AmoFlux®

Amorphous powder cores for high efficiency

AmoFlux® is a new powder alloy distributed gap material that is ideal for power factor correction (PFC) and output chokes. This alloy starts with amorphous ribbon that is pulverized into powder and then pressed into a toroid. By converting the ribbon into a powder, the resulting AmoFlux cores have the same excellent properties, including soft saturation, as Magnetics' other powder core materials: Kool Mµ®, MPP, High Flux, and XFlux®. What makes this amorphous powder core material unique is the combination of low core loss and high DC bias. These attributes make AmoFlux an excellent choice for computer, server, and industrial power supplies that require high current inductors with superior efficiency.

Material	Core Loss 100 mT 100 kHz
MPP	590
AmoFlux	**700**
Kool Mµ	700
High Flux	1,300
XFlux	2,000
Iron Powder	6,000
Units	mW/cm³

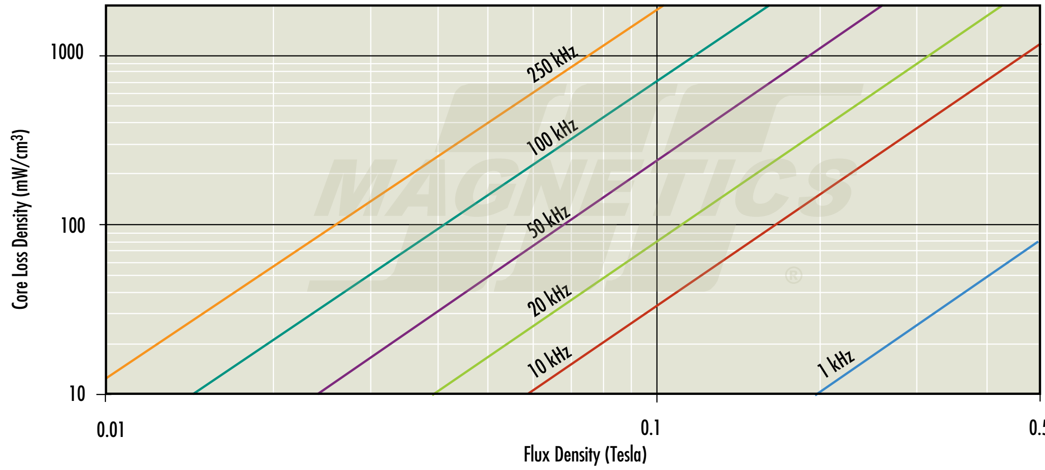
Material	DC Bias	
	80% Rolloff	50% Rolloff
XFlux	75	136
High Flux	70	130
AmoFlux	**62**	**111**
MPP	48	84
Kool Mµ	34	76
Iron Powder	23	56
Units	A-T/cm	A-T/cm

Attribute	AmoFlux vs. Other Products		
	High Flux	Sendust	MPP
Core Loss	AmoFlux is 50% better	Similar	MPP is better
DC Bias	High Flux is better	AmoFlux is 50% better	AmoFlux is 30% better
Cost	AmoFlux is lower and not subject to changes in Ni	Sendust is lower	AmoFlux is much lower and not subject to changes in Ni
AmoFlux Benefits	Better efficiency and a more cost-effective solution	Higher current handling, potential size reduction, and less copper required	Higher current handling, potential size reduction, less copper required, and a more cost-effective solution

Material	Alloy Composition	Core Loss	DC Bias	Relative Cost	Saturation Flux Density (Tesla)	Curie Temperature	Operating Temperature Range	60 µ µ flat to...
AmoFlux	**Fe Si B**	**Low**	**Better**	**Medium**	**1.5**	**400° C**	**-55° C to 155° C**	**2 MHz**
High Flux	Fe Ni	Moderate	Best	Medium	1.5	500° C	-55° C to 200° C	1 MHz
Kool Mµ	Fe Si Al	Low	Good	Low	1.0	500° C	-55° C to 200° C	900 kHz
MPP	Fe Ni Mo	Very Low	Better	High	0.75	460° C	-55° C to 200° C	2 MHz
XFlux	Fe Si	High	Best	Low	1.6	700° C	-55° C to 200° C	500 kHz
Iron Powder	Fe	Highest	Good	Lowest	1.2 - 1.5	770° C	-30° C to 75° C	500 kHz
Ferrite	Ceramic	Lowest	Poor	Lowest	0.45	100 - 250° C	Variable	Variable

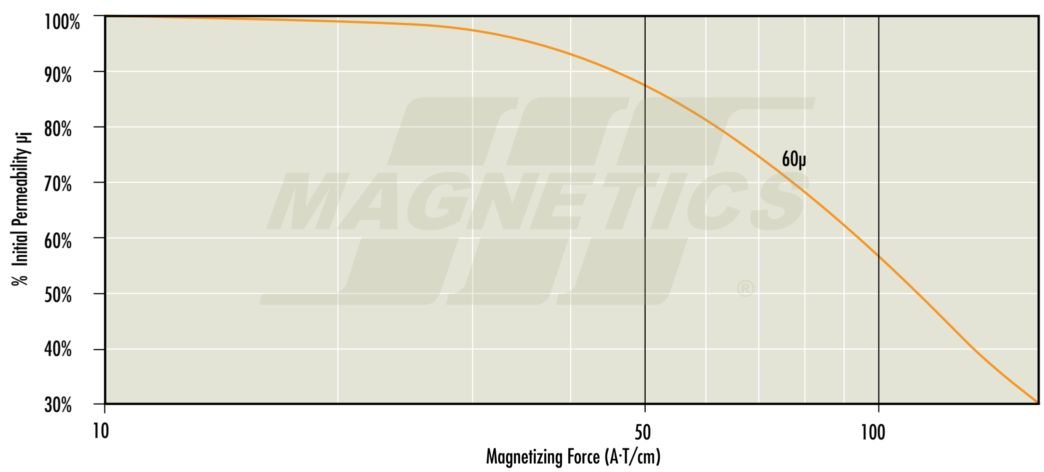
AmoFlux® Core Loss Density

1kHz - 49kHz	$P_L = 360\,(B^{2.22})\,(f^{1.184})$
50kHz - 99kHz	$P_L = 55.6\,(B^{2.20})\,(f^{1.65})$
100kHz - 250kHz	$P_L = 820\,(B^{2.19})\,(f^{1.06})$



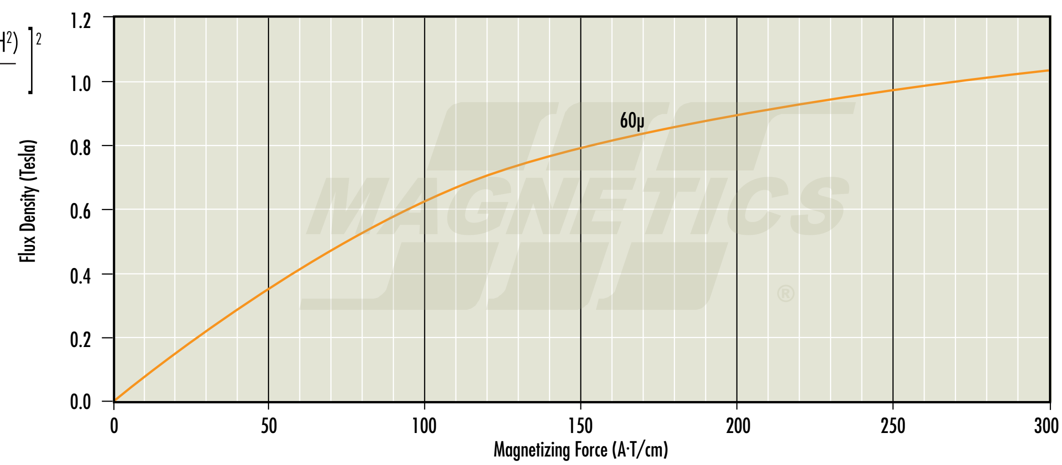
AmoFlux® Permeability vs. DC Bias

$$(\mu/\mu_i) = 0.9931 + (2.295 \times 10^{-3}\,H) - (1.291 \times 10^{-4}\,H^2) + (7.653 \times 10^{-7}\,H^3) - (1.361 \times 10^{-9}\,H^4)$$



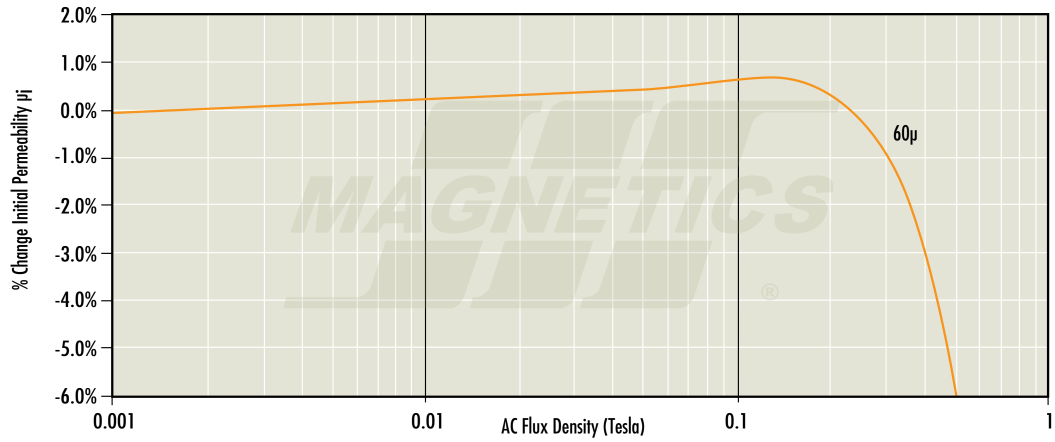
AmoFlux® Magnetization Curve

$$B = \left[\frac{8.252 \times 10^{-2} + 1.236 \times 10^{-1}\,H + 2.017 \times 10^{-2}\,H^2}{1 + H + 1.689 \times 10^{-2}\,H^2}\right]^2$$



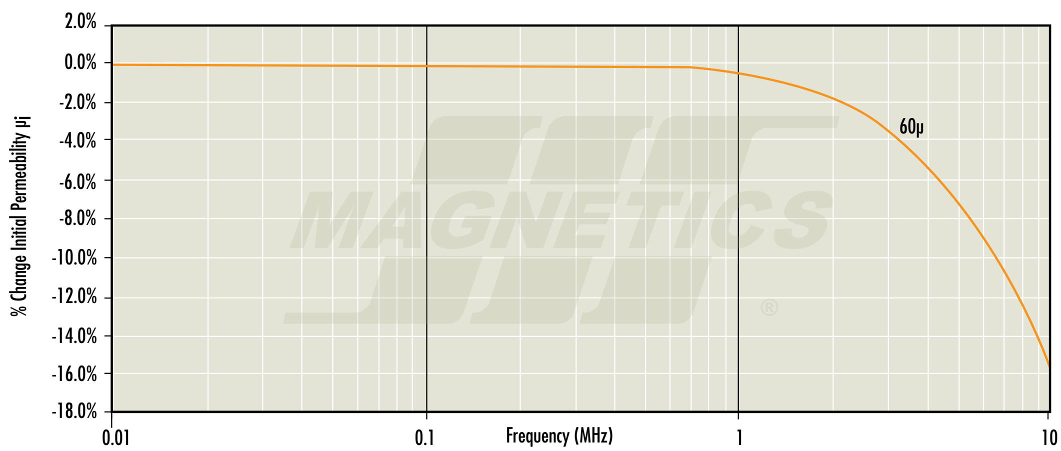
AmoFlux® Permeability vs. AC Flux Density

$$(\Delta\mu/\mu_i) = -8.828*10^{-4} + 1.482*10^{-1} B - (7.394*10^{-1} B^2) + (6.467*10^{-1} B^3) - (4.074*10^{-1} B^4)$$



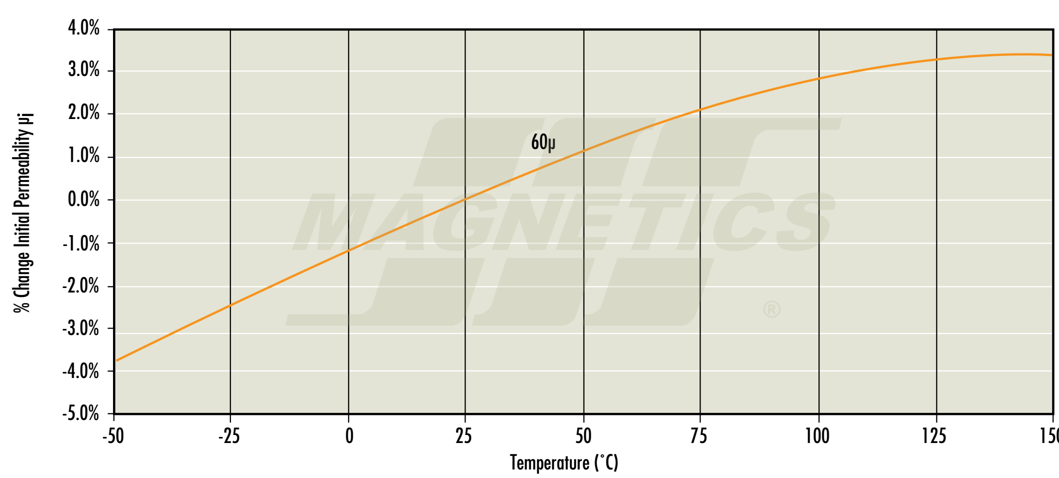
AmoFlux® Permeability vs. Frequency

$$(\Delta\mu/\mu_i) = 6.011*10^{-5} + (2.605*10^{-3} F) - (6.792*10^{-3} F^2) + (8.846*10^{-4} F^3) - (3.874*10^{-5} F^4)$$



AmoFlux® Permeability vs. Temperature

$$(\Delta\mu/\mu_i) = -1.014*10^{-2} + (5.222*10^{-4} T) - (1.491*10^{-6} T^2)$$

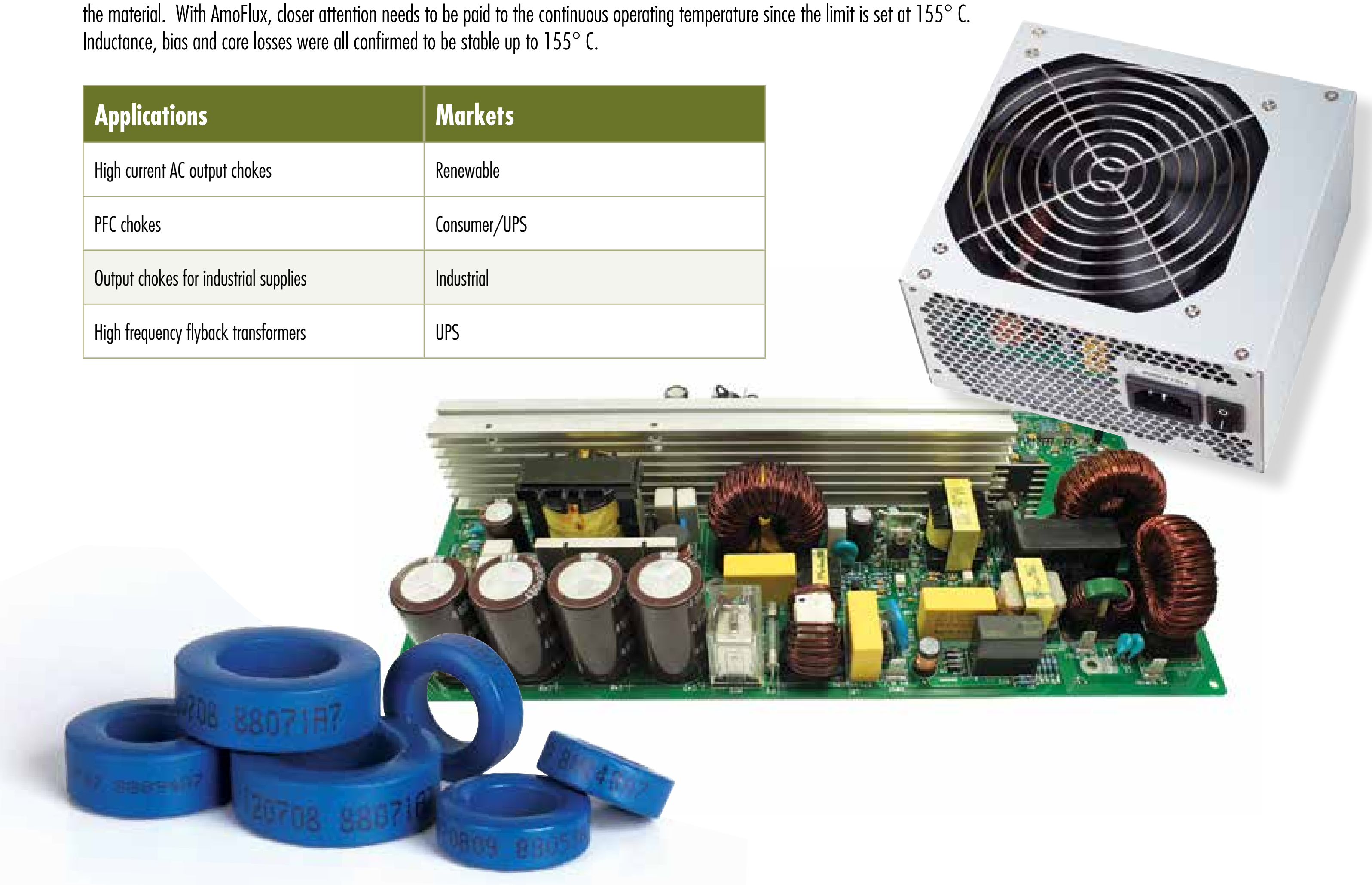


AmoFlux® Dimensions and Magnetic Data

Dimensions (after finish)			Part Number	Permeability	A_L±8% (nH/T²)	Magnetic Data				
OD (mm) max	ID (mm) min	HT (mm) max				W_a (mm²)	A_e (mm²)	L_e (mm)	V_e (mm³)	Weight (g)
24.4	13.7	9.66	0088351A7	60	51	149	38.8	58.8	2,280	14
27.69	14.1	12.0	0088894A7	60	75	156	65.4	63.5	4,150	26
33.66	19.4	11.5	0088071A7	60	61	297	65.6	81.4	5,340	33
40.77	23.3	15.4	0088083A7	60	81	427	107	98.4	10,600	65
47.63	23.3	19.0	0088439A7	60	135	427	199	107	21,300	131
58.04	25.57	16.2	0088192A7	60	138	514	229	125	28,600	173

Magnetics powder cores are able to continuously operate at a temperature of 200° C. This limit is set by the core coating as opposed to the material. With AmoFlux, closer attention needs to be paid to the continuous operating temperature since the limit is set at 155° C. Inductance, bias and core losses were all confirmed to be stable up to 155° C.

Applications	Markets
High current AC output chokes	Renewable
PFC chokes	Consumer/UPS
Output chokes for industrial supplies	Industrial
High frequency flyback transformers	UPS



New sizes will be added.
Go to www.mag-inc.com/products/powder-cores/amoflux-cores for updates.

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