AMORPHOUS PRODUCTS CATALOG

INDEX

1. Amorphous Ribbons

Iron-based Amorphous Alloy Ribbons

Composition: 76-80 at% Fe, 20-24 at% Si+B

Ribbon Thickness: 30 ± 5 μm

Ribbon Width: 5 to 50 mm

Applications:

Medium-frequency transformer cores in heating equipment
Toroidal gapless cores as SMPS output inductors and differential input inductors
Toroidal gapless cores as noise prevention chokes in car's audio and navigation system
Toroidal gap cores for PFC used in air conditioner and plasma TV
High-frequency rectangular cut cores as output inductors and transformers in SMPS, UPS etc.
Toroidal gapless cores as pulse transformer for driving IGBTs, MOSFETs and GTOs
Amorphous stators and rotors in high power density speed-variable electric motors and generators

Benefits:

High saturation induction of 1.56 Tesla—Reducing component volume
Low coercivity—Increasing component efficiency
Low core loss—Reducing temperature rise in devices
Variable permeability by different heat treatments—Satisfying various application requirements
Excellent thermal stability—Having a highest service temperature of 130^{o}C

Physical properties:

Saturation induction B_S	1.56 T	Hardness Hv	960 kg/mm^2
Curie Temperature T_C	410 ^{o}C	Density	7.18 g/cm^3
Crystallization Temperature T_X	535 ^{o}C	Resistivity	130 μΩ-cm
Saturation Magnetostriction λ_S	27×10^{-6}		

Magnetic properties：

	Transverse field annealed	No field annealed	Longitudinal field annealed
Maximum permeability μ_m	>2×10^4	>20×10^4	>25×10^4
Saturation induction B_S	1.5 T	1.5 T	1.5 T
Remanence B_r	<0.5 T	1.0 T	1.2 T
Coercivity H_C	<4A/m	<2.4 A/m	<4A/m
Core loss (50 Hz, 1.4 T)	<0.2 W/kg	<0.13 W/kg	<0.3 W/kg
Core loss (400 Hz, 1.2 T)	<1.8 W/kg	<1.25 W/kg	<2 W/kg
Core loss (8 kHz, 1.0 T)	<80 W/kg	<60 W/kg	<100 W/kg
Variation in loss between -55 ^{o}C and 125 ^{o}C	<15%	<15%	<15%
Variation in loss at 120 ^{o}C for 200 hours	<15%	<15%	<15%

2. Fe-based Nanocrystalline Ribbons

Iron-based Nanocrystalline Alloy Ribbons

Composition: 70-75 at% Fe, 20-25 at% Si+B, 0.5-2 at% Cu, 1-5 at% M (M represents one or a few transition metals)
Ribbon Thickness: 25 to 30 μm
Ribbon Width: 2 to 50 mm

Applications:
Fe-based Nanocrystalline Ribbons can be used to replace silicon steel, Permalloy, and ferrite as excellent materials to make transformer cores for high-frequency switch mode power supplies, current transformer cores, transformer cores for ground-fault-interrupters, cores for filters, storage inductors, and reactors, EMC common mode chokes, sensor cores, cores for saturable reactors, magnetic amplifiers, beads, and pulse compressors.

Characteristics:
--High saturation induction—minimizing the volume of transformers
--High permeability and low coercivity—increasing the efficiency of transformers and reducing distributional capacitance
--Low core loss—minimizing the temperature rise of transformers
--Excellent thermal stability—serving at 130^{o}C for a long time
--Relatively low cost when compared to Permalloys

Physical and magnetic properties:

Saturation induction B_S (T)	1.25	Saturate magnetostriction λ_S	2×10^{-6}
Curie temperature T_C (^{o}C)	560	Density d (g/cm^3)	7.2
Crystallization temperature T_X (^{o}C)	510	Resistivity ρ (μΩ-cm)	130
Hardness Hv (kg/mm^2)	880		

3. Amorphous & Nanocrystalline Cores

3.1. Cores for Current Transformers in Power System

3.1.1. Brief introduction:

Current transformer of power system plays an important role in providing a current in its secondary winding proportional to the alternating current flowing in its primary. They are commonly used in metering and protective relaying in the power plants and substations where they facilitate the safe measurement of large currents, often in the presence of high voltages. The current transformer safely isolates measurement and control circuitry from the high voltages typically present on the circuit being measured.

Comparing with the traditional core material, such as silicon steel and permalloy, Iron based nanocrystalline alloy takes the advantage of high permeability and low cost, and is thus more competitive in the application of precise current transformer with 0.2, 0.2s, and 0.1 accuracy class, Bushing current transformer for Epoxy resin cast, Gas insulated or oil-immersed switchgears, LV, MV and HV switchgear, and other apparatus in electric power transmission and distribution system.

3.1.2. Characteristics

3.1.2.1 Comparison of different core materials

Property	**Nanocrystalline cores**	**Permalloy cores**	**Si-steel cores**
Saturation induction (T)	1.25	0.76	2.03
Initial permeability (at 0.8 mA/cm)	40,000 ~ 80,000	> 80,000	1,000
Maximum permeability	> 250,000	> 200,000	40,000
Density (g/cm^3)	7.2	8.85	7.65
Curie temperature (^{o}C)	570	400	740
Thickness (mm)	0.025 ~ 0.035	0.1	0.3
Stacking factor	≥ 0.75	0.9	0.95

3.1.2.2 Advantages of nanocrystalline alloy core

- High permeability—smaller error in the measurement of current
- High saturation Induction — smaller size and lighter weight when compared to Permalloy
- Excellent thermal stability—Can work at -55~130^{o}C for a long time
- Low cost—Ideal for replacing commercial permalloy cores

3.1.3. Specification： (Case material： stainless steel）

Part NO.	Core Dimensions (mm)			Case Dimensions (mm)		
	OD	ID	HT	OD	ID	HT
MSCT-01	55	37	20	60	32	25
MSCT-02	115	90	10	120	85	15
MSCT-03	260	200	35	265	195	41
MSCT-04	280	205	90	285	200	97
MSCT-05	350	250	30	355	245	35
MSCT-06	390	260	25	395	255	30

MSCT-07	450	360	20	455	355	25
MSCT-08	485	445	15	490	440	20
MSCT-09	540	435	40	546	429	46
MSCT-10	600	460	65	606	454	71
MSCT-11	875	720	20	883	712	27
MSCT-12	1050	800	30	1058	792	37

Note: Cores of other specifications are available upon request.

3.2 Cores for High Power Transformers

3.2.1. Brief Introduction

High Power Transformer Cores have high permeability, high saturation induction, low loss, and good temperature stability; widely used for the main transformer cores of uni-polar, push-pull or bi-polar type high frequency and high power inverter power supply and switched mode power supply.

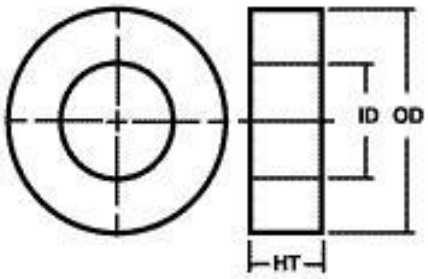
3.2.2. Applications:

Inverter welding machines
X-ray and laser source power supplies
UPS and high frequency heating systems
Charging power supply
Electrolytic and plating power supply
Frequency conversion power supply

3.2.3. Characteristics:

High saturate induction—minimizing the volume of transformers
High permeability and low coercivity—increasing efficiency and reducing the exciting power of transformers
Low core loss—minimizing the temperature rise of transformers
Excellent stability—serving from -55^{o}C to 130^{o}C for a long time

3.2.4. Specifications:



Part No.	Core dimension (mm)			Case dimension (mm)			Effective cross section (cm^2)	Mean magnetic path (cm)	Weight (g)	Power (KW)	Suitable inverter current
	OD	ID	HT	OD	ID	HT					
MSPCT-01	50	32	20	54	28	24	1.35	12.87	125		
MSPCT-02	64	40	20	68	36	24	1.68	16.3	200	0.2-0.5	
MSPCT-03	70	40	20	74	38	24	2.16	17.3	270	0.5-1	
MSPCT-04	80	50	20	84	46	24	2.1	20.4	300	2-4	
MSPCT-05	80	50	25	85	44	30	2.63	20.4	390	4-5	120A 160A
MSPCT-06	100	50	25	105	45	30	4.4	23.6	742		
MSPCT-07	100	60	20	105	55	25	2.8	25.1	510	4-5	160A 200A

MSPCT-08	105	60	30	110	56	35	5.06	25.9	950	8-10	
MSPCT-09	120	60	30	125	56	35	6.3	28.3	1280	8-15	315A
MSPCT-10	120	70	20	125	66	25	3.5	29.8	750	5-6	
MSPCT-11	120	70	25	125	66	30	4.38	29.8	940	6-7	200A 250A
MSPCT-12	120	70	30	125	66	35	5.25	29.8	1130	6-10	315A 400A
MSPCT-13	130	80	40	136	76	45	7	33	1660	15-20	400A 500A
MSPCT-14	130	80	50	136	76	55	8.75	33	2080	23-25	500A 630A
MSPCT-15	130	90	50	136	85	56	7	34.5	1740	15-20	630A

Core with other specifications are available upon request.

3.2.5. Comparison: nanocrystalline cores *vs.* ferrite cores

Parameters	**Nanocrystalline cores**	**Ferrite cores**
Saturate induction (T)	1.25	0.5
Residual induction (T) (20 kHz)	< 0.20	0.20
Core loss (20 kHz/0.2T) (W/Kg)	< 3.4	7.5
Core loss (20 kHz/0.5T) (W/Kg)	<3 0	--
Core loss (50 kHz/0.3T) (W/Kg)	<4 0	--
Permeability (20 kHz) (Gs/Oe)	> 20,000	2,000
Coercivity (A/m)	< 1.60	6
Saturate magnetostriction (10^{-6})	< 2	4
Resistivity (μΩ.cm)	80	106
Curie temperature (^{o}C)	570	< 200
Stacking factor	> 0.70	--

3.3. Cores for Leakage Circuit Breakers

Application:
Toroidal cores of nanocrystalline alloys used for leakage circuit breakers

Characteristics：
High permeability, low coercive force, low core loss
Sensitive to micro leakage circuit, excellent endurance against strong current impulse
Advanced technology for the protection of core surface
Excellent temperature stability-- working well from -25^{o}C to 100^{o}C

Specifications：

Part No.	Dimensions (mm）		
	OD	ID	HT
MSLCB-01	20	12	10
MSLCB-02	19	14	10
MSLCB-03	25	15	15
MSLCB-04	26	20	10
MSLCB-05	30	20	10
MSLCB-06	30	20	15
MSLCB-07	33	23	25
MSLCB-08	50	40	10
MSLCB-09	60	50	10

Cores with other dimensions are available upon request.

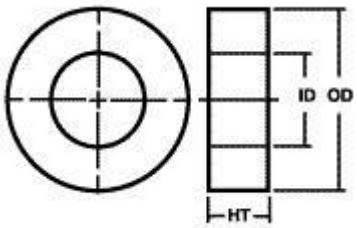
3.4. Cores for Transformers in Medium Frequency Power Supply

Characteristics:
High magnetic permeability, high saturation induction, low loss and good temperature stability; widely used for the main transformer cores at 400 Hz ~ 15 kHz.

Properties:

Saturation induction B_S (T)	1.56	Remanence B_r (T)	≥ 1.2 T
Curie Temperature T_C (^oC)	410	Coercivity H_C (A/m)	< 4
Crystallization Temperature T_X (^oC)	550	Core loss (400 Hz, 1.0T) (W/kg)	< 15
Saturation magnetostriction (10^{-6})	27	Core loss (400 Hz, 0.5T) (W/kg)	< 1.5
Maximum permeability (10^3)	> 200	Variation in core loss (-50~130^oC)	< 15%

Specifications:



Part No.	Core dimensions (mm)			Weight	A_{Fe}	Power (400 Hz)
	OD	ID	HT	kg	cm^2	kW
MSFH-01	360	200	50	≥18	28.8	25
MSFH-02	360	200	80	≥30	46	40
MSFH-03	360	200	100	≥36	57.6	50

Cores with other specifications are available upon request.

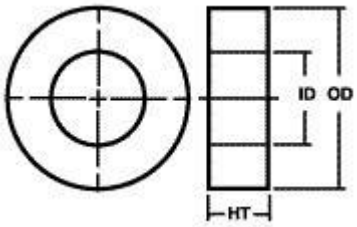
3.5. Cores for Switched Mode Power Supply

Characteristics:
A toroidal core of nanocrystalline alloy applied in switched mode power supply has the advantages of high permeability and low loss, and is thus an ideal material for the main transformer of uni-polar, push-pull or bi-polar type of high frequency switched mode power supply, magnetic amplifier, choke cores, energy storage inductor, filter inductor, resonant inductor, common mode inductor and sharp peak choke.

Properties:

Ribbon	Bs(T)	Transverse field annealed		No field annealed		Long
		Br/Bs	P (w/kg)	Br/Bs	P (w/kg)	Br/B
Nanocry.	1.25	<0.2	P0.3/100K <200	0.6	P0.3/100K <300	>0.8

Specifications:



Part No.	Core dimensions (mm)			Case dimensions (mm)			A_{Fe} (cm^2)	l_{Fe} (cm)
	OD	ID	HT	OD	ID	HT		
MSSP-01	9	6	4	10.1	4.9	6.6	0.039	2.40
MSSP-02	9.8	6.5	4.5	11.5	4.6	6.5		
MSSP-03	12	8.5	5	12.6	6.8	7.1	0.065	3.22

MSSP-04	19	11	5	19	9	9	0.13	4.70
MSSP-05	20	12	5	21	10	9	0.14	5.03
MSSP-06	22.	14	5	23	11	7.1	0.13	5.70
MSSP-07	26	16	5	30.6	14.2	9.9	0.163	6.60
MSSP-08	12	9	10	17	7	13	0.105	3.30
MSSP-09	19	14	10	23	12	13	0.175	5.18
MSSP-10	20	12	5	24.8	10.4	8.6	0.14	5.3
MSSP-11	20	12	8	24.8	10.4	11.6	0.20	5.03
MSSP-12	20	12	10	24.8	10.4	13.5	0.26	5.03

Note: Cores with other specifications are available upon request.

3.6. Magnetic Beads

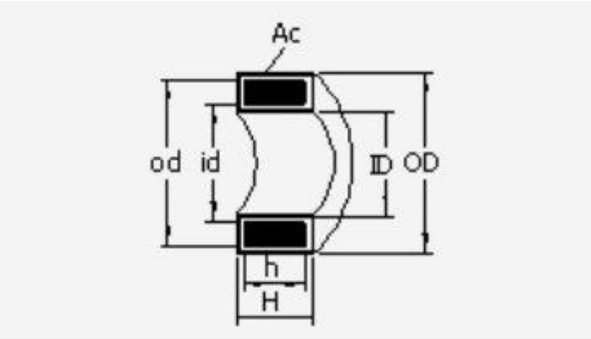
Characteristics:

High permeability, low loss, strong anti-electromagnetic interference capability, excellent frequency characteristics , and high thermal stability.

Applications:

Part No.	Material	Applications
MSMNB-01	Fe-based Nanocrystalline	Magnetic amplifier High frequency transformer Common mode inductor
MSMNB-02	Co-based Amorphous	Energy storage inductors Filter inductor, ISDN
MSMNB-03	Fe-based Amorphous	PFC, Pulse transformer AC/DC current transformer

Specifications:



Core Dimension OD × ID × H (mm)	Case Dimension OD × ID × H (mm)	Mean Path Length L_m (mm)	Cross Section A_C (mm^2)	Inductance at 10KHz A_L (μH)
3 × 2 × 2	3.5 × 1.8 × 2.5	0.8	7.85	4.5
3 × 2 × 3	4.2 × 1.5 × 3.5	1.20	7.85	5.0
3 × 2 × 4.5	3.5 × 1.5 × 5	1.80	7.85	8.0

3 × 2 × 6	3.5 × 1.5 × 6.5	2.40	7.85	10.0
4 × 2 × 2	4.5 × 1.5 × 2.5	1.60	9.42	5.0
4 × 2 × 3	4.5 × 1.5 × 3.5	2.40	9.42	8.0
4 × 2 × 4.5	4.5 × 1.5 × 5	3.60	9.42	12.0
4 × 2.3 × 4.5	4.5 × 1.8 × 5	3.06	9.89	10.0
4 × 2 × 8	4.5 × 1.5 × 8.5	6.40	9.42	25.0
6 × 3 × 3	6.5 × 2.6 × 3.5	3.60	14.13	12.0

3.7. Nanocrystalline C-Cores

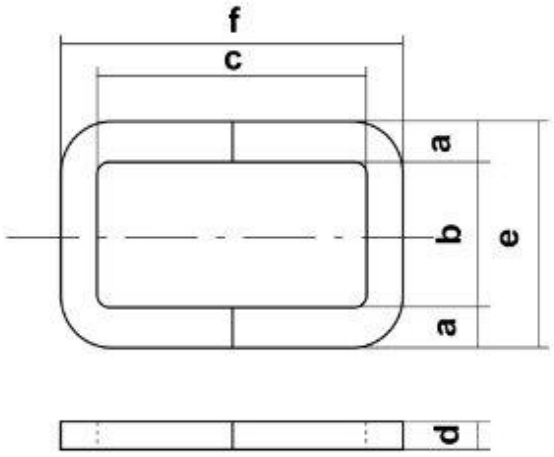
Applications：

Main transformers in high-frequency power supplies ; Inductors.

Characteristics:

Low loss at high frequency; small component size; variable inductance; easy to wind coils

Specifications:



Part No.	a	b	c	d	e	f	Le*	Ae**	M	Vol	Wa	WaAe
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(cm)	(cm^2)	(g)	(cm^3)	(cm^2)	(cm^4)
MSNC-01	10±0.5	11	33	20+0.5	31+1	53+2	13.1	1.59	150	20.9	3.6	5.8
MSNC-02	11±0.8	13	40	20+0.5	35+1	62+2	15.4	1.81	200	27.9	5.2	9.4
MSNC-03	11±0.8	13	50	30+0.5	35+1	72+2	17.5	2.71	340	47.4	6.5	17.6
MSNC-04	13±0.8	15	56	30+0.5	41+1	82+2	20	3.2	460	64.1	8.4	26.9
MSNC-05	10±0.8	30	30	10+0.5	50+1	50+2	16	0.8	96	24	9	7.2

*Le: average length of the magnetic path

**Ae: effective cross-sectional area

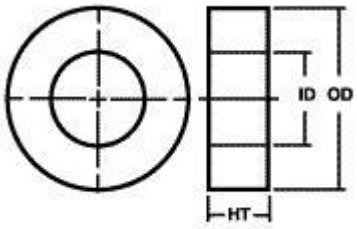
Cores of other specifications are available upon request.

3.8. Nanocrystalline Circular Cut Cores

Applications:
Open-type current transformers

Characteristics:
High permeability; low loss; high precision; small size; easy for measurements.

Specifications:



Part No.	Dimensions（mm）		
	ID	OD	HT
MSNCC-01	47	63	8
MSNCC-02	32	45	10
MSNCC-03	34	46	10
MSNCC-04	26	37	10
MSNCC-05	44	55	10
MSNCC-06	66	86	10
MSNCC-07	90	125	25
MSNCC-08	75	98	35
MSNCC-09	115	140	55

Note: Cores of other specifications are available upon request.

3.9. Nanocrystalline Common Mode Choke Cores

Applications:

Common mode chokes (CMC) are used to suppress EMI with a wide variety of applications in electronic equipment and electromagnetic interference (EMI) in electrical network.

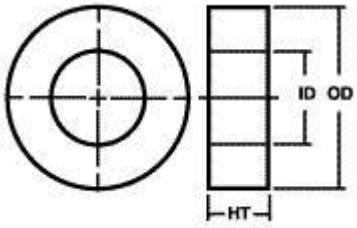
Characteristics:

High permeability, low loss, small size, strong anti-electromagnetic interference capability, excellent frequency characteristics, and high thermal stability.

Properties:

Saturation induction (Tesla)	1.25	Maximum permeability	> 600,000
Curie temperature (^{o}C)	> 570	Coercivity (A / m)	< 2
Crystallization temperature (^{o}C)	> 500	Iron loss (20kHz, 0.5T), w / kg	< 25
Saturation magnetostriction (ppm)	< 2	Iron Loss (100kHz, 0.2T), w / kg	< 70
Residual induction (Tesla)	0.5 ～0.8	Variation in Iron loss (-50 ~ 130^{o}C)	15%
Initial permeability	> 80,000	Working temperature range	－50 ～130^{o}C

Specifications:



Part NO.	Core dimensions OD*ID*HT (mm)	Case dimensions OD*ID*HT (mm)	Effective cross section A_{Fe}(mm^2)	Mean path length l_{Fe} (mm)	AL at 10 kHz (μH)
MSCM-01	21*15*8	24*12.3*11.5	18.7	56.5	20
MSCM-02	25*20*10	27.3*17.5*12.3	19.5	70.6	27
MSCM-03	26*16*10	28.5*14.8*13.2	32.6	66.6	25
MSCM-04	30*20*10	33*17.5*13.5	39	78.5	48
MSCM-05	32*20*10	35*17*13.5	46.8	81.6	56
MSCM-06	40*25*10	44*22*15	58.5	102	20
MSCM-07	40*25*15	44*22*18	85.5	102	80

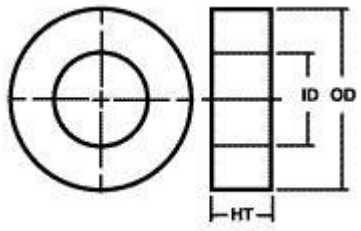
Note: Cores of other specifications can be provided upon request.

3.10. PFC Choke Cores

Applications:
PFC chokes for DC air conditioner, UPS, SMPS, plasma television, and inverter circuit.

Characteristics:
High saturation induction—Reducing the volume of inductor
High permeability and low coercivity—Increasing efficiency
Low core loss—Reducing the temperature rise in inductor
Air gap—for outstanding anti-bias field ability
Excellent thermal stability—Operating at 130°C for a long time

Specifications:



Part No.	Core dimensions （mm）			Case dimensions (mm)			Mean magnetic path	Net area	Weight of core
	OD	ID	HT	OD	ID	HT	l_{Fe} (mm)	A_{Fe} (mm^2)	(g)
MSPFC-01	40	25	15	45	20	20	102.1	90.0	66
MSPFC-02	50	32	15	55	27	20	128.8	108.0	100
MSPFC-03	60	35	25	65	30	30	149.2	250.0	270
MSPFC-04	64	40	20	69	35	25	163.3	192.0	220
MSPFC-05	70	40	25	75	35	30	172.7	300.0	370
MSPFC-06	26	16	10	30.6	14	13.6	65.9	40.0	19.12
MSPFC-07	30	20	10	38.7	18	13.6	78.5	40.0	22.77
MSPFC-08	30	20	15	36.7	18	18.6	78.5	60.0	34.15

Cores with other specifications are available upon request.

3.11. Precision Current Transformer Cores

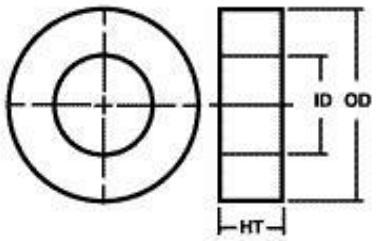
Applications:
Electronic Watt hour meter, precise power meter, current overload protection in engine control, current control in automation industry.

Characteristics:
High permeability--for low phase and amplitude error
Very high saturation induction--for higher measurement current range
Low core loss
Good temperature stability

Properties:

Material	Nanocrystalline	Amorphous
Saturation Induction B_S (T)	1.25	1.56
Permeability	70,000～100,000	1,300～2,000
Coercive Force H_C (A/m)	0.8	4.0
Curie Temperature (^oC)	560	410
Mass Density d (g/cm^3)	7.2	7.2

Specifications:



Part No.	Dimension (mm)			Performance		
	OD	ID	HT	N 1 : N 2	I in (mA) 50Hz	Vo (mV) min
MSSCT-01	18	13	5	1:1	2.73	0.006
MSSCT-02	19	14	6.5	1:1	50	2.00
MSSCT-03	19	14	8	1:1	50	2.00
MSSCT-04	21	13	10	1:1	6.14	0.15

MSSCT-05	21	14	20	1:1	50	9.00
MSSCT-06	21	16	4.5	1:1	10	0.02
MSSCT-07	21	16	10	1:1	10	0.25
MSSCT-08	23	16	10	1:1	6.9	0.15
MSSCT-09	25	19	4.5	1:1	10	0.02
MSSCT-10	26	18	10	1:1	10	0.25
MSSCT-11	28	18	15	1:1	4.07	0.12

3.12. Rectangular Cut Cores

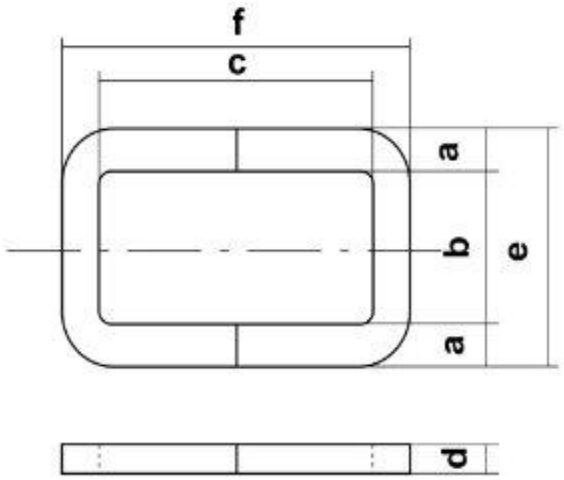
Applications:
Output filter or inductor cores in high-frequency/large-power supplies and solar inverters.

Characteristics:
High saturation induction--Reducing core volume
Rectangular shape--Easy to wind coils
With air gap--Excellent anti-bias current ability
Low core loss--Low temperature rise
Good thermal stability--Can work between -55 and 130^{o}C

Physical & Magnetic Properties:

Saturation Induction B_S	1.56 T	Hardness H_V	960 kg/mm^2
Curie Temperature T_C	410 ^{o}C	Density d	7.18 g/cm^3
Crystallization Temperature T_X	550 ^{o}C	Resistivity r	130 μΩ.cm
Saturation Magnetostriction l_S	27×10^{-6}		

Specifications:***



Part No	a	b	c	d	e	f	Le*	Ae**	Mass	Vol	Wa	WaAe
	(mm)	(mm)	(mm)	(mm)	(mm)	(mm)	(cm)	(cm2)	(g)	(cm3)	(cm2)	(cm4)
MSCC-6.3	10±0.5	11	33	20+0.5	31+1	53+2	13.1	1.59	150	20.9	3.6	5.8
MSCC-8	11±0.8	13	30	20+0.5	35+1	52+2	13.2	1.79	170	23.7	3.9	7
MSCC-10	11±0.8	13	40	20+0.5	35+1	62+2	15.4	1.81	200	27.9	5.2	9.4
MSCC-16A	11±0.8	13	40	25+0.5	35+1	62+2	15.1	2.31	250	34.8	5.2	12
MSCC-16B	11±0.8	13	50	25+0.5	35+1	72+2	16.9	2.31	280	38	6.5	15
MSCC-20	11±0.8	13	50	30+0.5	35+1	72+2	17.5	2.71	340	47.4	6.5	17.6
MSCC-25	13±0.8	15	56	25+0.5	41+1	82+2	19.6	2.7	380	52.9	8.4	22.7
MSCC-32	13±0.8	15	56	30+0.5	41+1	82+2	20	3.2	460	64.1	8.4	26.9
MSCC-40	13±0.8	15	56	35+0.5	41+1	82+2	19.9	3.71	530	73.8	8.4	31.2
MSCC-50	16±1	20	70	25+0.5	52+1	102+3	24.9	3.3	590	82.2	14	46.2
MSCC-63	16±1	20	70	30+0.5	52+1	102+3	25.3	3.91	710	98.9	14	54.7
MSCC-80	16±1	20	70	40+1	52+1	102+3	25.4	5.21	950	132	14	72.9
MSCC-100	16±1	20	70	45+1	52+1	102+3	25	5.91	1060	148	14	82.7
MSCC-125	19±1	25	83	35+1	63+1	121+3	30.2	5.4	1170	163	20.8	112
MSCC-160	19±1	25	83	40+1	63+1	121+3	28.5	6.5	1330	185	20.8	135
MSCC-200	19±1	25	83	50+1	63+1	121+3	29.8	7.81	1670	233	20.8	162
MSCC-250	19±1	25	90	60+1	63+1	128+3	31.4	9.31	2100	292	22.5	210
MSCC-320	22±1	35	85	50+1	79+1	129+4	32.5	9.3	2170	302	29.8	277
MSCC-400	22±1	35	85	65+1	79+1	129+4	33.6	11.7	2820	393	29.8	348
MSCC-500	25±1	40	85	55+1	90+1	135+4	35.6	11.3	2900	404	34	386
MSCC-630	25±1	40	85	70+1	90+1	135+4	35.6	14.4	3670	511	34	488
MSCC-800A	25±1	40	85	85±1.5	90+1	135+4	35.6	17.4	4450	620	34	592
MSCC-800B	30±1	40	95	85±1.5	100+1	155+4	39.3	21	5930	826	38	799
MSCC-1000	33±1	40	105	85±1.5	106+1	171+5	42.7	23	7060	983	42	967

*Le: average length of the magnetic path
**Ae: effective cross-sectional area
*** Cores of other specifications can be provided upon request

4. Amorphous and Nanocrystalline Magnetic Bars

Applications:

NMR magnetic circuits

Characteristics:

High saturation induction, high permeability, low loss;

Operation between -55 and 130^{o}C for a long time.

Specifications:

Amorphous Bars		Nanocrystalline Bars	
Part No.	Dimension （mm）	Part No.	Dimension （mm）
MSAB-01	10×10×200	MSNB-01	10×10×200
MSAB-02	15×15×200	MSNB-02	15×15×200
MSAB-03	20×20×250	MSNB-03	20×20×250
MSAB-04	10×10×180	MSNB-04	10×10×180
MSAB-05	15×15×180	MSNB-05	15×15×180
MSAB-06	20×25×100	MSNB-06	20×25×100

Note: Bars with other dimensions are available upon request.

5. Amorphous & Nanocrystalline Powders

Amorphous Fe-Si-B powder, 100 mesh	Nanocrystalline Fe-Cu-Nb-Si-B powder, 100 mesh
Amorphous Fe-Si-B powder, 200 mesh	Nanocrystalline Fe-Cu-Nb-Si-B powder, 200 mesh
Amorphous Fe-Si-B powder, 300 mesh	Nanocrystalline Fe-Cu-Nb-Si-B powder, 300 mesh
Amorphous Fe-Si-B powder, 400 mesh	Nanocrystalline Fe-Cu-Nb-Si-B powder, 400 mesh

6. Amorphous Brazing Foils

Norminal Compositions (wt.%)	Solidus Temp. (^oC)	Liquidus Temp. (^oC)	Brazing Temp. (^oC)	Density (g/cm^3)
$Cu_{80}Sn_{20}$	770	925	--	--
$Cu_{78.3}Ni_{9.9}Sn_{4.0}P_{7.8}$	610	645	--	--
$Cu_{77.6}Ni_{5.7}Sn_{9.7}P_{7.0}$	591	643	--	--
$Cu_{73.6}Ni_{9.6}Sn_{9.7}P_{7.0}$	595	635	--	--
$Cu_{68.7}Ni_{14.4}Sn_{9.7}P_{7.1}$	590	730	--	--
$Ni\text{-}Cr_{14.0}Fe_{4.5}Si_{4.5}B_{3.2}$	960	1095	1120	7.44
$Ni\text{-}Cr_{13.0}Fe_{4.2}Si_{4.5}B_{2.8}$	965	1100	1130	7.51
$Ni\text{-}Cr_{11.3}Fe_{4.0}Si_{1.5}B_{2.2}W_{8.0}$	1120	1175	1205	8.11
$Ni\text{-}Cr_{7.0}Fe_{3.0}Si_{4.5}B_{3.2}$	970	1025	1050	7.46
$Ni\text{-}Si_{4.5}B_{3.2}$	985	1055	1080	7.94
$Ni\text{-}Si_{7.3}B_{2.1}$	990	1035	1060	7.70
$Ni\text{-}C\ r_{19.0}Si_{7.3}B_{1.25}$	1050	1145	1170	7.49
$Ni\text{-}Cr_{10.0}Fe_{5.5}B_{3.5}Co_{23.0}Mo_{7.0}$	1055	1110	1140	7.98
$Ni\text{-}Cr_{15.2}B_{4.0}$	1045	1090	1120	7.80
$Ni_{89}P_{11}$	880	920	950	7.91
$Ni_{75.9}Cr_{14.0}P_{10.1}$	880	925	950	7.51
$Ni\text{-}Fe_{4.6}Cr_{8.6}Pd_{35.3}B_{2.7}$	945	995	1025	8.80
$Ni\text{-}Fe_{9.0}Cr_{8.6}Pd_{32.4}B_{2.7}$	925	990	1020	8.85
$Ni\text{-}Fe_{0.95}Cr_{8.8}Pd_{27.1}Si_{2.3}B_{1.4}$	825	986	1015	--
$Ni\text{-}Pd_{47.7}Si_{8.4}$	732	906	935	--
$Ni\text{-}Pd_{46.7}Si_{6.1}$	810	850	880	9.93
$Ni\text{-}Pd_{41.2}Si_{8.8}$	713	938	960	--
$Pd\text{-}Ni_{38.1}Si_{8.1}$	850	895	925	9.09
$Pd\text{-}Ni_{6.6}Si_{5.1}$	770	820	850	11.44
$Pd\text{-}Ni_{15.0}Fe_{21.2}Si_{6.2}$	960	1020	1055	10.13
$Pd\text{-}Ni_{40.0}Si_{5.0}Co_{5.0}Mo_{4.5}$	820	870	900	9.11
$Pd\text{-}Ni_{35.2}Si_{3.8}B_{0.7}Co_{10.0}Mo_{4.5}$	840	875	900	8.88
$Ti_{37.5}Zr_{37.5}Cu_{15}Ni_{10}$	805	815	840	6.31
$Ti_{70}Cu_{15}Ni_{15}$	910	960	990	5.80
$Zr_{83.1}Ni_{16.9}$	960	960	990	6.83

7. Amorphous Materials for Research

Bulk Metallic Glasses	Amorphous Ribbons	Amorphous Powders
Palladium-based disks Palladium-based rods (dia 3-50 mm, length 10-50 mm) $Zr_{41.2}Ti_{13.8}Cu_{12.5}Ni_{10}Be_{22.5}$ rod (dia 6 mm, length 6.0-6.5 mm) Titanium-based	Iron-based Cobalt-based Nickel-based Copper-based Iron-Nickel-based Titanium-based Zirconium-based: $Zr_{50}Cu_{46}Al_4$ $Zr_{55}Cu_{37}Al_8$ $Zr_{60}Cu_{30}Al_{10}$ $Zr_{65}Cu_{23}Al_{12}$ $Zr_{50}Ni_{46}Al_4$ $Zr_{65}Ni_{23}Al_{12}$ $Zr_{70}Ni_{16}Al_{14}$ $Zr_{50}Pd_{46}Al_4$ $Zr_{70}Pd_{16}Al_{14}$ $Ti_{37.5}Zr_{37.5}Cu_{15}Ni_{10}$ $Zr_{41.2}Ti_{13.8}Cu_{12.5}Ni_{10}Be_{22.5}$	Iron-based Cobalt-based $Co_{85}Si_{10}Fe_5$ (wt%), R-P $Co_{85}Si_{10}Fe_5$ (wt%), P-P Nickel-based Copper-based Titanium-based Zirconium-based Hafnium-based Niobium-based