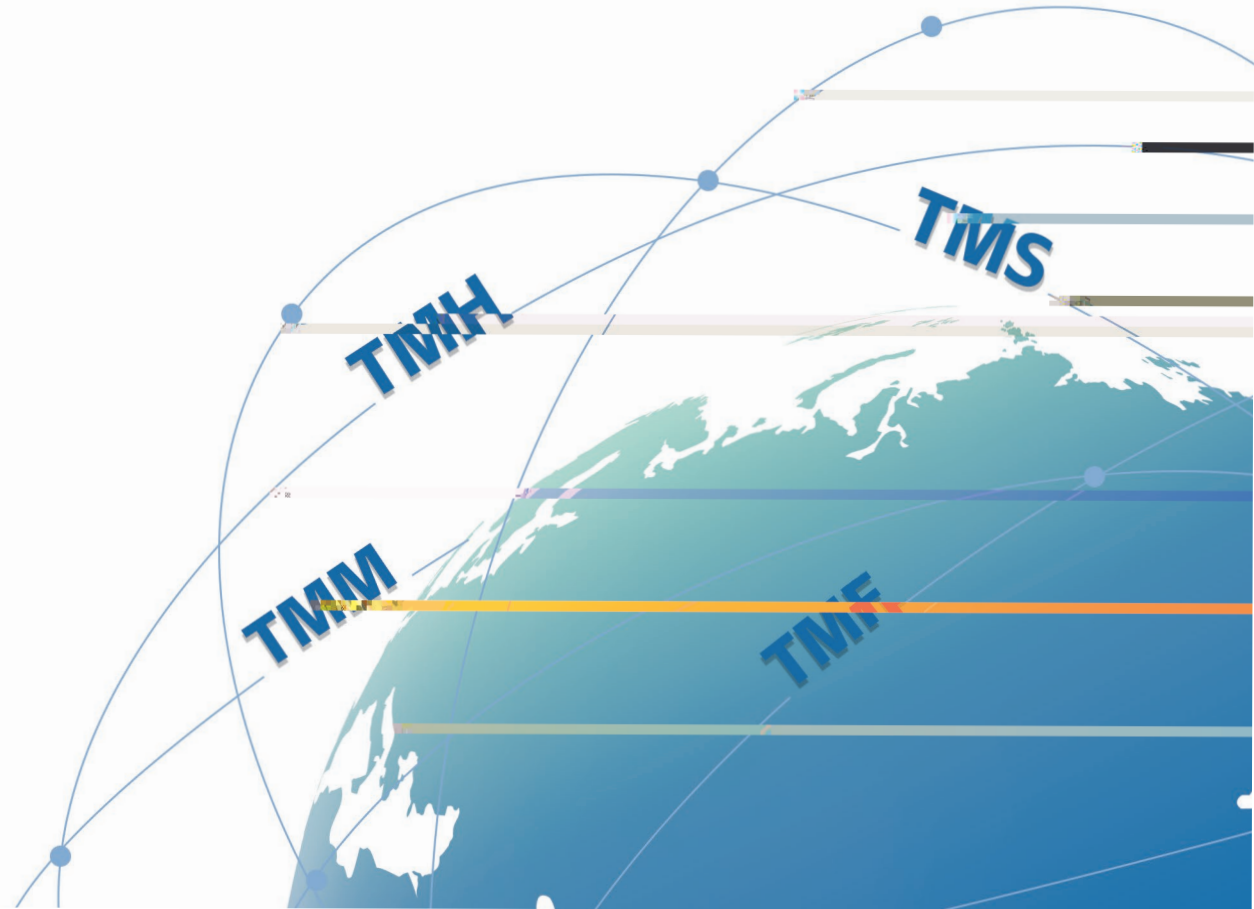
MAGNETIC POWDER CORES

金属磁粉心



Introduction

(:600330) 1984 2001

,

2009

5G

Founded in 1984 and listed on the Shanghai Stock Exchange in 2001 (Stock Code: 600330), TDG Holding Co., Ltd is a high-tech enterprise in China and has a number of subsidiaries. TDG has formed four major business segments: electronic materials, electronic module, green energy and smart equipment, the business covers the entire industrial chain of electronic information materials.

TDG has been researching and developing magnetic powder cores since 2009, and owns magnetic powder cores industrial bases in Haining, Zhejiang and Lu'an, Anhui. TDG has developed and can mass produce Fe-Si-Al , Fe-Si, Fe-Ni, Fe-Ni-Mo and composite powder cores, the products are widely used in the field of electronic technology, such as new energy vehicles, PV and energy storage, 5G communication, data centers, servers, smart homes, medical care and consumer electronics.

Product Introduction

Magnetic powder cores are distributed-air-gap cores made from ferrous alloy powders for low loss at high frequencies and stable inductance and other performance over temperature. Small air gap distributed evenly throughout the cores increase the amount of DC (direct current) that can be passed through the winding before core saturation occurs. The magnetic powder cores mainly include Fe-Si-Al (Sendust), Fe-Si, Fe-Ni (High Flux), FeNi composite powder core and FeSi composite powder core.

The company's products are widely used in Solar inverter, energy storage, new energy vehicles, DC Charging station, uninterruptible power supply, communication server, high-e ciency switching power supply, high-end household appliances and other fields.

Material

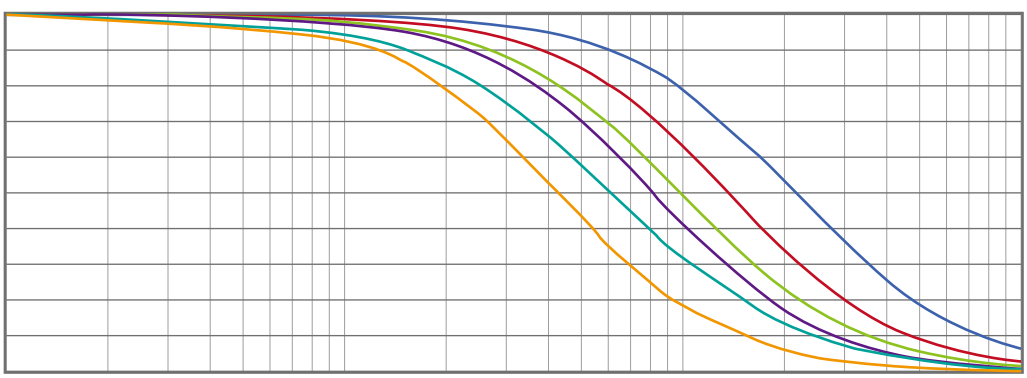
Bs(T)											
	good										
	48%				72%	72%			83%		83%
3											

/Material: TMS SERIES

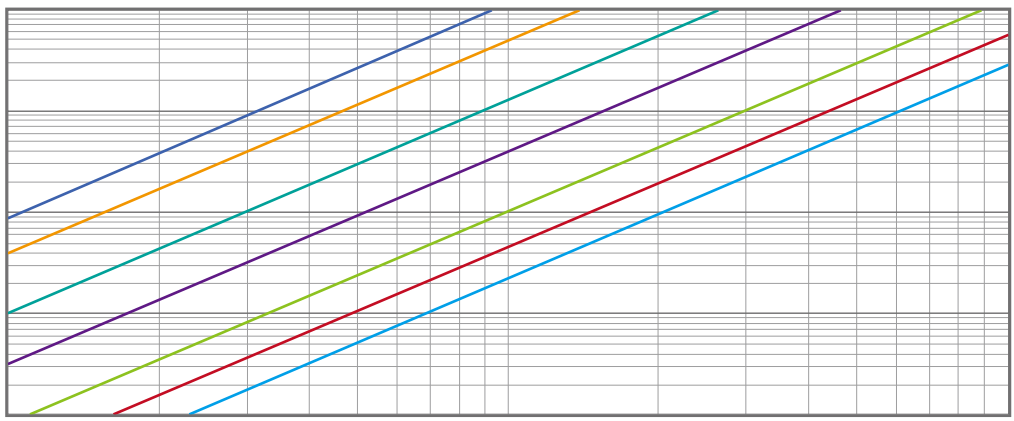
	Al-Si-Fe
1.05T	High saturation flux density (1.05T)
	Low loss characteristics
	Low magnetostriction
	Good temperature & frequency stability

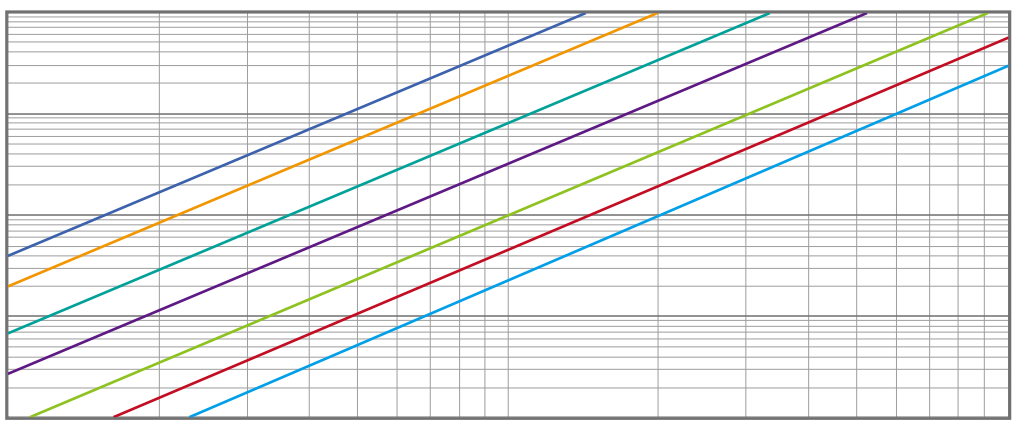
	Power adapter
	Boost choke for PV inverter
PC	PC power supply

1.1



1.2



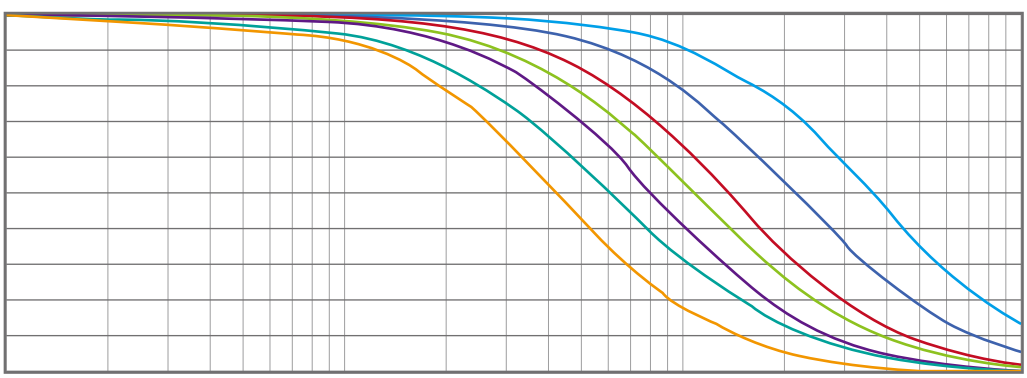


/Material: TMSA SERIES

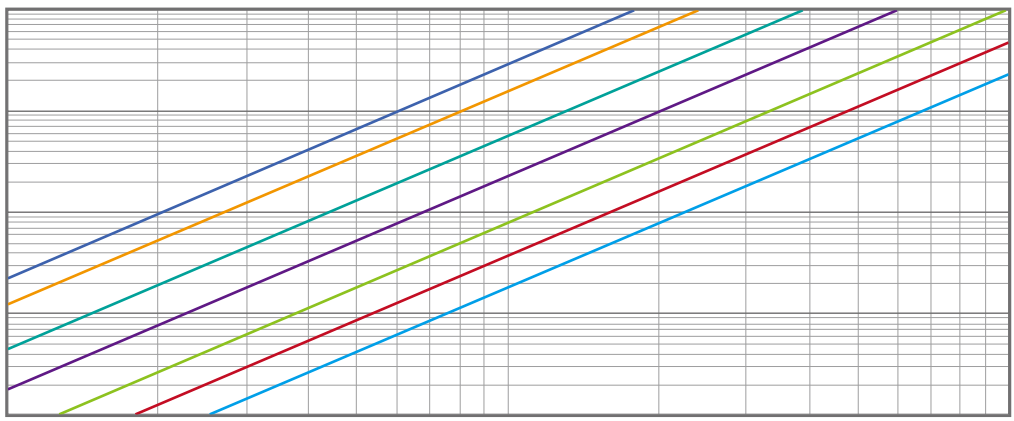
0.95T	High saturation flux density (1.0T)
	Ultra-low core loss
	Low magnetostriction
	Good temperature & frequency stability

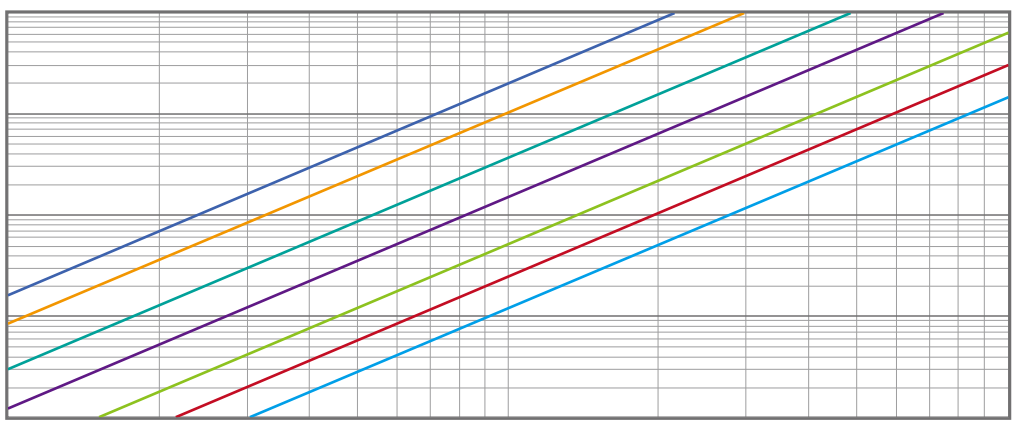
	150kHz	Resonant inductor	150kHz
PFC	50-200kHz	PFC inductor	50-200kHz
		Flyback transformer	
		Buck inductor	

1.1



1.2



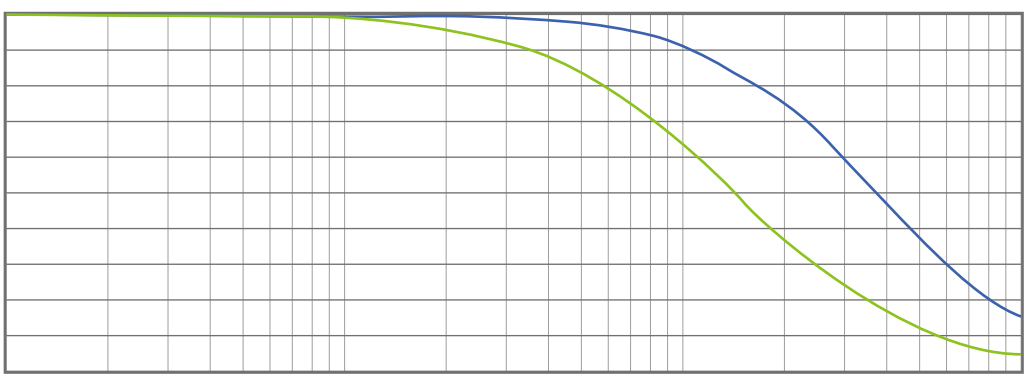


/Material: TMSB SERIES

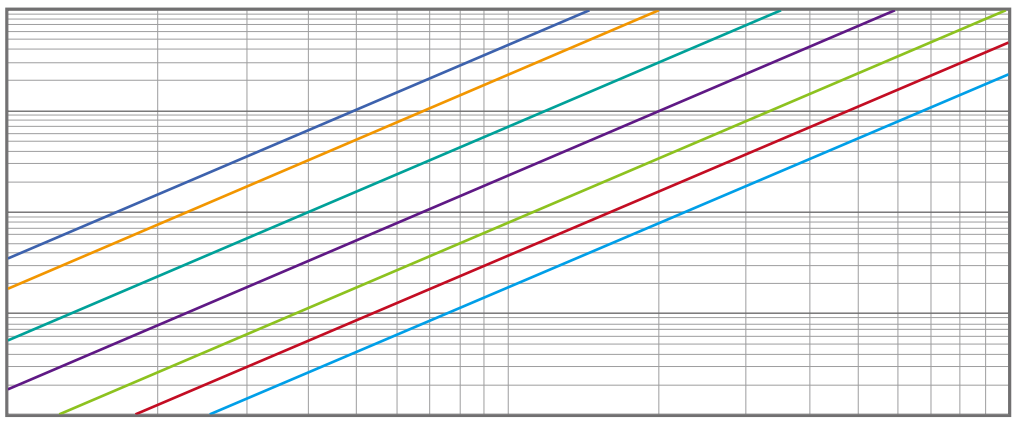
Excellent DC Bias performance
Lower loss
Excellent temperature & frequency stability

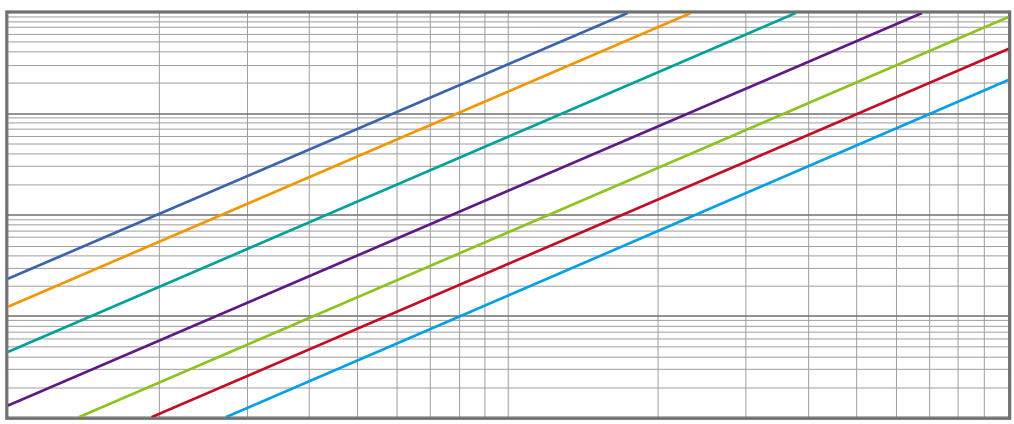
PV inverter
Energy storage system
Server power supply
DC charging module

1.1



1.2



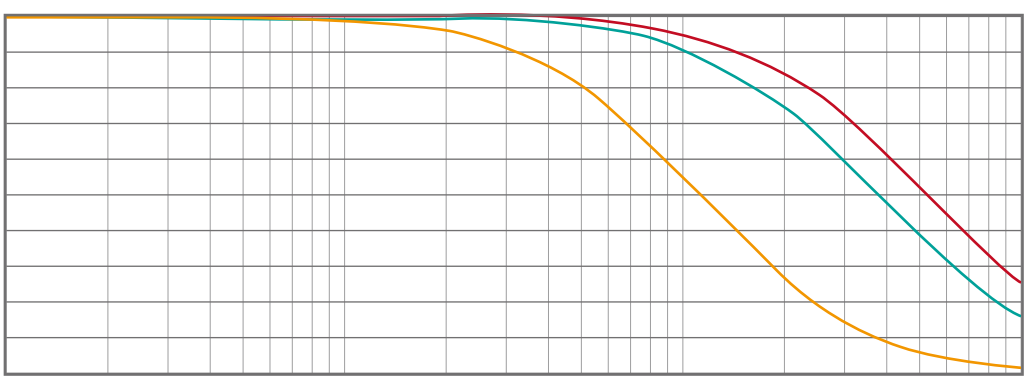


/Material: TMSG SERIES

Ultra-low core loss
High saturation flux density
Near zero magnetostriction
Excellent temperature & frequency stability

High frequency Inductor
Resonant inductor
Chip Inductor

1.1

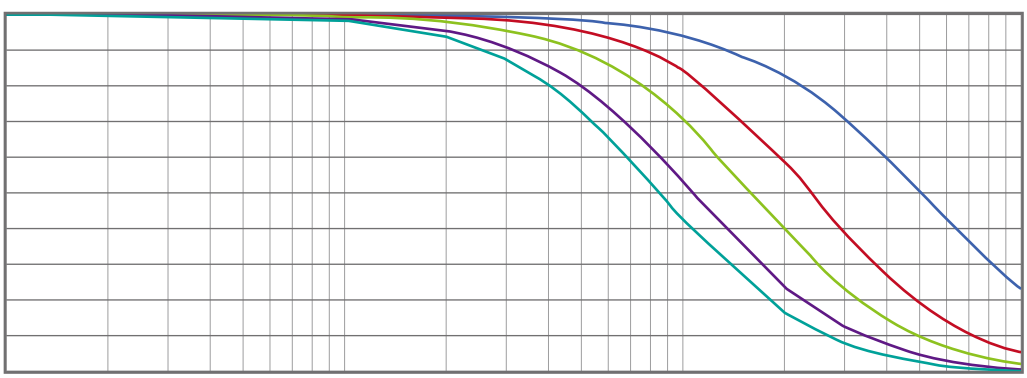


/Material: TMF SERIES

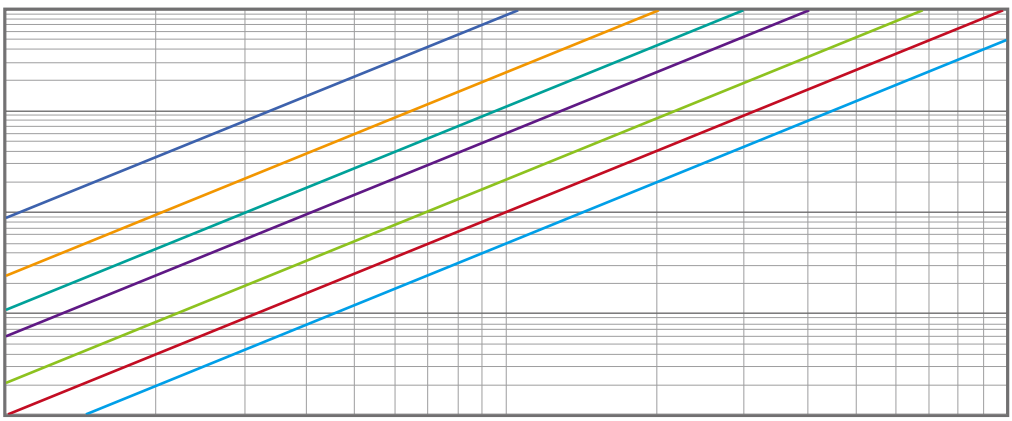
	Distributed air gap
1.6T	Very high saturation flux density (1.6T)
	High DC bias performance
	Low magnetostriction
	Good temperature & frequency stability

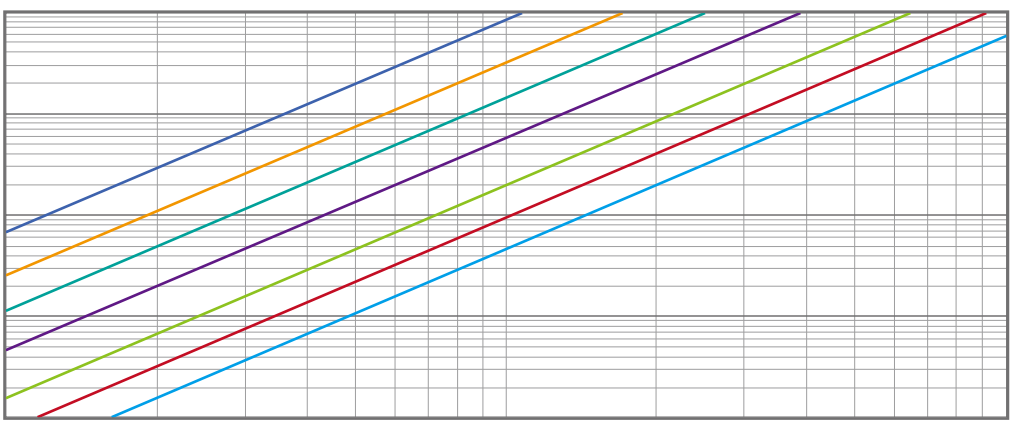
	PV Inverter
	General industrial power supply
UPS	UPS power supply
	DC charging station

1.1



1.2





/Material: TMFA SERIES

	1.5T	High saturation flux density (1.5T)
		High DC bias performance
		Low magnetostriction
		Good temperature & frequency stability
TMF	30%	The loss is 30% lower than TMF

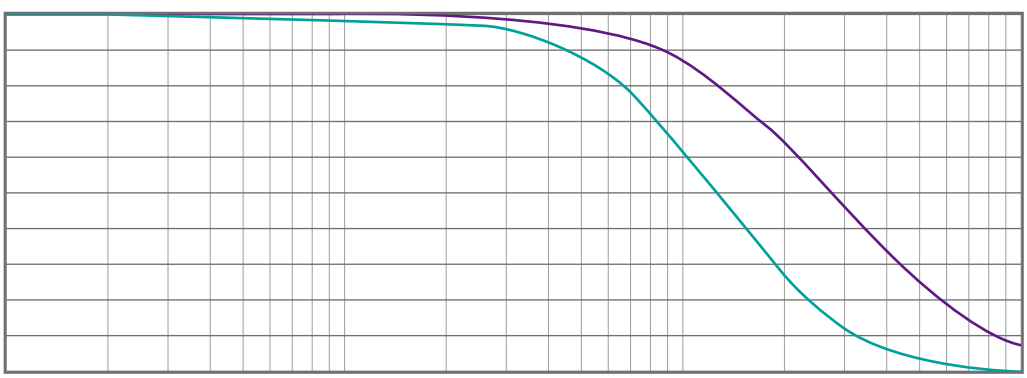
PV Inverter
New energy vehicle
General industrial power supply
DC charging pile

/Material: TMFB SERIES

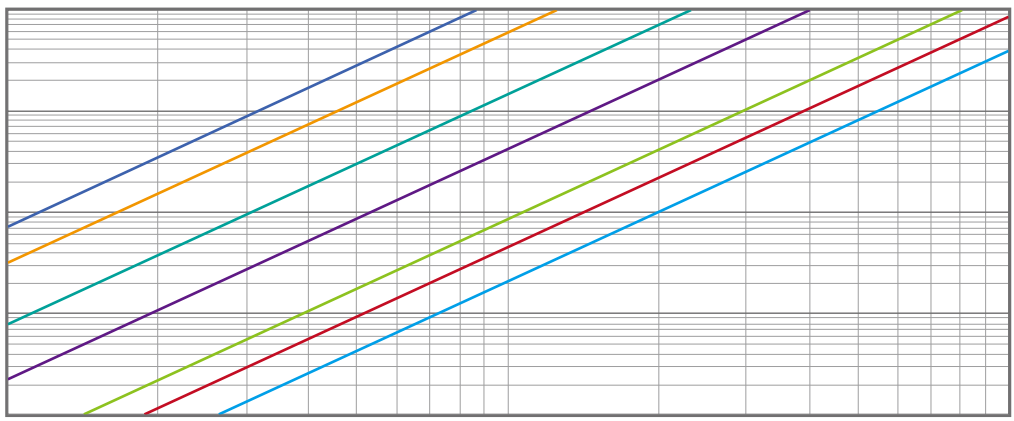
1.2T	Very high saturation flux density (1.2T)
	Low core loss
	Low magnetostriction
	Good temperature & frequency stability

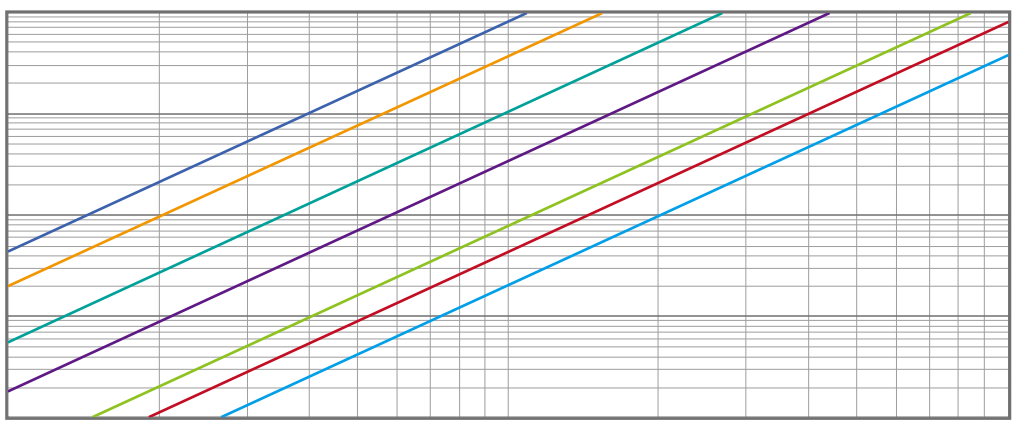
UPS
PV Inverter
New energy vehicle
Server power supply
DC charging pile

1.1



1.2



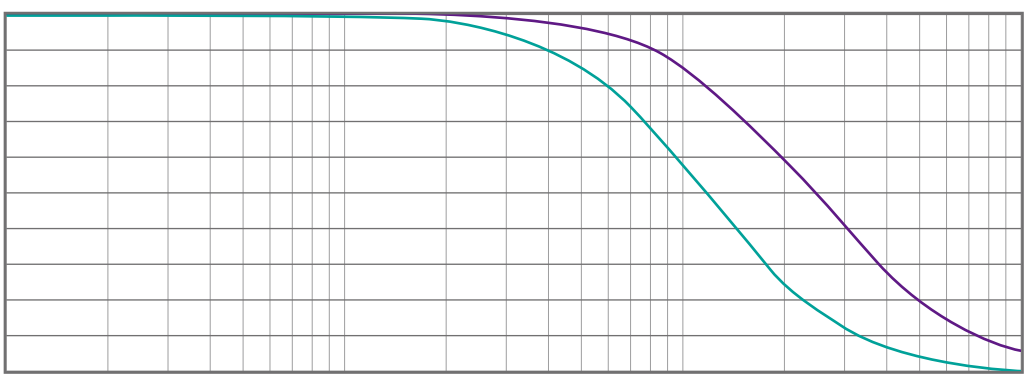


/Material: TMFC SERIES

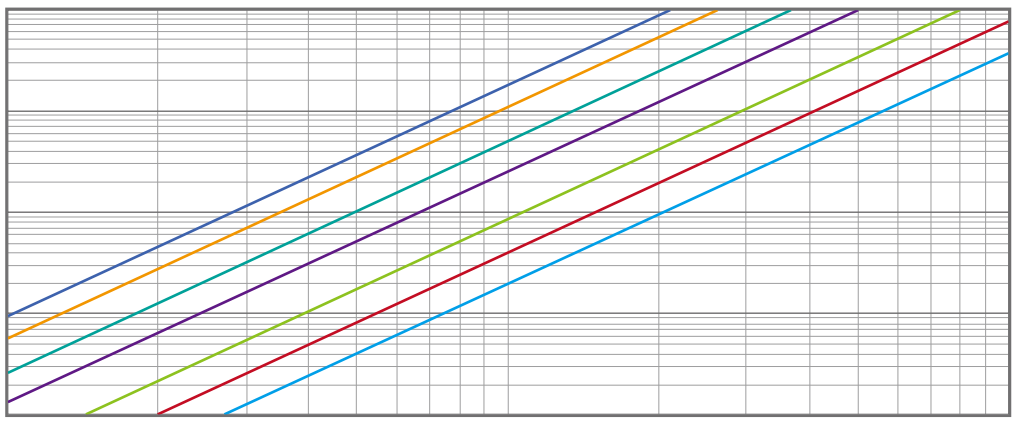
	Distributed air gap
1.1T	Very high saturation flux density (1.1T)
	Low core loss
	Low magnetostriction
	Good temperature & frequency stability

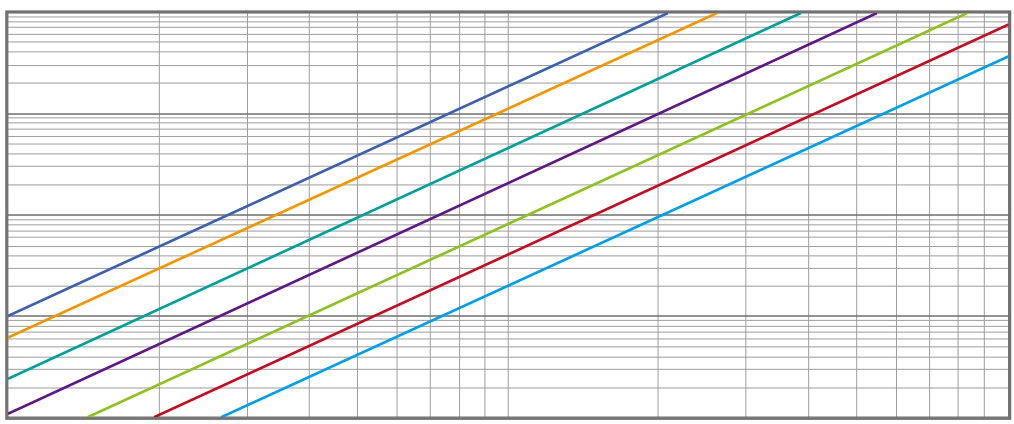
UPS
PV Inverter
New energy vehicle
Server power supply

1.1



1.2



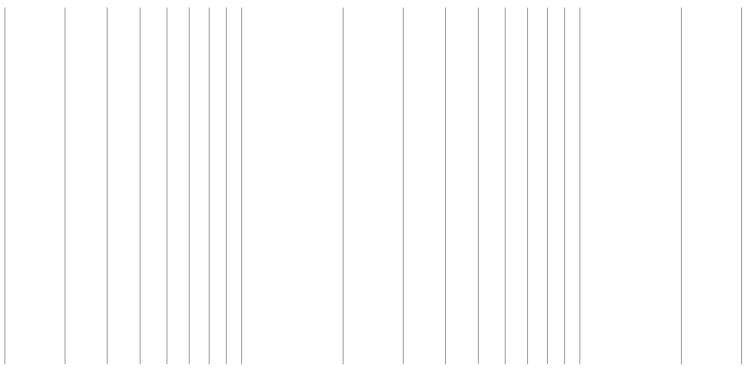


/Material: TMH SERIES

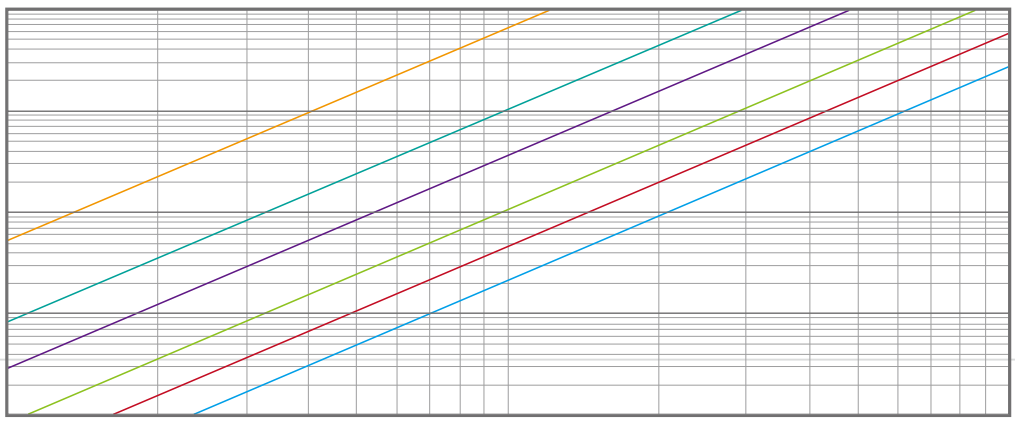
1.5T	Very high saturation flux density (1.5T) Low core loss Excellent DC bias performance Good temperature & frequency stability

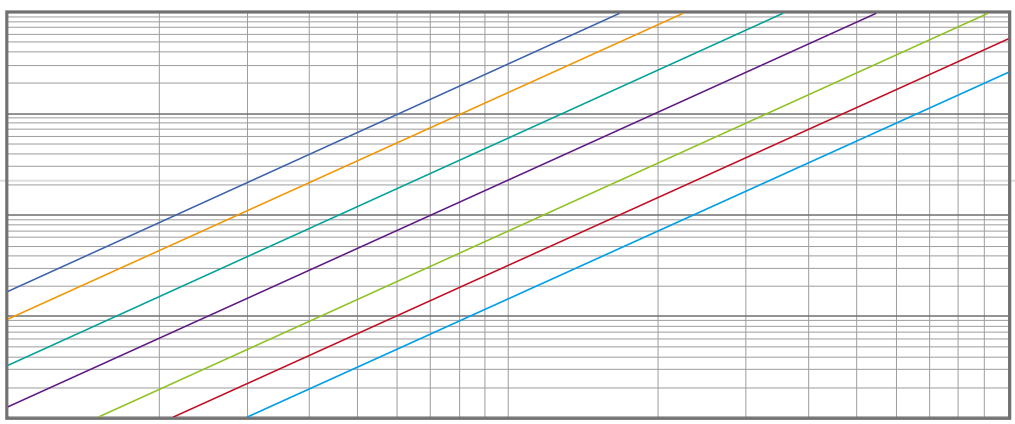
Industrial power supply
Communication power supply
New energy vehicle
Server power supply

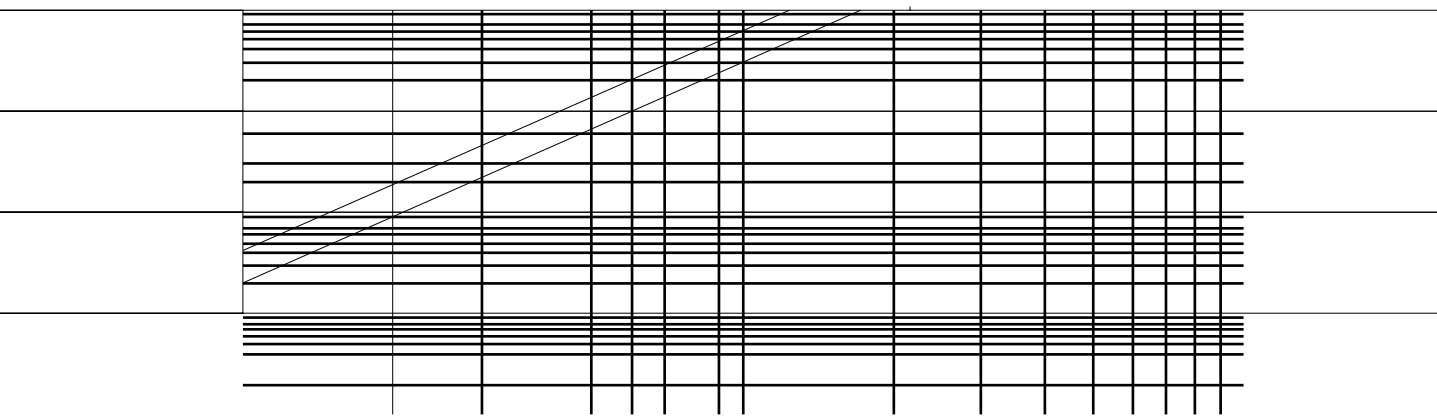
1.1



1.2







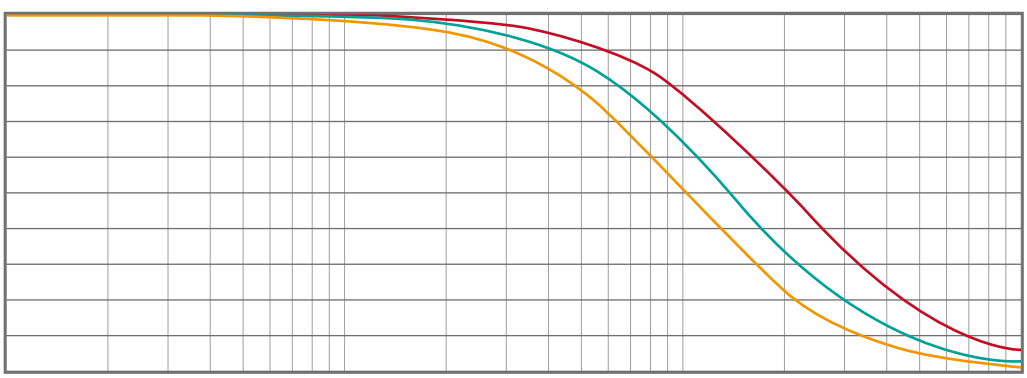
/Material: TMHA SERIES

1.2T

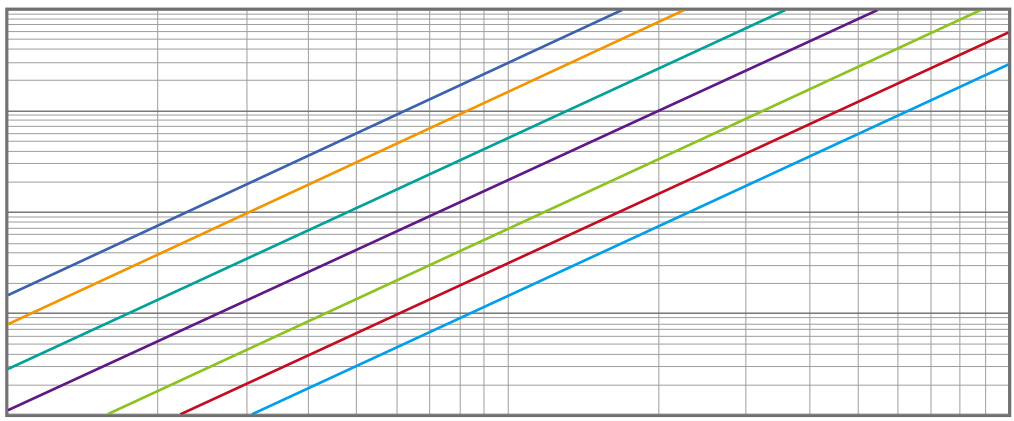
Distributed air gap
Very high saturation flux density (1.2T)
Low core loss
Excellent DC bias performance
Good temperature & frequency stability

Industrial power supply
Communication power supply
New energy vehicle
Server power supply
Chip inductor

1.1



1.2

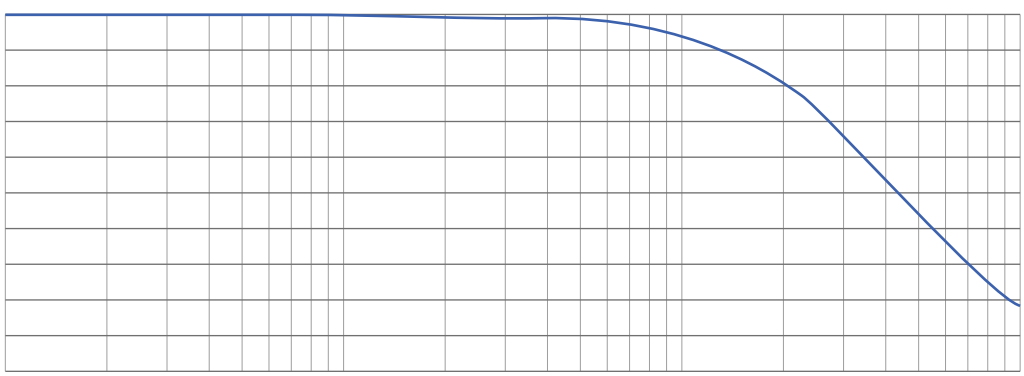


/Material: TMHB SERIES

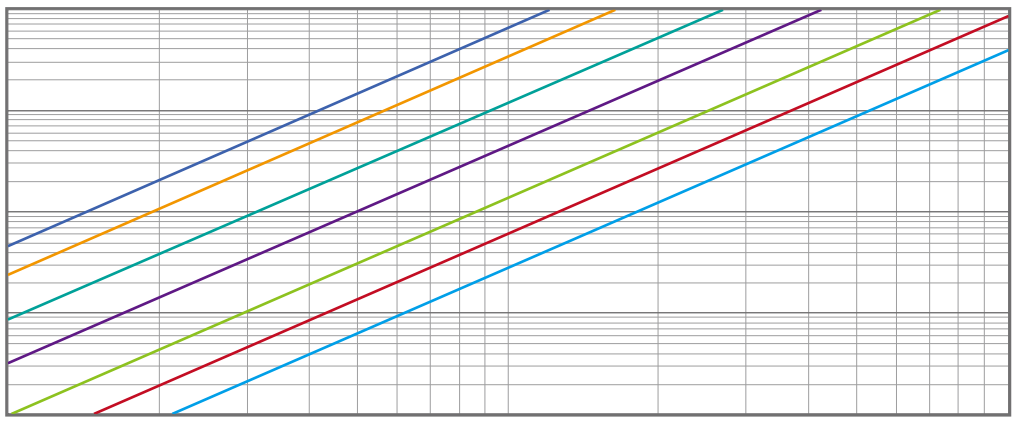
	Distributed air gap
1.3T	Very high saturation flux density (1.3T)
	Excellent DC bias performance
	Low magnetostriction
	Good temperature & frequency stability

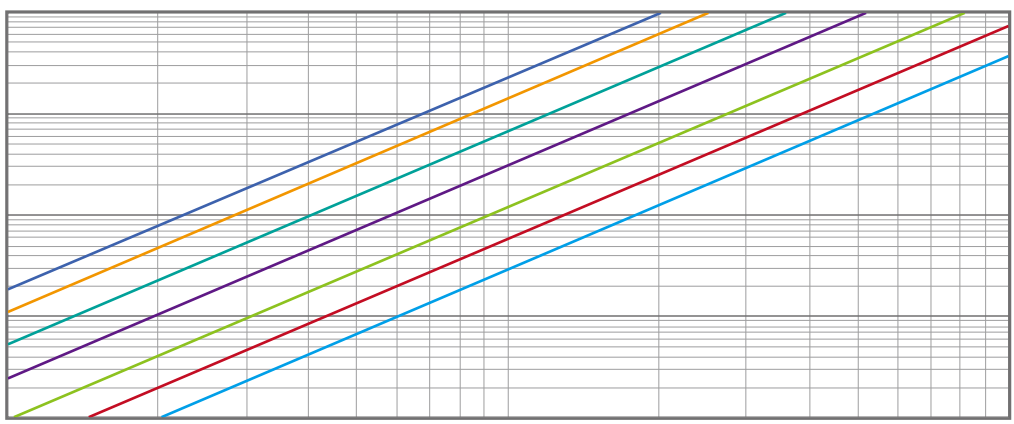
Industrial power supply
Communication power supply
New energy vehicle
Server power supply

1.1

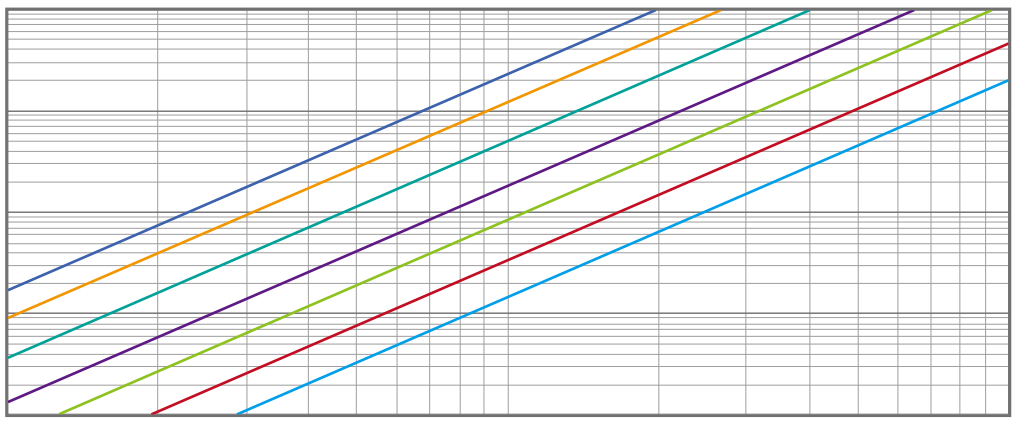


1.2





1.2



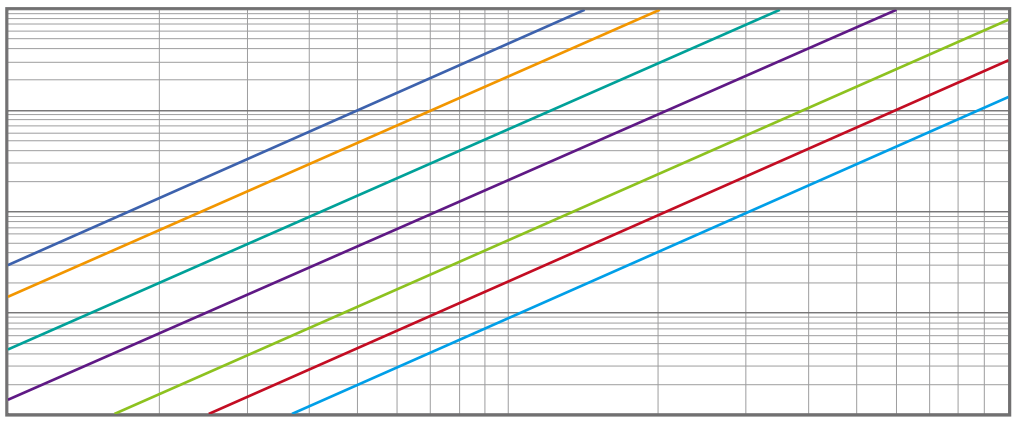
/Material: TMM SERIES

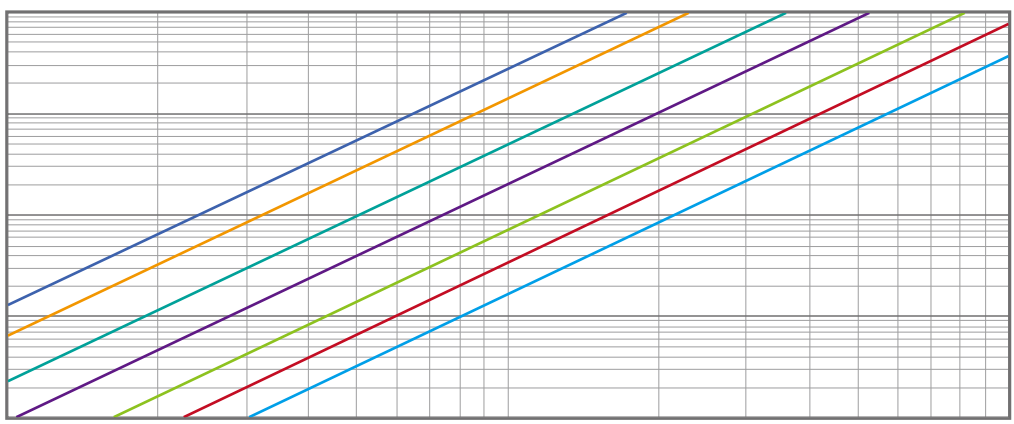
	Distributed air gap
0.75T	High saturation flux density (0.75T)
	Very low core loss
	Low magnetostriction
	Good temperature & frequency stability

High e ciency server power supply
Communication power supply

1.1

1.2





OD6.35mm × ID2.79mm × Ht2.79mm

TMS 063 125

- Permeability(μe)
- Size: OD in 10th mm
- TDG. Material Mix No.

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	13.61 mm	4.7 mm^2	64 mm^3	4.12 mm^2
B.S.	0.536 in	0.007 in^2	0.004 in^3	0.006 in^2

			24		
TMF					
			24		
			24		

OD6.60mm × ID2.67mm × Ht2.54mm

TMS 066 125

- Permeability(μe)
- Size: OD in 10th mm
- TDG. Material Mix No.

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	13.63 mm	4.76 mm^2	64.9 mm^3	4.10 mm^2
B.S.	0.537 in	0.007 in^2	0.004 in^3	0.006 in^2

TMF					
			32		


TMS096125A


TMS102125

OD11.2mm × ID6.35mm × Ht3.96mm

TMS 112 125

Permeability(μe)

Size: OD in 10th mm

TDG. Material Mix No.

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	26.90 mm	9.06 mm^2	243.70 mm^3	27.30 mm^2
B.S.	1.080 in	0.014 in^2	0.015 in^3	0.0423 in^2

			38		
TMF					
			32		
			38		

	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	31.20 mm	10.90 mm^2	360.52 mm^3	38.30 mm^2
L	2 ₴ 1.228 in Ĭ	0.018 in^2	0.022 in^3	0.059 in^2

OD16.5mm × ID10.2mm × Ht6.35mm

TMS 165 125

Permeability(μe)

Size: OD in 10th mm

TDG. Material Mix No.

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	41.10 mm	19.20 mm^2	789.00 mm^3	71.30 mm^2
B.S.	1.619 in	0.030 in^2	0.048 in^3	0.111 in^2

			72		
TMF					
			23		
			43		
			72		

OD17.3mm × ID9.65mm × Ht6.35mm

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	41.40 mm	23.20 mm^2	960.00 mm^3	57.60 mm^2
B.S.	1.63 in	0.0306 in^2	0.059 in^3	0.089 in^2

			43		
TMF					
			28		
			43		
			43		

OD20.3mm × ID12.7mm × Ht6.35mm

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	50.90 mm	22.58 mm^2	1150.00 mm^3	114.00 mm^2
B.S.	2.01 in	0.035 in^2	0.070 in^3	0.177 in^2

			32		
TMF					
			32		
			32		

OD22.9mm × ID14.0mm × Ht7.62mm

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	56.70 mm	33.10 mm^2	1868.00 mm^3	141.00 mm^2
B.S.	2.23 in	0.051 in^2	0.114 in^3	0.218 in^2

			43		
TMF					
			43		
			43		

OD23.6mm × ID14.4mm × Ht8.89mm

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	58.80 mm	38.80 mm^2	2280.00 mm^3	149.00 mm^2
B.S.	2.32 in	0.061 in^2	0.142 in^3	0.231 in^2

			22		
TMF			22		
			34		

OD27.0mm × ID14.7mm × Ht11.2m

TMS 270 125

- Permeability(μe)
- Size: OD in 10th mm
- TDG. Material Mix No.

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	63.50 mm	65.40 mm^2	4150.00 mm^3	156.00 mm^2
B.S.	2.50 in	0.101 in^2	0.254 in^3	0.242 in^2

			32		
TMF			32		

OD33.0mm × ID19.9mm × Ht10.7mm

TMS 330 125

- Permeability(μe)
- Size: OD in 10th mm
- TDG. Material Mix No.

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	81.50 mm	67.10 mm^2	5473.00 mm^3	293.00 mm^2
B.S.	3.21 in	0.104 in^2	0.334 in^3	0.454 in^2

			28		
TMF			28		

OD34.3mm × ID23.4mm × Ht8.89mm

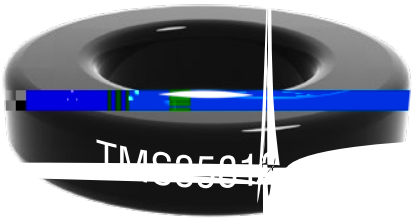
TMS 343 125

- Permeability(μe)
- Size: OD in 10th mm
- TDG. Material Mix No.

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	89.50 mm	45.40 mm^2	4060.00 mm^3	401.00 mm^2
B.S.	3.530 in	0.070 in^2	0.249 in^3	0.622 in^2

			38		
TMF					
			38		
			47		
			38		



OD39.9mm × ID24.1mm × Ht14.5mm

TMS 400 125

- Permeability(μe)
- Size: OD in 10th mm
- TDG. Material Mix No.

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	98.40 mm	107.20 mm^2	10569.66 mm^3	427.00 mm^2
B.S.	3.880 in	0.166 in^2	0.645 in^3	0.662 in^2

TMF					


TM


TM


TMS50

OD57.2mm × ID26.4mm × Ht15.2mm

TMS 571 125

- Permeability(μe)
- Size: OD in 10th mm
- TDG. Material Mix No.

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	125.00 mm	229.00 mm^2	28677.00 mm^3	514.00 mm^2
B.S.	4.930 in	0.355 in^2	1.750 in^3	0.796 in^2

			287		
TMF					
			287		

OD62.0mm × ID32.6mm × Ht25.0mm

TMS 610 125

- Permeability(μe)
- Size: OD in 10th mm
- TDG. Material Mix No.

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	143.70 mm	367.50 mm^2	52810.00 mm^3	772.50 mm^2
B.S.	5.660 in	0.570 in^2	3.223 in^3	1.198 in^2

			83		
			288		
TMF			83		
			288		

OD77.8mm × ID49.2mm × Ht12.7mm

TMS 777 125

- Permeability(μe)
- Size: OD in 10th mm
- TDG. Material Mix No.

Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	200.00 mm	177.00 mm^2	34700.00 mm^3	1799.00 mm^2
B.S.	7.720 in	0.274 in^2	2.118 in^3	2.788in^2

OD101.6mm × ID57.2mm × Ht16.5mm

TMS 1016 125

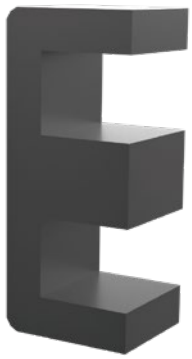
- Permeability(μe)
- Size: OD in 10th mm
- TDG. Material Mix No.

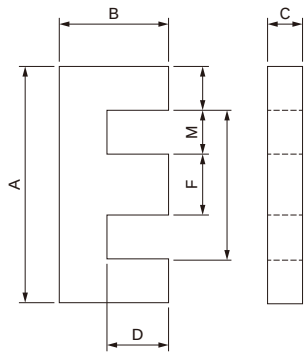
Material:TMS, TMSA, TMSG, TMF, TMFA,TMFB, TMH, TMHA, TMHB

Parameter	Magnetic Path Length	Cross Section Area	Core Volume	Window Area
	Le	Ae	V	W
SI	242.71.00 mm	352.30 mm^2	84495.00 mm^3	2441.13 mm^2
B.S.	9.555 in	0.546 in^2	5.217 in^3	4.818in^2

			228		
TMF					
			228		

EE EE CORE



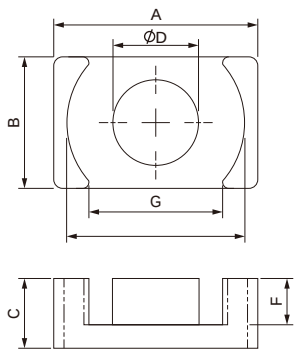


TMS 18 08 E - 090

- Material Code
- Size(mm) A
- Size(mm) B
- E type Core
- Permeability

										[2]	[3]				
	A	B	C	D		F		M							
														48	
												33			
										84					
												88			234
			27												

EQ EQ CORE



TMF060 - EQ 26.5 / 19.5 / 7.5

Material

EQ type Core

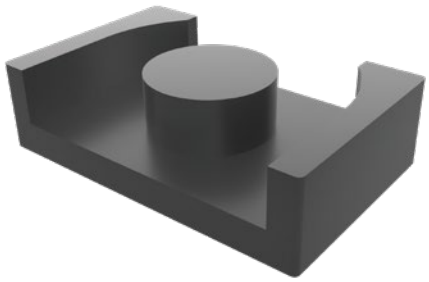
Size(mm) A

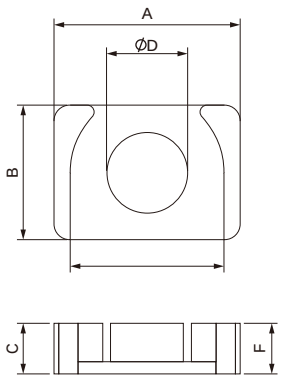
Size(mm) C

Size(mm) B

	A	B	C	D		F	G			[3]			
											72		
	32	22									83		
	32	22											
					32								
		28										87	
		32			44						77		

ER ER CORE





TMF060 - ER 50.6 / 32.0 / 13.5

Material

EQ type Core

Size(mm) A

Size(mm) B

Size(mm) C

								[2]	[3]			
	A	B	C	D		F						
		32										
		32										273

AR AR CORE

TMF060 - AR 13.5 / 5

Material

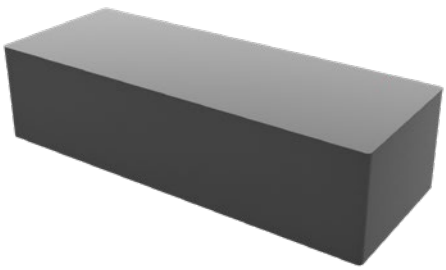
AR type Core

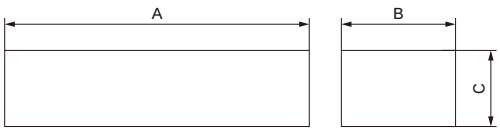
Size(mm) A

Size(mm) B

		)

BLOCK CORE





TMS 50 30 15 B 060

Material
Size(mm) A
Size(mm) B
Size(mm) C
Block Core
Permeability

	A	B	C
		28	

▶ Effective Permeability

μ_e E ective Permeability
B Flux Density Gauss
H Magnetizing Force Oe

▶ Inductance and Inductance Factor

$$A_L = \frac{L}{N^2}$$

L Inductance H
μ_e E ective Permeability
N Inductance Coe cien
A_L Inductance Coe cien
A_e E ective Area cm^2
l_e E ective length cm

▶ Magnetization Field

H Magnetizing force Oersteds
N Turn
I Current A
L_e E ective length cm

▶ R Winding DC Resistance

l Length of per turn cm/Ts
r Line resistivity $10^{-3}\ \Omega \cdot in^{-1}$
N Turn

▶ Quality Factor

Q Quality fator
L Inductance(H)
ω Angular velocity 2πf(Hz)
R_{dc} Winding resistivity(Ω)
R_{ac} Hysteresis losses resistivity(Ω)
R_{cd} Dielectric loss resistivity(Ω)

$$Q = \frac{\omega L}{R_{dc} + R_{ac} + R_{cd}}$$

▶ Magnetic Flux Density

B_{max} Max flux density (Gauss)
E_{rms} Max volt (Volts)
N Turn
A_e E ective area (cm2)
f Frequency (Hz)

$$B_{\max} = \frac{E_{rms} 10^8}{4.44 f A_e N}$$

▶ Magnetic Core Loss

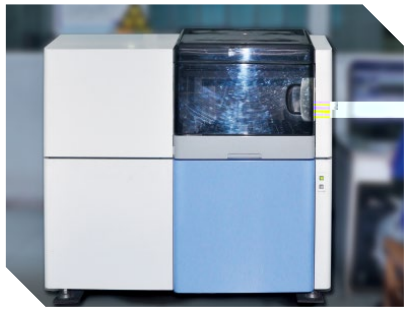
a= Hysteresis losses coe cient
c= Surplus losses coe cient
e= Eddy-current losses coe cient
f Frequency Hz
B_{max} Max flux density Gauss
L Inductance H
μ_e E ective Permeability

$$\frac{R_{ac}}{\mu_e L} = aB_{\max} f + cf + ef^2$$

Under high frequency conditions, eddy current loss is the main loss.
Hysteresis loss is the main loss at low frequency.

RAW MATERIAL TEST

icp-oes



X fluorescence analyzer

PERFORMANCE TEST

B-H analyzer

HP 4284A precision LCR tester

Network/spectrum/impedance analyzer

MATS Soft magnetic DC Tester

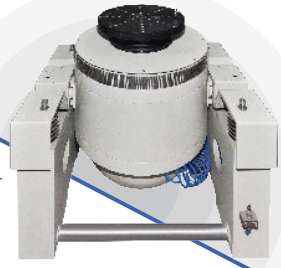
PERFORMANCE TEST

High-low
Temperature
Test Chamber

Metallographic
Microscope

High and low
temperature test box

Electric Vibrator



High and low temperature
alternating test box

TDG

MAGNETIC POWDER CORES 2024 2024