ARNOLD®
MAGNETIC TECHNOLOGIES

Arnold Technical Bulletin

SMSS POWDER E-CORE and BLOCK CORE

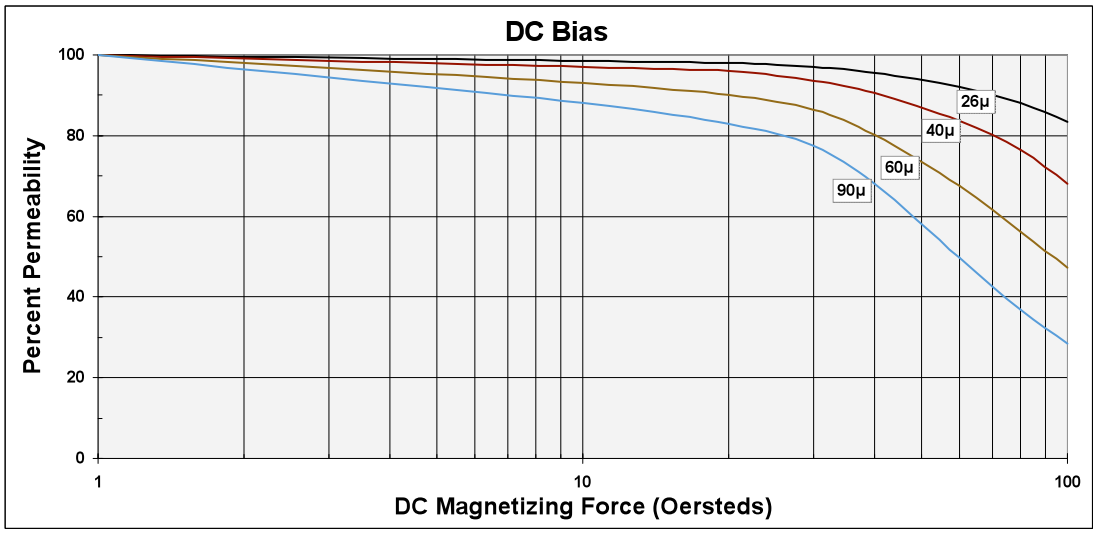
INTRODUCTION

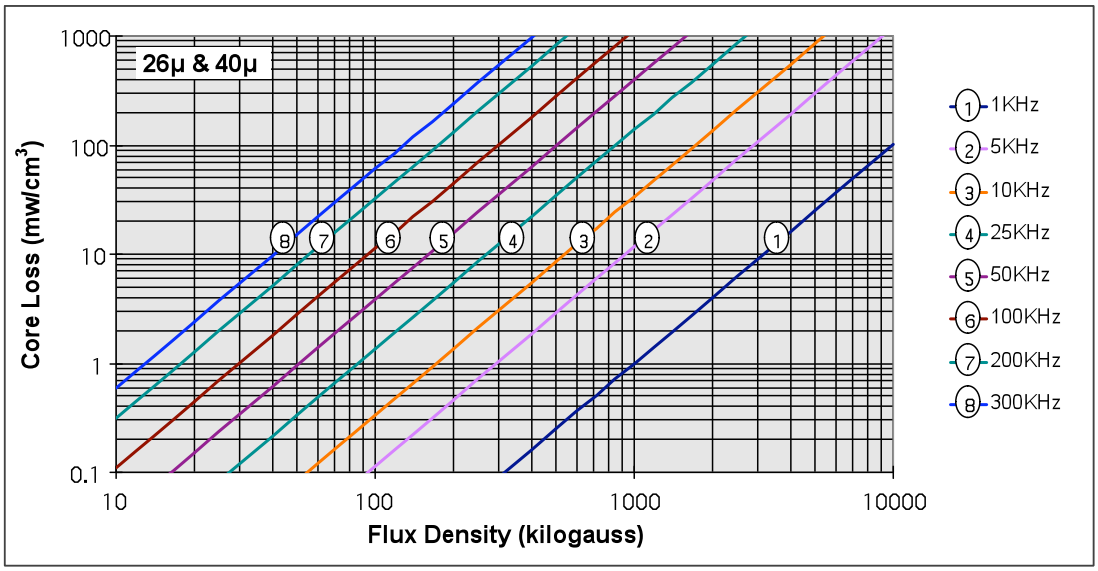
Arnold's SMSS powder E-cores and Block cores are made of an alloy powder which has low losses at elevated temperature and has relatively stable inductance over temperature. Arnold cores feature a distributed air gap which minimizes fringing flux and makes them highly suited for applications such as switching regulator inductors, flyback transformers, and power factor correction (PFC) inductors.

The 10,000 gauss saturation level provides a higher energy storage capability than can be obtained with gapped ferrite E-cores and Block cores, thus resulting in a smaller core size. SMSS E-cores and Block cores do not have a significant decrease in saturation flux density at high temperature – a characteristic that lowers ferrite's DC bias handling ability. The flux capacity difference is even more dramatic at high temperatures, since the flux capacity of ferrites decrease with temperature while SMSS E-cores and Block cores stay relatively constant. SMSS E-cores and Block cores have significantly lower losses and substantially better thermal properties when compared to powdered iron E-cores and Block cores.

Arnold SMSS E-cores and Block cores are competitively priced against gapped ferrite E-cores and Block cores and their distributed air gap eliminates EMI loss problems associated with ferrites. A selection of standard size E cores and Block cores is available along with the ability to produce custom dimensions and other geometries. Arnold offers a range of permeabilities (14μ ~ 125μ) as well as with a variety of other soft magnetic materials such as MPP (Molypermalloy), HF (High Flux) and FeSi (Iron Silicon).

Typical Incremental Permeability vs. D.C. Bias and Core Loss Curves



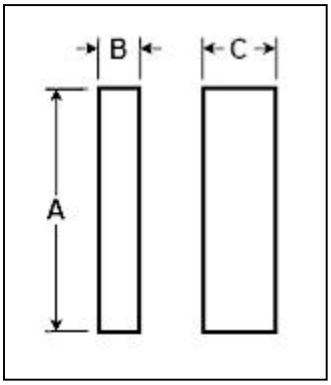


FEATURES:

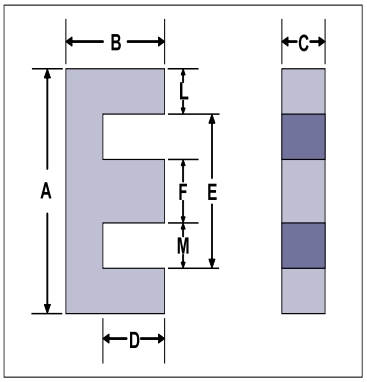
- Large energy storage capacity and flexible solution for large current application.
- Low magnetic flux leakage.
- Excellent temperature and frequency stability.
- Low core loss at high frequencies.
- Excellent DC-Biased inductance features.

APPLICATIONS:

- High inductance choke coils.
- Flyback transformers.
- Multiple circuit choke coils.
- Large current choke coils.
- Output chokes for SMPS.
- PFC reactors.
- Power inductor for high current
- AC reactor for inventer
- Buck/Boost Inductor for HEV



Block core



E core

E CORE DATA

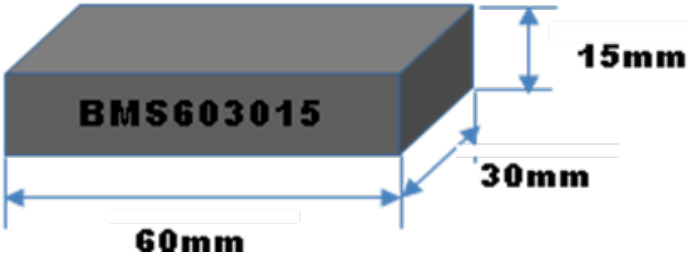
PART NO.	UNIT	A	B	C	D(min)	E(min)	F	L(nom)	M(min)
EMS-1306	in	0.500±.010	0.252±.004	0.140±.006	0.178	0.35	0.140±.005	0.07	0.104
	(mm)	(12.70)	(6.40)	(3.56)	(4.42)	(8.89)	(3.56)	(1.78)	(2.64)
EMS-1908	in	0.760±.012	0.319±.007	0.188±.006	0.218	0.548	0.188±.005	0.094	0.183
	(mm)	(19.30)	(8.10)	(4.78)	(5.54)	(13.90)	(4.78)	(2.39)	(4.65)
EMS-2510	in	1.000±.015	0.375±.007	0.250±.004	0.245	0.740	0.250±.005	0.125	0.246
	(mm)	(25.40)	(9.50)	(6.50)	(6.20)	(18.80)	(6.20)	(3.20)	(6.30)
EMS-3015	in	1.185±.018	0.591±.009	0.278±.006	0.376	0.768	0.274±.008	0.201	0.254
	(mm)	(30.10)	(15.01)	(7.06)	(9.70)	(19.50)	(6.96)	(5.11)	(6.46)
EMS-3514	in	1.360±.020	0.557±.009	0.368±.007	0.378	0.995	0.367±.008	0.175	0.310
	(mm)	(34.50)	(14.10)	(9.40)	(9.60)	(25.30)	(9.30)	(4.40)	(7.90)
EMS-4117	in	1.609±.024	0.650±.011	0.493±.007	0.409	1.115	0.493±.008	0.238	0.310
	(mm)	(40.90)	(16.50)	(12.50)	(10.40)	(28.30)	(12.50)	(6.00)	(7.90)
EMS-4321	in	1.687±.025	0.830±.013	0.424±.010	0.587	1.195	0.468±.010	0.234	0.365
	(mm)	(42.80)	(21.10)	(10.80)	(15.00)	(30.40)	(11.90)	(5.95)	(9.27)
EMS-4322	in	1.687±.025	0.830±.013	0.608±.010	0.587	1.195	0.468±.010	0.234	0.365
	(mm)	(42.80)	(21.10)	(15.40)	(15.00)	(30.40)	(11.90)	(5.95)	(9.27)
EMS-4323	in	1.687±.025	0.830±.013	0.788±.010	0.587	1.195	0.468±.010	0.234	0.365
	(mm)	(42.80)	(21.10)	(20.00)	(15.00)	(30.40)	(11.90)	(5.95)	(9.27)

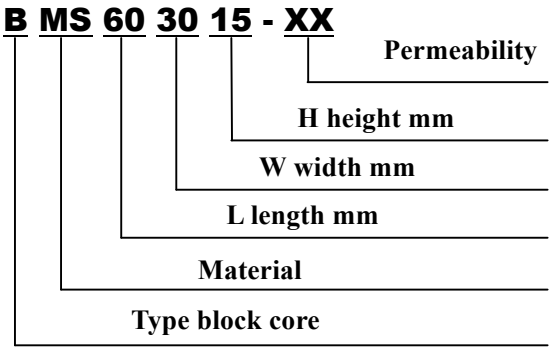
PART NO.	A_L mH/1000TURNS±8%				Path Length	Cross Section	Volume
	26µ	40µ	60µ	90µ	le (cm)	Ae (cm^2)	Ve (cm^3)
EMS-1306-xxx	-	-	-	-	2.96	0.13	0.385
EMS-1908-xxx	26	35	48	69	4.01	0.228	0.914
EMS-2510-xxx	39	52	70	100	4.85	0.385	1.87
EXM-3015-xxx	33	46	71	92	6.56	0.601	3.94
EMS-3514-xxx	56	75	102	146	6.94	0.840	5.83
EMS-4117-xxx	88	119	163	234	7.75	1.520	11.8
EXM-4321-xxx	56	76	105	217	9.84	1.280	12.6
EXM-4322-xxx	80	108	150	217	9.84	1.830	18.0
EMS-4323-xxx	104	140	194	281	9.84	2.370	23.3

xxx: Add material code to part number, e.g., for 60µ the complete part number is EMS-2510-060.

PART NO.	Volume cm^3	Weight grams	Weight lbs
EMS-1306	0.2207	1.54	0.0034
EMS-1908	0.5032	3.45	0.0076
EMS-2510	1.0526	6.90	0.0152
EMS-3015	2.3055	14.5	0.0319
EMS-3514	3.0927	18.5	0.0408
EMS-4117	6.3085	36.6	0.0805
EMS-4321	6.6590	36.1	0.0796
EMS-4322	9.4953	51.5	0.1135
EMS-4323	12.3316	66.9	0.1474

BLOCK CORE DATA





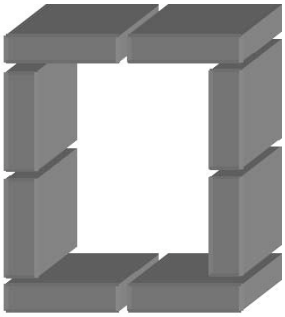
XX: At the end of the part number – please add material code to part number, e.g., for 60μ the complete part number is BMS603015-60.

Example of a 4 piece assembly

Unit part No.	Unit Dimension (mm)			Assembled 4pcs			AL (nH/N^2)			Le (cm)	Ae (cm^2)	Volume (cm^3)	Window Area (cm^2)
	L	W	H	L_4	W_4	H_4	26u	40u	60u				
BMS503010-XX	50	30	10	70	50	30	51	79	118	19.13	3	15	15
BMS503015-XX	50	30	15	80	50	30	79	121	182	18.69	4.5	22.5	10
BMS552815-XX	55	28	15	85	55	28	66	102	153	20.69	4.2	23.1	13.75
BMS552820-XX	55	28	20	95	55	28	90	139	208	20.26	5.6	30.8	8.25
BMS603015-XX	60	30	15	90	60	30	65	100	150	22.69	4.5	27	18
BMS603020-XX	60	30	20	100	60	30	88	136	203	22.26	6	36	12
BMS703015-XX	70	30	15	100	70	30	55	85	127	26.69	4.5	31.5	28

Example of a 6 piece assembly

Unit part No.	Unit Dimension (mm)			Assembled 6pcs			AL (nH/N^2)			Le (cm)	Ae (cm^2)	Volume (cm^3)	Window Area (cm^2)
	L	W	H	L_6	W_6	H_6	26u	40u	60u				
BMS503010-XX	50	30	10	70	100	30	34	52	78	29.13	3	15	40
BMS503015-XX	50	30	15	80	100	30	51	79	118	28.69	4.5	22.5	35
BMS552815-XX	55	28	15	85	110	28	43	67	100	31.69	4.2	23.1	44
BMS552820-XX	55	28	20	95	110	28	59	90	135	31.26	5.6	30.8	38.5
BMS603015-XX	60	30	15	90	120	30	42	65	98	34.69	4.5	27	54
BMS603020-XX	60	30	20	100	120	30	57	88	132	34.26	6	36	48
BMS703015-XX	70	30	15	100	140	30	36	56	83	40.69	4.5	31.5	77



Example of an 8 piece assembly

Unit part No.	Unit Dimension (mm)			Assembled 8pcs			AL (nH/N^2)			Le (cm)	Ae (cm^2)	Volume (cm^3)	Window Area (cm^2)
	L	W	H	L_8	W_8	H_8	26u	40u	60u				
BMS503010-XX	50	30	10	120	100	30	25	39	58	39.13	3	15	80
BMS503015-XX	50	30	15	130	100	30	38	58	88	38.69	4.5	22.5	70
BMS552815-XX	55	28	15	140	110	28	32	49	74	42.69	4.2	23.1	88
BMS552820-XX	55	28	20	150	110	28	43	67	100	42.26	5.6	30.8	77
BMS603015-XX	60	30	15	150	120	30	31	48	73	46.69	4.5	27	108
BMS603020-XX	60	30	20	160	120	30	42	65	98	46.26	6	36	96
BMS703015-XX	70	30	15	170	140	30	27	41	62	54.69	4.5	31.5	154

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CERTIFICATE OF APPROVAL

This is to certify that the Quality Management System of:

Arnold Magnetics (Shenzhen) Limited
Fuyong Town, Baoan, Shenzhen,
People's Republic of China

has been approved by Lloyd's Register Quality Assurance to the following Quality Management System Standards:

ISO 9001:2000
GB/T 19001-2000

The Quality Management System is applicable to:

Manufacture of soft magnetic powder cores, bonded magnets, precision mechanical and electrical assemblies for the reprographics industry. Dimensional inspection and packaging of samarium cobalt permanent magnets. Procurement and assembly of magnetic materials.

This certificate is valid only in association with the certificate schedule bearing the same number on which the locations applicable to this approval are listed.

Approval Certificate No: HKG0031001

Original Approval: 21st March 2003
Current Certificate: 12th December 2007
Certificate Expiry: 29th November 2008

Issued by: Lloyd's Register Quality Assurance Limited

CERTIFICATE OF APPROVAL

This is to certify that the Environmental Management System of:

Arnold Magnetics (Shenzhen) Ltd.
Fuyong Town, Baoan, Shenzhen,
People's Republic of China

has been approved by Lloyd's Register Quality Assurance to the following Environmental Management System Standard:

ISO 14001:2004
GB/T 24001-2004

The Environmental Management System is applicable to:

Manufacture of soft magnetic powder cores.

Approval Certificate No: HKG6002686

Original Approval: 4th January 2008
Current Certificate: 4th January 2008
Certificate Expiry: 3rd January 2011

Issued by: Lloyd's Register Quality Assurance Limited