

# High Efficiency Magnetic Components

**AMOGREENTECH** produces advanced material - based components



- High Efficiency Solution for Reactor
- High Efficiency Solution for Micro Inverter
- Common Mode Noise Solution for EMI
- Current Measurement Solution
- Noise Suppression Solution

**AMO**  
AMOGREENTECH

# General Introduction

## General Introduction

Since 1994, AMOGREENTECH has manufactured Amorphous and Nanocrystalline strip and magnetic inductive parts such as Mag-Amp Core, Cut Core, Noise Protection Core under name of AMOS.

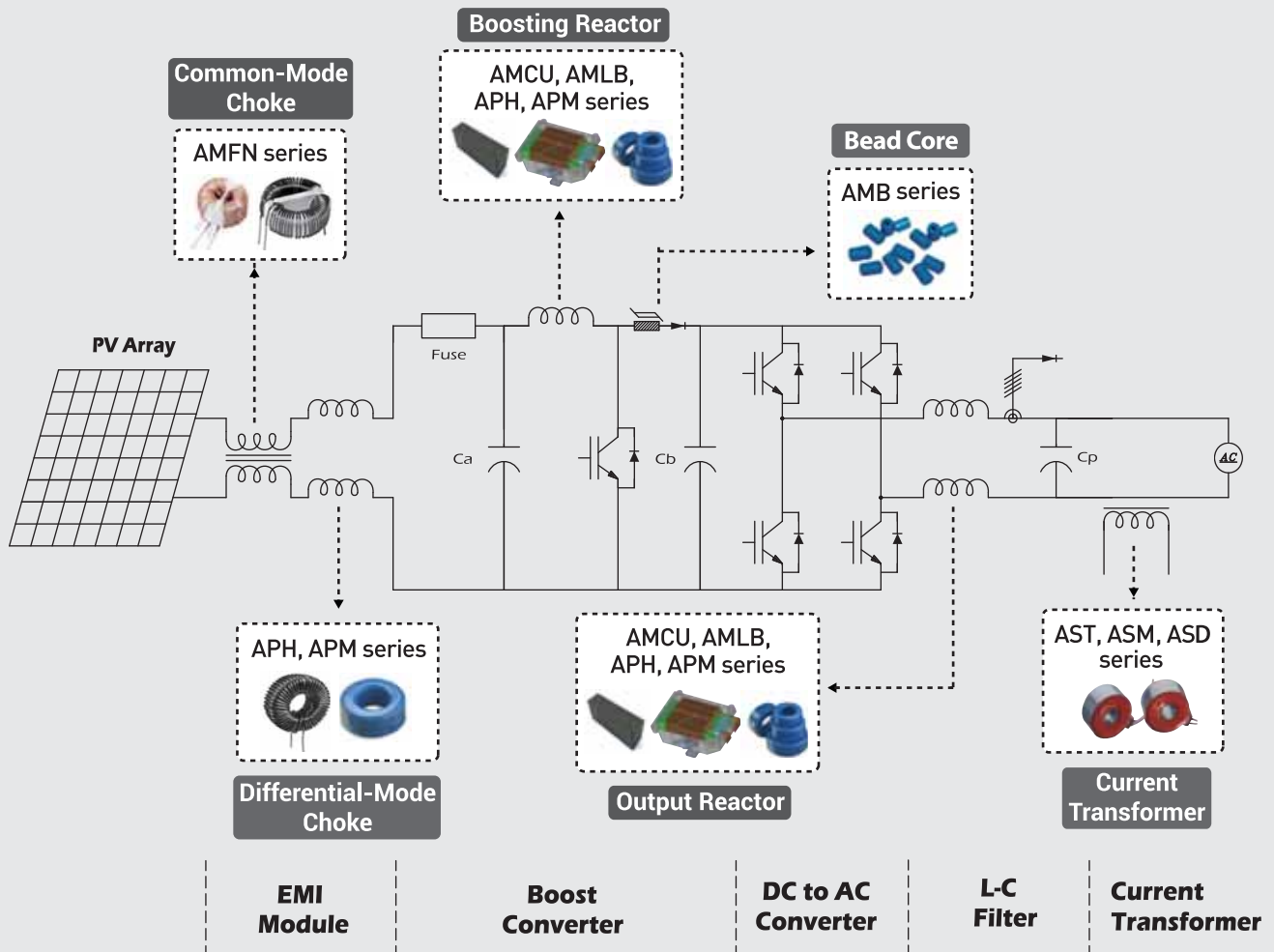
### Amorphous Ribbon Manufacturing



### Basic Material Information

Property	Fe-Amorphous	Nanocrystalline
Max Flux Density $B_m$ (T)	1.56	1.2
Permeability ( $\mu_i$ )	200 – 7,000	10,000 – 150,000
Coercivity (Static, A/m)	$2 < H_c < 3$	$0.5 < H_c < 3$
Core Loss ( $P_{cv}$ , kW/m <sup>3</sup> ) @100kHz, 0.2T	2,200	300
Currie Temperature ( $T_c$ )	400	600

## Typical Solar Inverter



# Cut Core for High Power Application

## Features

- Inductor for AC and DC Inductor(Reactor)



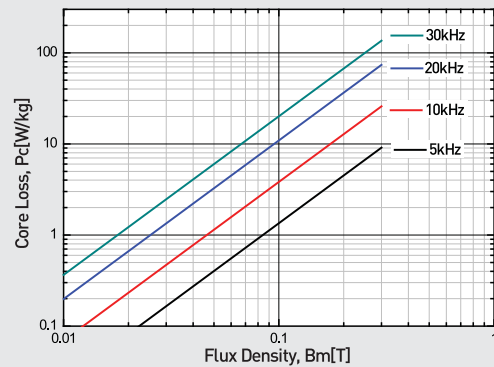
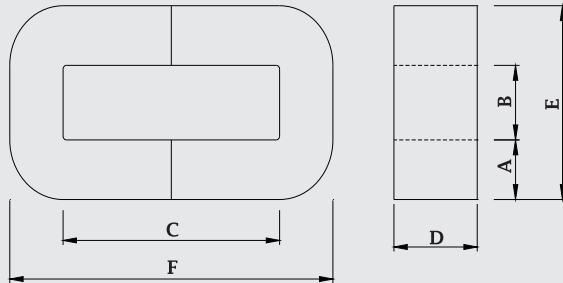
## Property & Material Information

- Low eddy current Losses
- Low hysteresis Losses
- Using for high efficiency application
- Low temperature rise
- Smaller component size and mass

Property	AMLB-Series (Block type)	AMCU-Series (C type)	Super-E	Si-Steel	Bk
Bs [T]	1.56	1.56	1.80	1.87	1.60
Core Loss[W/kg] @0.1T,20kHz	7.8	11.2	20.9	51.6	18.2
LDC/Lo[%]@1000e	Dependent of gap size				
Size	Middle	Middle	Middle	Middle	Middle
Material	Fe-Si-B (Sheet)	Fe-Si-B (Sheet)	Fe-Si(6.5%) (Sheet)	Fe-Si(3.5%) (Sheet)	Fe-Si(6.5%) (Powder)

## Structure & Core Loss

- Cut Core : AMCU - □□□

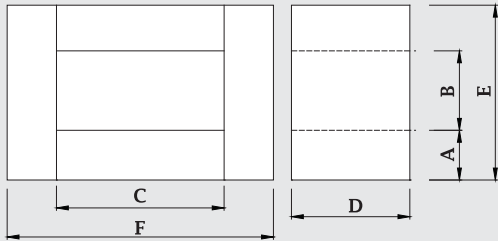


## Specification

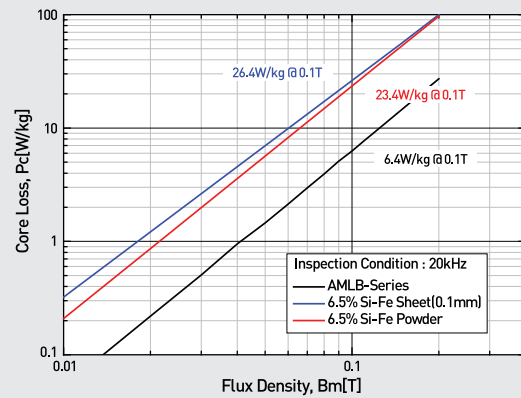
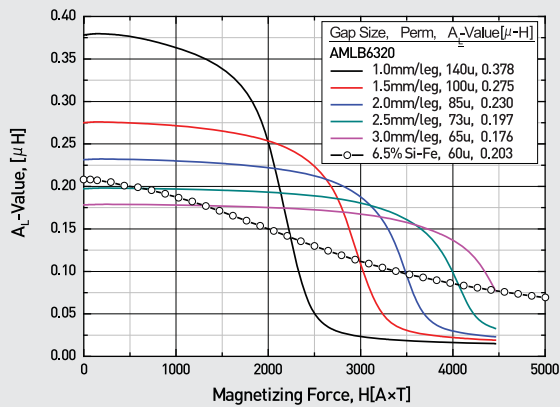
Cut Core	A	B	C	D	E	F	M[g]	Le[cm]	Ac[cm <sup>2</sup> ]	Wa[cm <sup>2</sup> ]
AMCU 6.3	10	11	33	20	31	53	150	13.1	1.6	3.6
AMCU 8	11	13	30	20	35	52	170	13.2	1.8	3.9
AMCU 10	11	13	40	20	35	52	200	15.4	1.8	5.2
AMCU 16A	11	13	40	25	35	62	250	15.1	2.3	5.2
AMCU 32	13	15	56	30	41	82	460	20.0	3.2	8.4
AMCU 40	13	15	56	35	41	82	530	19.9	3.7	8.4
AMCU 50	16	20	70	25	52	102	590	24.9	3.3	14.0
AMCU 100	16	20	70	45	52	102	1060	25	5.9	14
AMCU 125	19	25	83	35	63	121	1170	30.2	5.4	20.8
AMCU 200	19	25	83	50	63	121	1670	29.8	7.8	20.8
AMCU 320	22	35	85	50	79	129	2170	32.5	9	29.8
AMCU 500	25	40	85	55	90	135	2900	35.6	11.3	34.0
AMCU1000	33	40	105	85	106	171	7060	42.7	23.0	42.0

# Lamination Core for High Power Application

## Structure



## Comparison of Reactor DC Bias & Core Loss Characteristic



## Specification

Note : AMLB-6320 Dimension : Length×Width×Height = 60×30×20

Lamination Core	A	B	C	D	E	F	M(g)	Le(cm)	Ac(cm <sup>2</sup> )	Wa(cm <sup>2</sup> )
AMLB-6320	20	20	60	30	60	100	890	24.0	5.16	12.0
AMLB-7320	20	30	70	30	70	110	1038	26.0	5.16	21.0
AMLB-8320	20	40	80	30	80	120	1186	32.0	5.16	32.0

\* Customised Design Available

# Differential Mode Noise Solution

Impulse noise preventive use in DC power line of automobile.



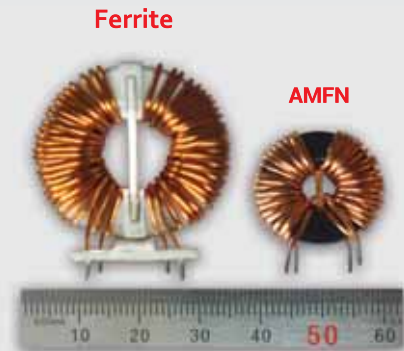
AMCA Series

Model	Size(OD×ID×HT)	AL(uH)
AMCA-11S-N	12.4×5.5×6.7	0.142
AMCA-18B-N	20.0×8.7×12.0	0.280
AMCA-20S-N	22.0×10.7×11.8	0.960

# Common Mode Noise Solution for EMI

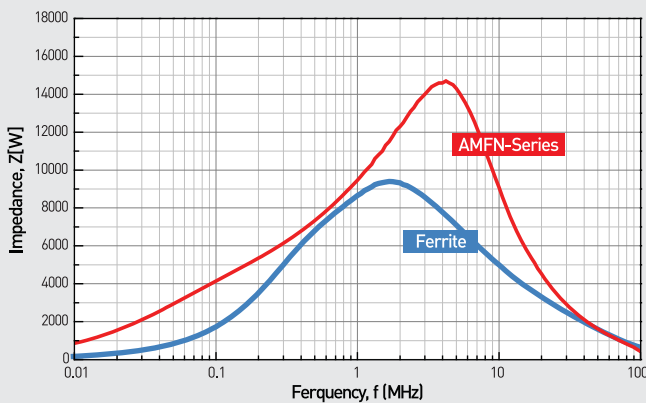
## ▶ Benefits of Nanocrystalline vs Ferrite CMC

Benefit	Nanocrystalline	Ferrite	Thanks to
Size	Small	Big	High Permeability
No. of Turns	Fewer	More	High Permeability
Attenuation @ Low Fq.	Very High	Low	High Permeability
Attenuation@High Fq.	High	Low	Smooth Permeability Decrease
Operating Temperature	High	Low	Very high Currie Temperature

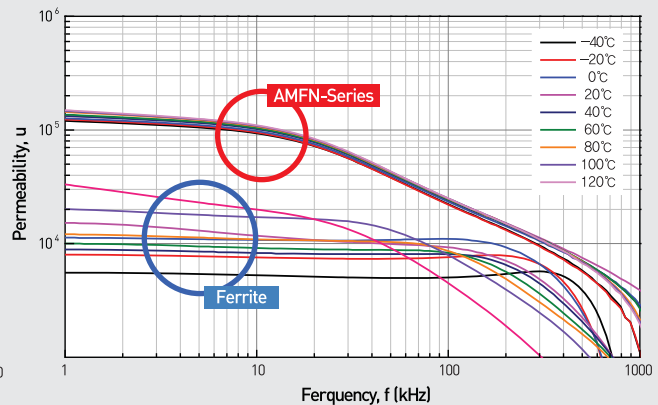


## ▶ Characteristics

### ▶ Frequency Characteristics



### ▶ Temperature Characteristics



## ▶ Part List & Cross Reference

P/N (core)	Core Dimension			L [mm]	A [mm <sup>2</sup> ]	AL [μH] @ 10kHz
	O.D [mm]	I.D [mm]	H.T [mm]			
AMFN161006SS	16.0	10.0	6.0	40.8	13.5	38
AMFN181108SS	18.0	11.0	8.0	45.5	21.0	50
AMFN201208SS	20.0	12.5	8.0	51.0	22.5	46
AMFN252010SS	25.0	20.0	10.0	70.7	18.8	27
AMFN251504SA	25.0	15.0	4.0	62.8	15.0	20
AMFN302010SS	30.0	20.0	10.0	78.5	37.5	53
AMFN312115SS	31.0	21.0	15.0	81.6	56.3	78
AMFN372415SS	37.0	24.0	15.0	5.8	73.1	85
AMFN372820SS	37.0	28.0	20.0	102.1	67.5	70
AMFN452520SS	45.0	25.0	20.0	109.9	150.0	130
AMFN543020SS	54.0	30.0	20.0	131.9	180.0	130
AMFN906020SV	90.0	60.0	20.0	235.5	225.0	81

# High Efficiency Powder Solution (APH Series)

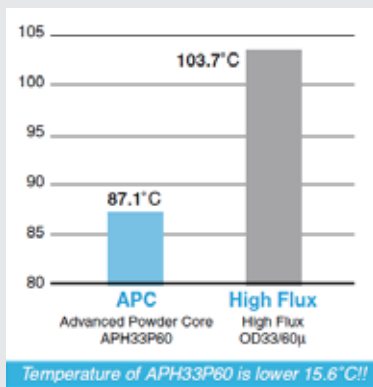
## Features

- Made by Fe-Amorphous Ribbon
- Reduce overall cost than other solution
- Very High efficiency
- Smaller in size(Save PCB size)



## Material Comparison

### Example of Field Test



### Material Comparison

Property	APH™	High Flux	MPP	Sendust
Saturation Flux Density, Bs(Gauss)	15,000	15,000	7,500	10,000
Core Loss @100kHz, 0.1T	Low (600mW/cm³)	High	Lowest	Medium
Perm. vs DC Bias @1000e	Better(75%)	Best	Good	Medium
Relative Cost	Medium	High	Highest	Low
Composition	Fe-Si-B	Fe-Ni	Fe-Ni-Mo	Fe-Al-Si

## Part List & Cross Reference

**APH**

Advanced Powder Core

**XX**

Size of Core

**P**

Permeability

**XX**

Perm. Value

- Permeabilities : 60, 90µ

- Sizes (OD) : 13, 17, 18, 20, 23, 24, 27, 33, 36, 40, 46mm

APH™	Size (Coated) (OD×ID×HT)	Al. (nH/N <sup>2</sup> )		Cross Reference(60µ)	
		60 µ	90 µ	CSC	Magnetics
APH13PXX	13.5×7.0×5.5	27	40	CH127060	58051-A2
APH17PXX	17.4×9.5×7.1	35	52	CH166060	58121-A2
APH18PXX	18.0×9.0×7.1	43	64	CH172060	58381-A2
APH20PXX	21.1×12.1×7.1	32	49	CH203060	58848-A2
APH23PXX	23.6×13.4×8.4	43	65	CH229060	58059-A2
APH24PXX	24.3×13.8×9.7	51	76	CH234060	58351-A2
APH27PXX	27.7×14.1×12.0	75	113	CH270060	58894-A2
APH33PXX	33.8×19.3×11.6	61	-	CH330060	58071-A2
APH36PXX	36.7×21.5×11.3	56	-	CH358060	58076-A2
APH40PXX	40.7×23.3×15.4	81	-	CH400060	58083-A2
APH46PXX	47.6×23.318.9	135	-	CH467060	58439-A2
APH50P60	51.7×30.9×14.4	73	-	CH508060	58716-A2
APH57P60	58.0×25.6×16.1	138	-	CH571060	58192-A2

# High Efficiency Powder Solution (APM Series)

## Features

- Made by Nanocrystalline alloy Ribbon
- The highest efficiency (Lowest Core loss)
- No Acoustic Noise ( $\lambda \approx 0$ )
- Excellent High Temperature stability

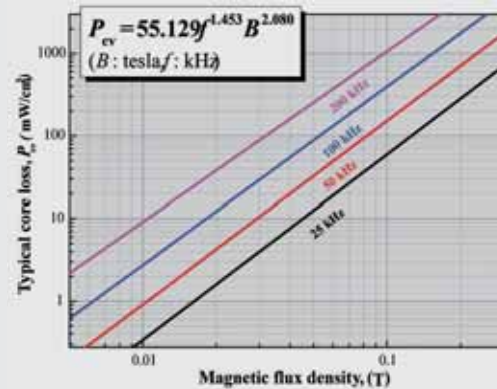


## Material Comparison

### Material Comparison

Property	APM™	High Flux	MPP	Sendust
Saturation Flux Density, Bs(Gauss)	12,000	15,000	7,500	10,000
Core Loss @100kHz, 0.1T	Lowest	High	Low	Medium
Perm. vs DC Bias @1000e	Good	Best	Good	Medium
Composition	Fe-Si-B -Nb-Cu	Fe-Ni	Fe-Ni-Mo	Fe-Al-Si

### Core loss property



## Part List & Cross Reference

**APM**

Advanced Powder Core

**XX**

Size of Core

**P**

Permeability

**XX**

Perm. Value

- Permeabilities : 26, 60, 90, 125 $\mu$
- Sizes (OD) : 13, 17, 18, 20, 23, 24, 27, 33, 36, 40, 46mm

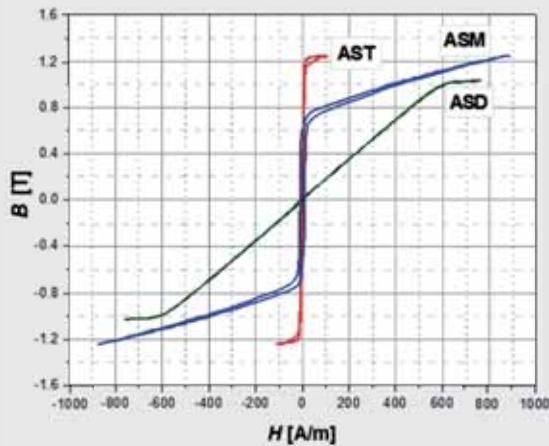
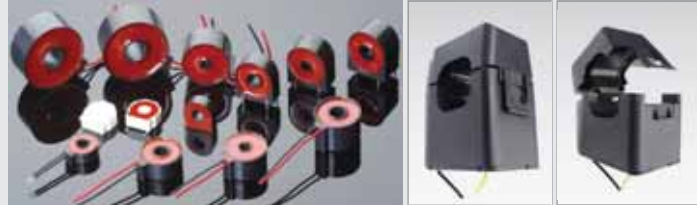
APM™	Size (Coated) (OD×ID×HT)	AL (nH/N <sup>2</sup> )				Cross Reference(60 $\mu$ )	
		26 $\mu$	60 $\mu$	90 $\mu$	125 $\mu$	CSC	Magnetics
APM13PXX	13.5×7.0×5.5	12	27	40	56	CM127060	55051-A2
APM17PXX	17.4×9.5×7.1	15	35	52	73	CM166060	55121-A2
APM18PXX	18.0×9.0×7.1	19	43	64	89	CM172060	55381-A2
APM20PXX	21.1×12.1×7.1	14	32	49	66	CM203060	55848-A2
APM23PXX	23.6×13.4×8.4	19	43	64	89	CM229060	55059-A2
APM24PXX	24.3×13.8×9.7	22	51	76	106	CM234060	55351-A2
APM27PXX	27.7×14.1×12.0	33	75	113	156	CM270060	55894-A2
APM33PXX	33.8×19.3×11.6	26	61	91	127	CM330060	55071-A2
APM36PXX	36.7×21.5×11.3	24	56	84	116	CM358060	55076-A2
APM40PXX	40.8×23.3×15.4	35	81	121	169	CM400060	55083-A2
APM46PXX	47.6×23.3×18.9	59	135	202	-	CM467060	55439-A2
APM50P60	51.7×30.9×4.4	32	73	-	-	CM508060	55716-A2
APM57P60	58.0×25.6×16.1	60	138	-	-	CM571060	55192-A2

# Current Measurement & Noise Protection



## ▶ Current Transformer & Zero Phase CT

- High Accuracy in whole current range
  - Very low losses
  - Good Temperature Stability
  - Having long-term stability due to the controlled magnetic function
- ▶ Hysteresis curve of AMOGREENTECH CT-Series



Part number (P/N)	Primary current range		Dimensions	
	$I_N$ (A <sub>rms</sub> )	$I_{DC,MAX}$ (A <sub>op</sub> )	Φ (mm)	Width x height (mm x mm)
AST-005L	5	-	6	24,5 x 11,1
AST-005LA	5	-	7,5	23,2 x 10,8
AST-005LC	5	-	6,5	23,3 x 11,0
AST-080L	80	-	8,9	26,1 x 17,1
AST-120L	120	-	12,2	39,0 x 17,6
ASD-040L	40	40	5,7	28,0 x 16,2
ASD-060L	60	60	8,0	31,0 x 15,3
ASD-120L	120	120	12,2	39,0 x 17,6
ASM-040L	40	40	7	26,3 x 17,3
ASM-060LD	60	60	11,1	33,0 x 16,4
ASM-120LC	120	120	14,5	39,0 x 16,5

### AST-Series

#### Application

- Very good accuracy power sensor and instruments
- 0.2-1.0 class power meters (in MVCT & LVCT for industrial complex and commercial watt hour meters)

#### Features

- Very small and high linear phase and amplitude error
- Easily compensable phase error
- Low temperature dependence
- Very low losses
- RoHS compliant

### ASM & ASD-Series

#### Application

- Precision DC immune electronic energy meters conforming to IEC 62053-21, -23
- Accurate measurement under DC components and anti tampering

#### Features

- Excellent linearity and precision
- Steady phase shift and No saturation in DC factor
- Stability from the external magnetic field
- Negligible small amplitude error
- Very low losses - RoHS compliant
- Possible to adopt the permanent magnetic immunity

## ▶ Noise Protection

- Low loss which improve the efficiency of inverter
- Reduction of ripple noise and ringing
- Simplifies design of noise suppression circuit



Part No.	Finished Core (mm)			A <sup>L</sup> (μH)	2Φm (μWb)	Cross Reference	
	OD	ID	HT			VAC	Hitachi
AMB-03A-N	4.1	1.5	4.5	3.0	1.10		AB3 X 2 X 3W
AMB-03S-N	4.1	1.5	6.0	5.0	1.65		AB3 X 2 X 4.5W

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Please consult sales on more different size and performance

