

## COMMON MODE CHOKES

# PRODUCT SUMMARY

**Description** N80 series common mode choke cores are made of nanocrystalline alloy of high permeability .

Recently, electromagnetic interference(EMI) considerations are increasingly important as electronic devices become part of our daily lives. This has rapidly increased the required performances for electromagnetic compatibility(EMC) components such as common mode chokes coils, which provide protection against incoming and outgoing high frequency noise. They also protect electronic devices against high voltage pulse noise generated by spark discharge, etc. These types of noise are created whenever there rapid transitions in voltage and/or current waveforms. In switching power supplies, the waveforms are periodic, but it's waveforms are non-periodic in case of data line for telecommunication. The application area of common chokes covers all products from telecommunication product for signal transmitting to switch-mode power supplies, frequency converters, and UPS units.

Common mode chokes are mainly used to provide attenuation of asymmetrical conducted interferences. Their design is determined by the specifications of the corresponding international standards and the specific interference suppression problem.

N80 series common mode chokes shows a higher insertion attenuation, that is insertion damping, overall the wide-range of frequency. The typical permeability of N80 series common mode choke is 80,000. To satisfy these requirements, SHINHOM will provide a higher level of common mode chokes with N80 series flat loop cores.

**Feature**

- High permeability
- Reduce in size
- Reduce the winding turns
- Low DC resistance
- Low core loss
- High impedance overall the wide-range of frequency
- Meet the EN500081 and EN 500082 standards.
- Getting a suitable insertion loss in wide-range of frequency
- Low profile (1~5mm height)

**Application**

- EMI common mode filtering
- Telecommunications and data communications interface transformers
- High accuracy current transformers
- High accuracy pulse transformers
- Ground fault protection devices

# COMMON MODE CHOKES CORES

## STANDARD CORE DIMENSIONS & SPECIFICATIONS

### N80 Series Nanocrystalline Common Mode Choke Cores

Part No.	Core Dimensions(mm)			Case Dimensions(mm) ①			$L_{eff}$ ②	$A_{eff}$ ③	$V_{eff}$ ④	$A_L$ ⑤	Box type ⑥
	OD	ID	HT	OD	ID	HT	(mm)	(mm <sup>2</sup> )	(mm <sup>3</sup> )	( $\mu$ H)	
N80-0703	7.2	4.3	2.8	8.0	3.5	3.5	18.0	3.0	55.0	9.0	a)
N80-1004	10.0	6.5	4.5	11.2	5.1	5.7	25.9	5.9	153.0	15.0	a)
N80-1005	10.0	6.5	5.0	11.2	5.1	6.5	25.9	6.6	170.0	16.5	a)
N80-1204	12.0	8.0	4.5	13.5	6.5	6.5	31.4	6.8	212.0	15.0	b)
N80-1205	14.0	10.0	5.0	15.5	8.5	6.8	31.4	7.5	236.0	16.5	b)
N80-1608	16.0	10.0	8.0	17.2	8.5	10.0	40.8	18.0	735.0	22.0	b)
N80-1908	19.0	14.0	8.0	22.5	12.1	12.2	51.8	15.0	777.0	17.5	b)
N80-2008	20.0	12.0	8.0	22.3	10.0	10.3	50.2	24.0	206.0	22.0	b)
N80-2110	21.0	16.0	10.0	24.5	14.0	12.5	50.2	30.0	508.0	20.5	b)
N80-2610	26.0	16.0	10.0	27.5	14.0	12.5	66.0	37.0	2474.0	46.5	b)
N80-2815	28.0	18.0	15.0	30.2	16.0	17.6	72.3	56.0	4064.0	55.0	b)
N80-3015	30.0	20.0	15.0	33.1	17.8	17.5	78.5	56.0	4418.0	45.0	b)
N80-3210	32.0	20.0	10.0	34.0	17.8	12.5	81.7	45.0	3676.0	38.0	b)
N80-4010	40.0	25.0	10.0	42.5	22.5	13.0	102.1	56.3	5740.0	30.0	b)
N80-4013	40.0	25.0	12.5	42.5	22.5	14.5	102.1	70.3	7179.0	40.0	b)
N80-4015	40.0	25.0	15.0	43.2	21.9	18.9	102.1	84.4	8615.0	45.0	b)
N80-5015	50.0	32.0	15.0	53.2	29.0	18.2	128.8	101.3	13042.0	55.0	b)
N80-5020	50.0	32.0	20.0	53.2	29.5	23.5	128.8	135.0	17388.0	70.0	b)
N80-5920	59.0	40.0	20.0	62.0	37.0	23.0	155.5	142.5	22160.0	55.0	b)
N80-6420	64.0	40.0	20.0	67.0	37.0	24.0	163.3	180.0	29405.0	60.0	b)
N80-8020	80.0	50.0	20.0	84.0	47.0	24.0	204.2	225.0	45946.0	65.0	b)
N80-10020	100.0	60.0	20.0	105.0	56.0	25.0	251.3	300.0	75398.0	70.0	b)
N80-12020	120.0	70.0	20.0	125.0	67.0	25.0	298.5	375.0	111920.0	58.2	b)
N80-12025	120.0	70.0	20.5	125.0	67.0	31.0	298.5	468.8	139900.0	70.0	b)
N80-12030	120.0	70.0	30.0	125.0	67.0	36.0	298.5	562.5	167880.0	82.0	b)
N80-13040	130.0	80.0	40.0	135.0	75.0	45.0	329.9	750.0	247400.0	125.0	b)
N80-13050	130.0	80.0	50.0	135.0	75.0	55.0	329.9	937.5	309200.0	155.0	b)

Notes:

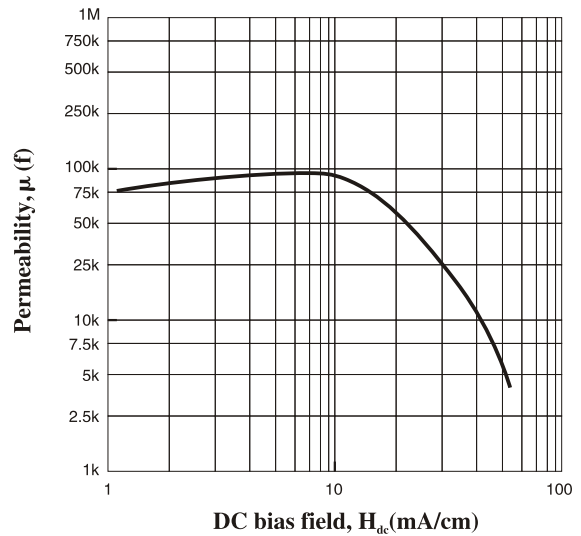
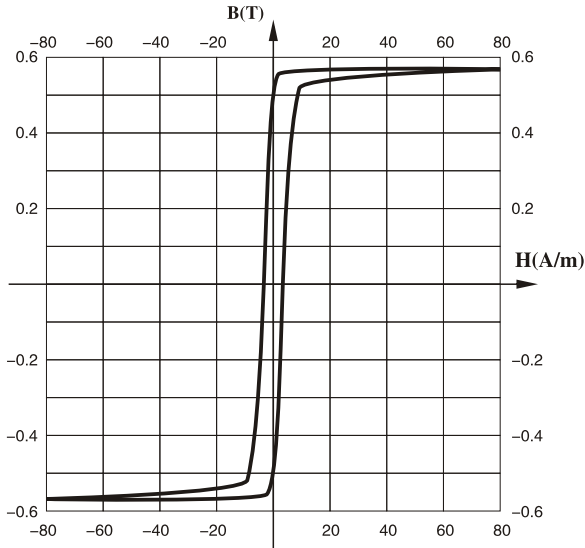
- ① The finished core dimensions shows a typical ones. Tolerance is  $\pm 0.2$ mm.
- ② Norminal values of magnetic path length.
- ③ Norminal values of cross-section area.
- ④ Norminal values of volume.
- ⑤ Minimum values. Initial nominal inductance at 10kHz, 0.1Vosc@RT.
- ⑥ Finished box type
  - a) Epoxy coating.
  - b) Plastic case.

## COMMON MODE CHOKES

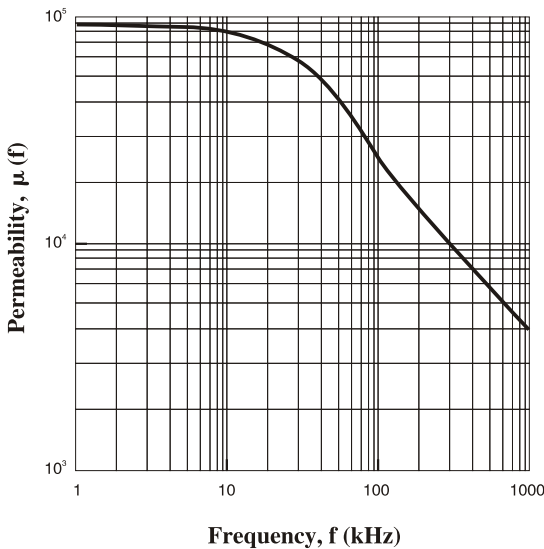
# TYPICAL MAGNETIC CHARACTERISTICS OF N80 SERIES

### Typical Frequency & DC Current Dependency of Common Mode Chokes

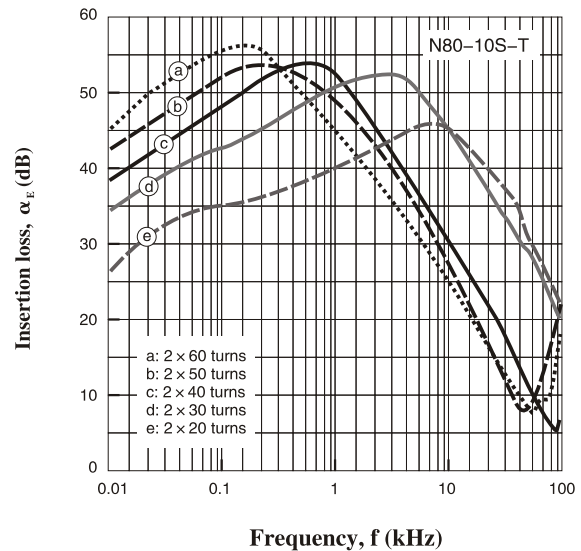
Typical B-H loop and it's incremental permeability with DC bias at 10kHz



Typical frequency properties



Insertion damping curve

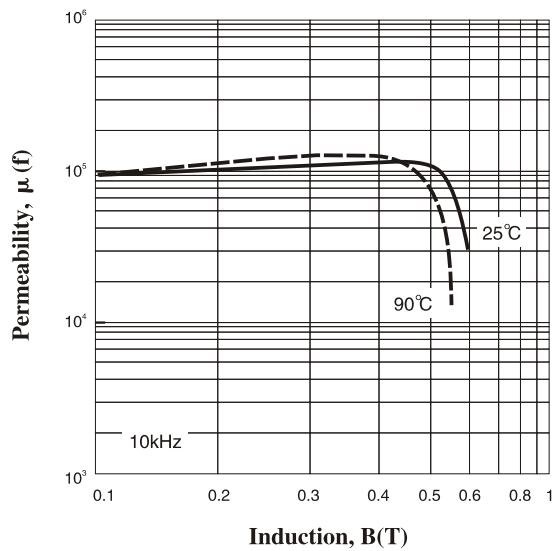


\* All characteristics as shown above are measured at room temperature ~25°C

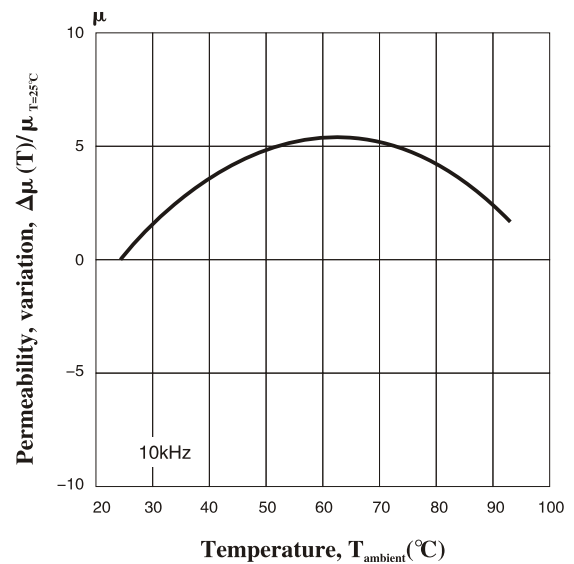
# COMMON MODE CHOKES

## TYPICAL MAGNETIC CHARACTERISTICS OF N80 SERIES

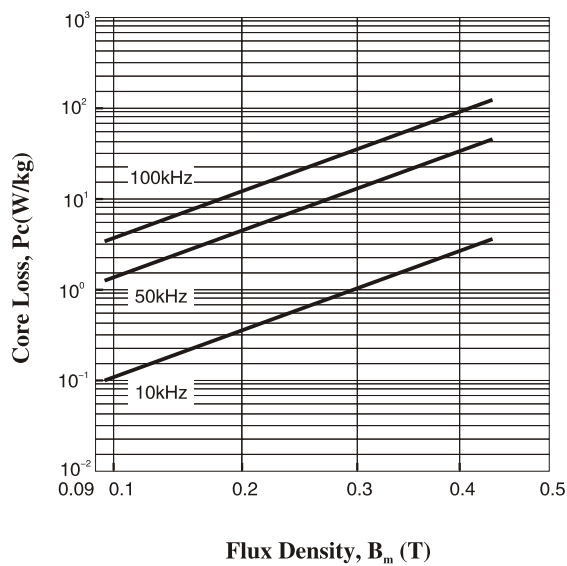
Typical  $\mu_{peak}$  with flux density



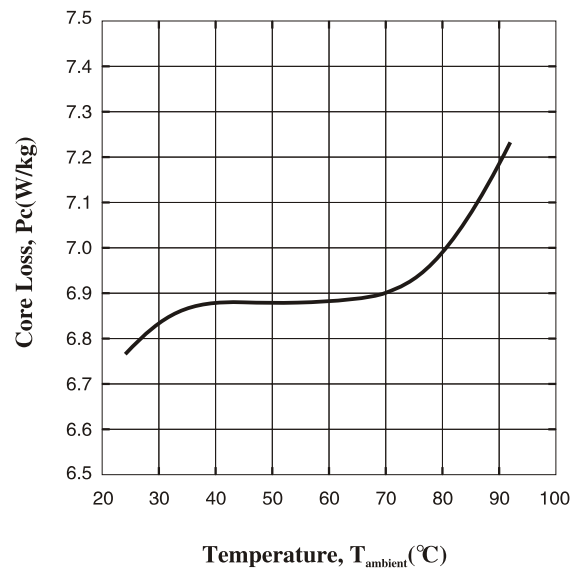
Typical temperature properties of  $\mu$



Typical core loss Pc(f)



Typical Pc(T)



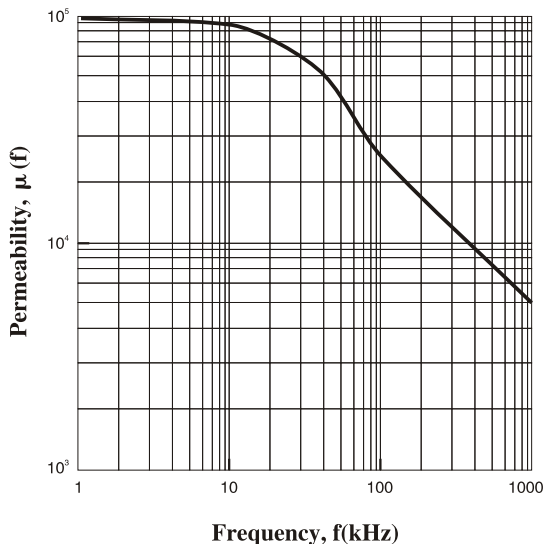
\* All characteristics as shown above are measured at room temperature ~25°C

# COMMON MODE CHOKES

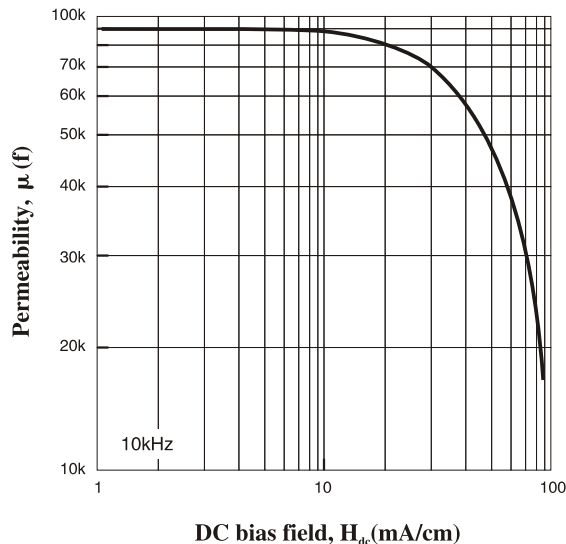
## TYPICAL MAGNETIC CHARACTERISTICS OF N80 SERIES

### Typical Frequency & DC Current Dependency of Common Mode Chokes

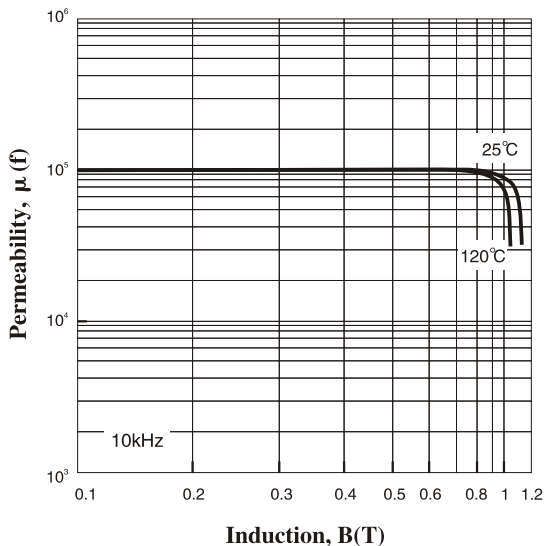
Typical frequency properties



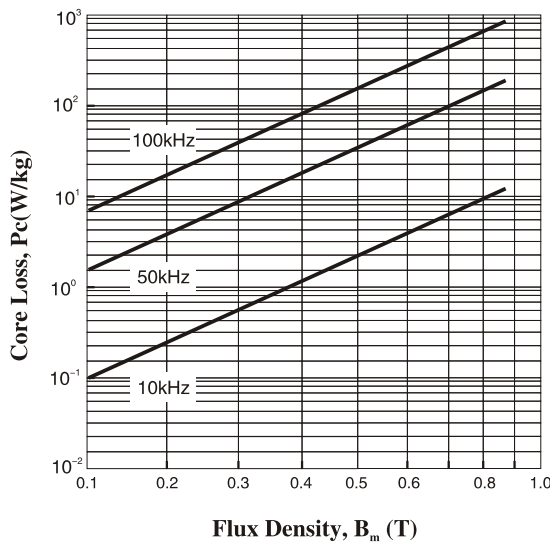
Typical incremental permeability



Typical  $\mu_{peak}$  with flux density



Typical core loss Pc(f)



\* All characteristics as shown above are measured at room temperature ~25°C

## HIGH QUALITY MAG-AMP CORES

# PRODUCT SUMMARY

**Description** Mag-Amp technique is one of simple, the most reliable and cost-effective post regulation ways providing control on the secondary side of the auxiliary outputs in multiple-output switch mode power supplies. Therefore, Mag-Amp cores are now the industry standard for implementing high precision and high efficiency independent of outputs in switch-mode power supplies of server, telecom and personal computer applications.

**Adapting MA Mag-Amp gives following attractive benefits.**

**1. Shorten Design Time with Reduced Total Cost**

simple circuit construction with fewer component for the control circuit is achieved.

**2. High Reliability**

Mag-Amp can withstand instantaneous surges in current or voltage and protect output diode from voltage and current spike in circuit.

**3. High Precision and Low Noise**

The output voltage kept in tightly from no load to full load conditions and noise from output diode is suppressed by high inductance of Mag-Amp in series connection with diode.

it's differ from semiconductor regulation(eg.MOS-FET)which adds switching noise in regulating circuit.

- Feature**
- High squareness(~98%)
  - Low coercive force field
  - Low temperature rise
  - High efficiency
  - Low reset current requirement
  - UL94V-0 compliant

- Application**
- Magnetic Amplifiers for Switched mode power supplies.(PC, Server, OA)
  - Magnetic Amplifiers for DC to DC Converter.
  - Power supplies for network products such as Hubs, etc.
  - Adapter for notebook / laptop
  - Oscillating transformer
  - Other kinds of saturable reactors

# HIGH QUALITY MAG-AMP CORES

## STANDARD CORE DIMENSIONS & SPECIFICATIONS

Part No.	Finished Core(mm) ①			$L_{eff}$ ②	$A_{eff}$ ③	$V_{eff}$ ④	$W_a$ ⑤	$\emptyset W_a$ ⑥	$\emptyset$ ⑦
	OD	ID	HT	(mm)	(mm <sup>2</sup> )	(mm <sup>3</sup> )	(mm <sup>2</sup> )	( $\mu$ Wb-mm <sup>2</sup> )	( $\mu$ Wb)
MA-09S-L	10.7	5.5	6.3	25.0	3.5	88	24	97	4.1
MA-10S-L	11.9	5.8	6.3	27.0	4.7	129	26	145	5.5
MA-10B-L	11.2	5.7	5.7	25.9	6.0	157	26	176	6.9
MA-11A-L	14.0	6.6	4.8	29.9	3.7	113	34	147	4.3
MA-11S-L	14.0	6.6	6.3	29.9	5.6	196	34	257	6.6
MA-12A-L	14.0	6.6	4.8	31.0	4.7	147	34	185	5.4
MA-12S-L	14.0	6.6	6.3	31.0	7.0	221	34	277	8.1
MA-13B-L	14.7	7.8	4.6	34.8	4.1	144	48	235	4.8
MA-14S-L	15.9	6.8	6.5	34.3	10.0	350	36	421	11.6
MA-15A-L	16.7	10.5	6.3	42.2	5.3	223	87	528	6.1
MA-15S-L	16.9	8.6	6.5	38.7	9.1	355	58	624	10.5
MA-16B-L	17.8	11.0	5.1	44.7	4.0	179	95	445	4.6
MA-16D-L	17.8	8.3	8.1	39.3	12.6	504	54	801	14.8
MA-16A-L	17.8	8.3	8.1	40.1	14.4	588	54	904	16.7
MA-18S-L	19.8	10.4	6.4	46.5	10.5	496	85	1036	12.2
MA-18D-L	20.0	8.7	12.0	45.7	21.1	973	59	1451	24.4
MA-19B-L	21.2	11.0	5.1	49.4	8.1	407	95	910	9.4
MA-19A-L	21.6	11.0	7.9	49.8	15.9	805	95	1758	18.5
MA-20A-L	22.5	10.4	10.1	50.1	23.4	1195	85	2302	27.1
MA-21S-L	22.8	12.4	6.3	54.2	12.3	675	121	1727	14.3
MA-25A-L	27.7	17.3	12.9	70.4	19.5	1378	235	5312	22.6
MA-25S-L	28.4	13.8	12.2	63.4	35.1	2261	150	5912	40.7

**Notes:**

- ① The finished core dimensions shows a nominal ones. please consult sales department for tolerance.
- ② Norminal values of magnetic path length.
- ③ Norminal values of cross-section area.
- ④ Norminal values of volume.
- ⑤ Norminal values window area.
- ⑥ Norminal handling power factor.
- ⑦ The typical total flux with its tolerance of  $\pm 15\%$ . All values are measured at 100kHz, 80A/m, RT( $\sim 25^\circ\text{C}$ ).

For the detailed total flux specification limits, please contact sales and marketing department.

The squareness, Br/Bm(%), of all above listing part numbers is greater than 96% at 100kHz, 80A/m and 25°C for L-type.

\* \* The coercive force field, Hc(A/m), of all above listing part number is lower than 18A/m at 100kHz, 80A/m and 25°C.

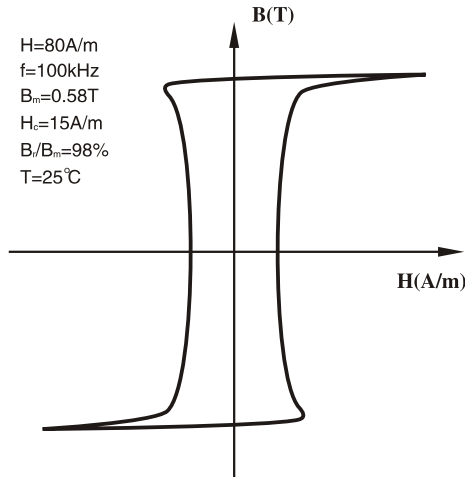
\* \* \* If customer need the exact information's on each part number, please inquire of SHINHOM sales department.

For a special request, SHINHOM can be provide special Mag-Amp cores with higher permeability.

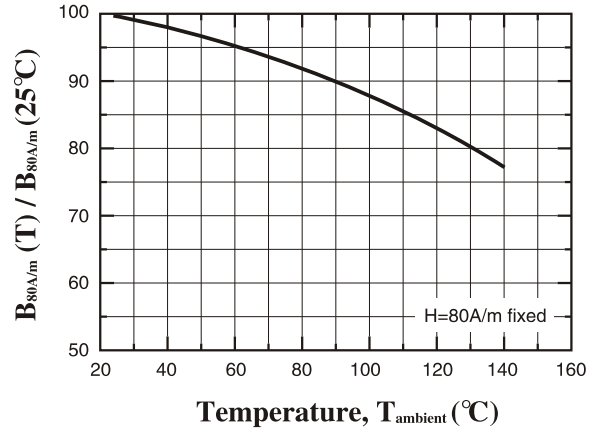
## HIGH QUALITY MAG-AMP CORES

# TYPICAL MAGNETIC CHARACTERISTICS

Typical B-H loop shape @100kHz

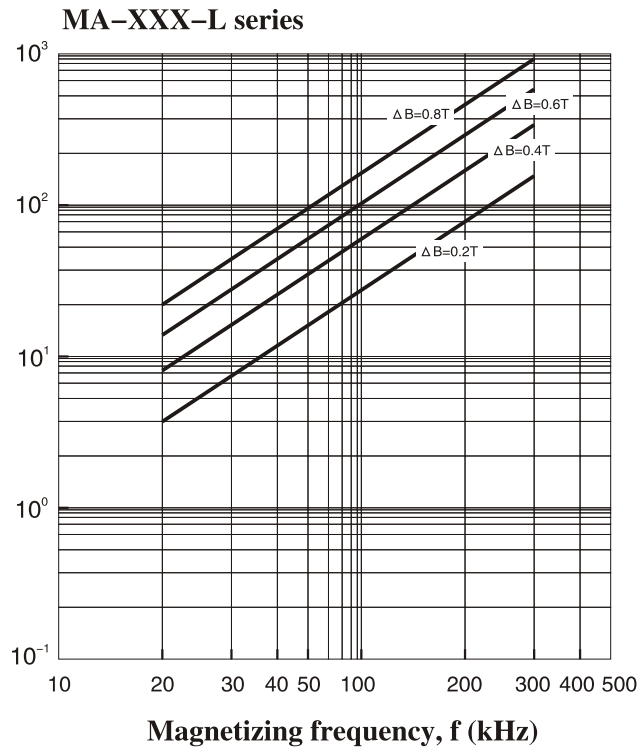


Temperature dependency of  $B_T(T)$



\* At higher temperatures a lower total flux density swing,  $\phi(T)=2B(T)A$ , has to be considered by designer in SMPS design.

Typical magnetic reversal losses of MA series Mag-Amp cores,  $P_c(f, \Delta B)$

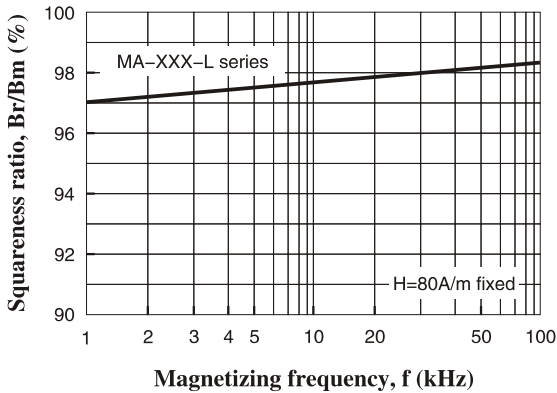


\* The core losses measured by sinusoidal waveforms in bipolar swing between +B to -B.

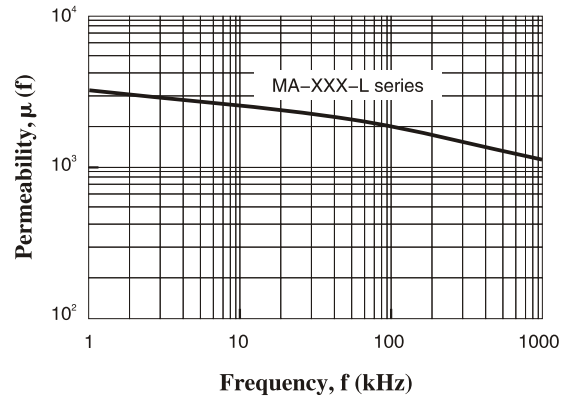
# HIGH QUALITY MAG-AMP CORES

## TYPICAL MAGNETIC CHARACTERISTICS

### Typical frequency dependency of squareness ratio and permeability

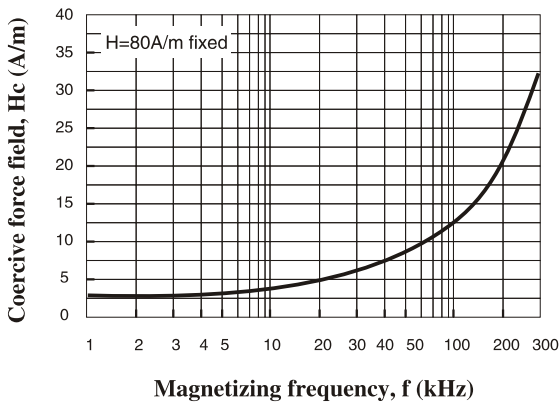


\* The squareness of MA-XXX-L series Mag-Amp with Magnetizing frequency shows a nearly constant between lower and higher frequency ranges. MA-XXX-L series is suitable for a high stability SMPS when the load changes dynamically in parallel connected PSU system.



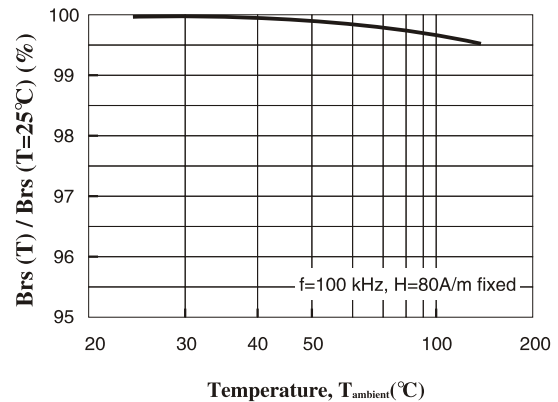
\* The permeability of MA-XXX-L series Mag-Amp shows a quite different characteristics with frequency. Before install MA series Mag-AMP in SMPS, it have to be considered the corner frequency and stability of feedback circuit in the PSU system.

### Typical frequency dependency of Hc



\* The coercive force field have still low value even at 300kHz. it might be provide a higher Mag-Amp gain from PSU feedback-controlled switching element to the output.

### Typical temp. dependency of Br/Bm



\* The squareness ratio with ambient temperature are negligible in most cases up to 100°C. In normal case, it may not affect the output voltage regulation if the ambient temperature goes up to 100°C except on if the PSU system has a temperature protection function in switching element.

# NANOCYRSTALLINE MAG-AMP CORE

## PRODUCT SUMMARY

**Description** MN series nanocrystalline Mag-Amp cores are now available by SHINHOM's innovated technology. The nanocrystalline Mag-Amp cores are manufactured with a new class of iron-based nanocrystalline soft magnetic alloys, Fe-Cu-Nb-Si-B.

Since the nanocrystalline materials have a relatively high electrical resistivity of about  $120\mu\Omega\text{-cm}$  and a ribbon thickness of about  $18\sim 24\mu\text{m}$  the eddy current losses are relatively low up to frequencies of about  $18\sim 24\mu\text{m}$  the eddy current losses are relatively low up to frequencies of about 100kHz. As an applications in switch-mode power supply, the high saturation magnetic induction of 1.2T and thermal stability would give it a distinct advantage over many existing materials.

And with its very high squareness is an another choice for switch-mode power supply engineers to design Mag-Amp circuits for secondary output voltage regulation which are highly cost-effective in general purpose power supplies.

Adapting MN Mag-Amp gives following attractive benefits.

1. Cut Down the Cost

Smaller in component size with the help of large saturation magnetic induction give cost effective circuit design.

2. High Temperature Operating

Higher Curie temperature of material enables operating up to  $120^{\circ}\text{C}$ .

3. High Precision Regulation

High squareness and relatively low coercive force enable precision regulation.

**Feature**

- High saturation flux density of 1.2T
- Smaller component size
- Extended operating temperature range up to  $120^{\circ}\text{C}$

**Application**

- Magnetic Amplifiers for switched mode power supplies
- power supplies for personal computer
- Open-frame switched-mode power supplies
- Precise output voltage control such as 3.3V, 5V and 12V in SMPS
- Other kinds of saturable reactor

# NANOCYRSTALLINE MAG-AMP CORE STANDARD CORE DIMENSIONS & SPECIFICATIONS

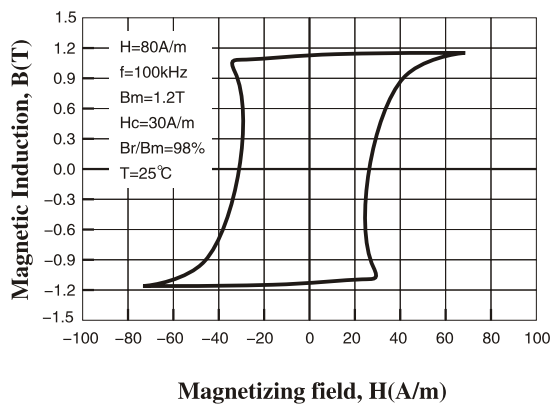
Part No.	Finished Core(mm) ①			$L_{eff}$ ②	$A_{eff}$ ③	$V_{eff}$ ④	$W_a$ ⑤	$\emptyset W_a$ ⑥	$\emptyset$ ⑦
	OD	ID	HT	(mm)	(mm <sup>2</sup> )	(mm <sup>3</sup> )	(mm <sup>2</sup> )	( $\mu$ Wb-mm <sup>2</sup> )	( $\mu$ Wb)
MN-10B-L	11.2	5.7	5.7	26.1	5.6	148	26	344	13.5
MN-11S-L	14.0	6.6	6.3	29.6	5.3	157	34	431	12.6
MN-13B-L	14.7	7.8	7.8	34.8	4.1	144	49	485	9.9
MN-15S-L	16.9	8.6	8.6	38.7	8.8	345	59	1254	21.1
MN-18S-L	19.8	10.4	10.4	45.7	9.5	438	85	1928	22.7

**Notes:**

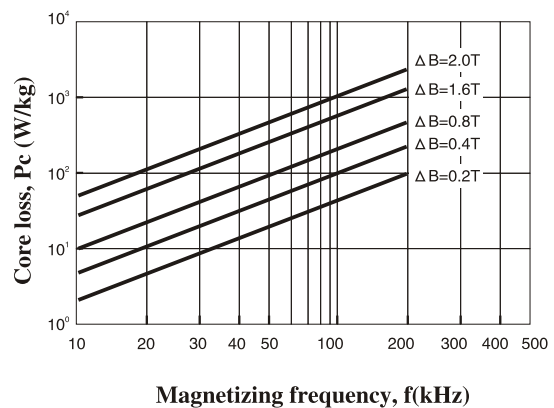
- ① The finished core dimensions shows a nominal ones. please consult sales department for tolerance.
- ② Norminal values of magnetic path length.
- ③ Norminal values of cross-section area.
- ④ Norminal values of volume.
- ⑤ Norminal values window area.
- ⑥ Norminal handling power factor.
- ⑦ The total flux with its tolerance of  $\pm 15\%$ . All values are measured at 100kHz, 80A/m, RT( $\sim 25^\circ\text{C}$ ).
- \* The squareness, Br/Bm(%). of all above listing part numbers is greater than 96% at 100kHz, 80A/m and 25°C.
- \*\* The coercive force field, Hc(A/m), of all above listing part number is lower than 36A/m at 100kHz, 80A/m and 25°C.
- \* \* \* If customer need the exact information's on each part number, please inquire of SHINHOM sales department.

## TYPICAL MAGNETIC CHARACTERISTICS

**Typical B-H loop shape@100kHz**



**Typical losses, Pc(f, ΔB)**

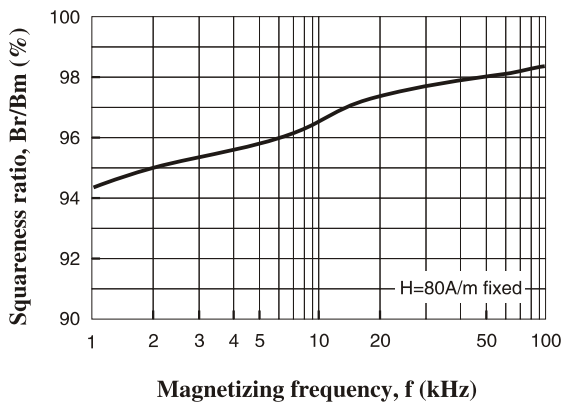


\* The core losses measured by sinusoidal waveforms in bipolar swing between +B to -B

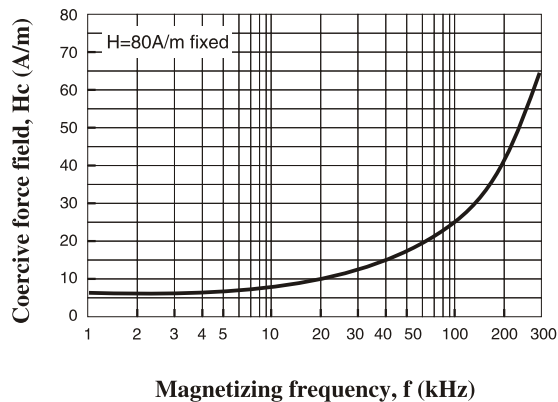
# NANOCYRSTALLINE MAG-AMP CORE

## TYPICAL MAGNETIC CHARACTERISTICS

Typical freq. dependency of Br/Bm

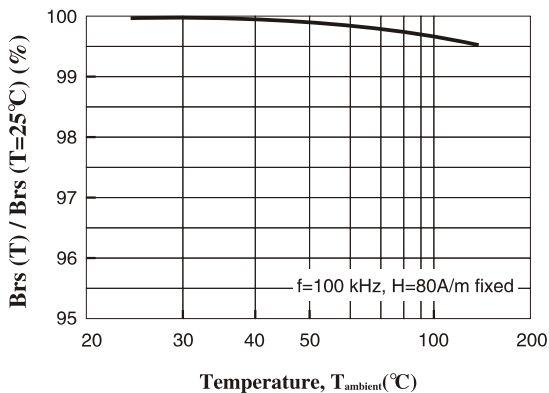


Typical freq. dependency of Hc



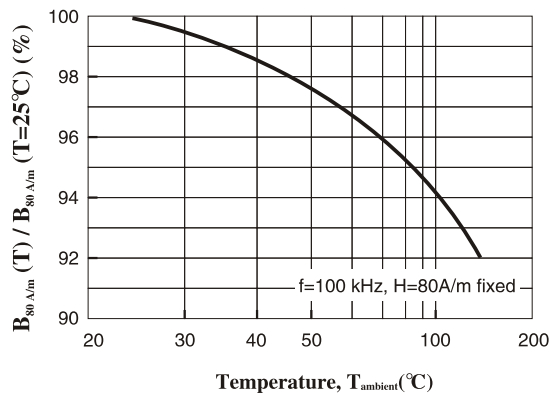
\* The squareness of nanocrystalline MN-XXX-L series Mag-Amp with magnetizing frequency shows very high over all frequency ranges.

Typical temp. dependency of Br/Bm



\* The squareness ratio with ambient temperature are negligible in most cases up to 120°C

Typical temp. dependency of Bm



\* High Tc offers a lower decreasing the maximum induction with temperature.