C、从查磁导率初值百分率与DC磁化能力关系曲线，可以看出，在H=70.8 O_e时，-8的曲线能满足下跌80.6%要求，故KT50-8B能满足其性能要求。