



# AMO

**CORPORATE PROFILE**  
TRUSTED INNOVATION

Since 1994, The AMO Group leads the global market with its unique technological process, claiming its reputation as a Hidden Champion company

**321** Million(USD) **Sales in 2018**

**6** products

**World Best Product  
in 2019**

**31.7** Million(USD) **R&D expenses in 2018**

**3,023** patents

**Patents as of  
December 31, 2018**

**3,261** employees **Employees as of  
December 31, 2018**

**13** factories

**Production Site**



# It makes innovation to reality that 28 Division specialized in their own technology

## AMO Group

AMOTECH	AMOGREENTECH		AMOSENSE	AMOLIFESCENCE
EMC	Magnetic Component	Nano Fiber	Wireless Charging	Bio Device
Antenna	Flexible Battery	Thermal Magnetic EMI	PCB ass'y	AMO Skin
Motor	Vent	Thin-film PCB	RF module	Nano-mag
	AMO Plant	Flexible PCB	LED Lighting module	Stem Cell
	Flexible Battery	Metal-Graphite	Sensor module	Bio Medical
	ESS	Metallic Converter	IoT Device	
	Water Treatment	Smart Clean Window	Sigfox Operator	

# AMO is chosen by the leading global companies in industries

## ✓ Global Leader's Choice

### Mobile



### Automotive



### IoT



### Chipset



AMO guarantees the stable stream of production and on-time supply with its ten globally-certified production facilities across the world and 643 supply networks

☑ Domestic and Foreign Production Facilities



Country	Established	City	No. of Employees	Certification
1 Korea	1994	Kimpo Tongjin	43	
	2000	Kimpo Hasung	98	
	2003	Inchon	660	
	2007	Pyong-taek	198	
	2008	Chonan Factory 1	103	
	2012	Chonan Factory 2	75	
	2017	Cheorwon	8	
2019(scheduled)	Geomdan	-		
2 China	2003	Zibo Factory 1	360	
	2007	Zibo Factory 2	280	
	2006	Qingdao	257	
3 Vietnam	2014	Hanoi Factory 1	564	
	2018	Hanoi Factory 2	615	
<b>Total</b>	-	<b>13 factories</b>	<b>3,261</b>	

# AMOGREENTECH

Advanced Materials Technologies

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The high efficiency magnetic material  
for green energy

# Amogreentech is advanced materials and components company leading the 4<sup>th</sup> industrial revolution with nano-material technology

<b>Company name</b>	Amogreentech Co., LTD.	<b>Headquarter</b>	Gimpo, Korea
<b>CEO</b>	S.C Yang & Y.S Song	<b>R&amp;D Location</b>	Korea & China
<b>Sales(2018)</b>	72M USD	<b>Factory location</b>	China & Vietnam
<b>Employees</b>	280 (Worldwide)	<b>History</b>	Established in 2004 Acquired IATF16949 in 2012 Listed on Korean stock market in 2019

## Main products



Magnetic components



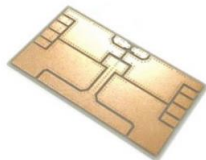
FIN Heater



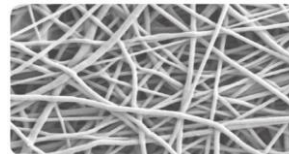
Thermal Solution



Flexible Battery



AMB Substrate



Nano Membrane(vent)



Nano Thin Film

# Magnetic components for Inductor(Coil), EMI Filter, Current sensor

## High-Efficiency Magnetic Component

Based on nanocrystalline alloy ribbons design and manufacturing technology, we have been leading the rapidly growing component market with high efficiency magnetic components for power converter as well as for precise measurement.



## Application



EV & Charging



5G



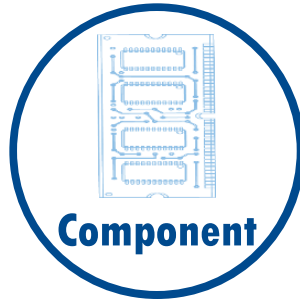
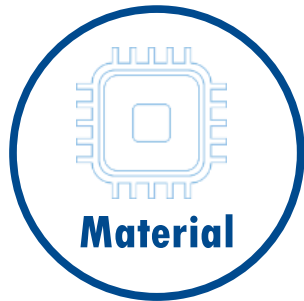
Solar & ESS



Smart Grid



# Providing total solution



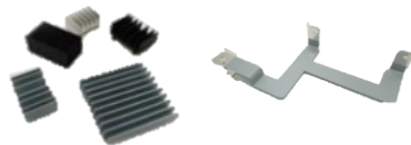
- Amorphous & Nanocrystalline core



- Thermal pad & Grease



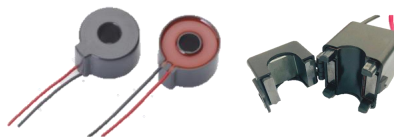
- e-Heat Sink & e-Bus bar



- Inductor, CMC



- Current Transformer



- Hybrid bus bar



- Filter Design –Inductor, CMC, Capacitor
- Small space, e-Bus bar & Thermal solution (Thermal Coat & Mold)



- EMI Test by EMI Chamber





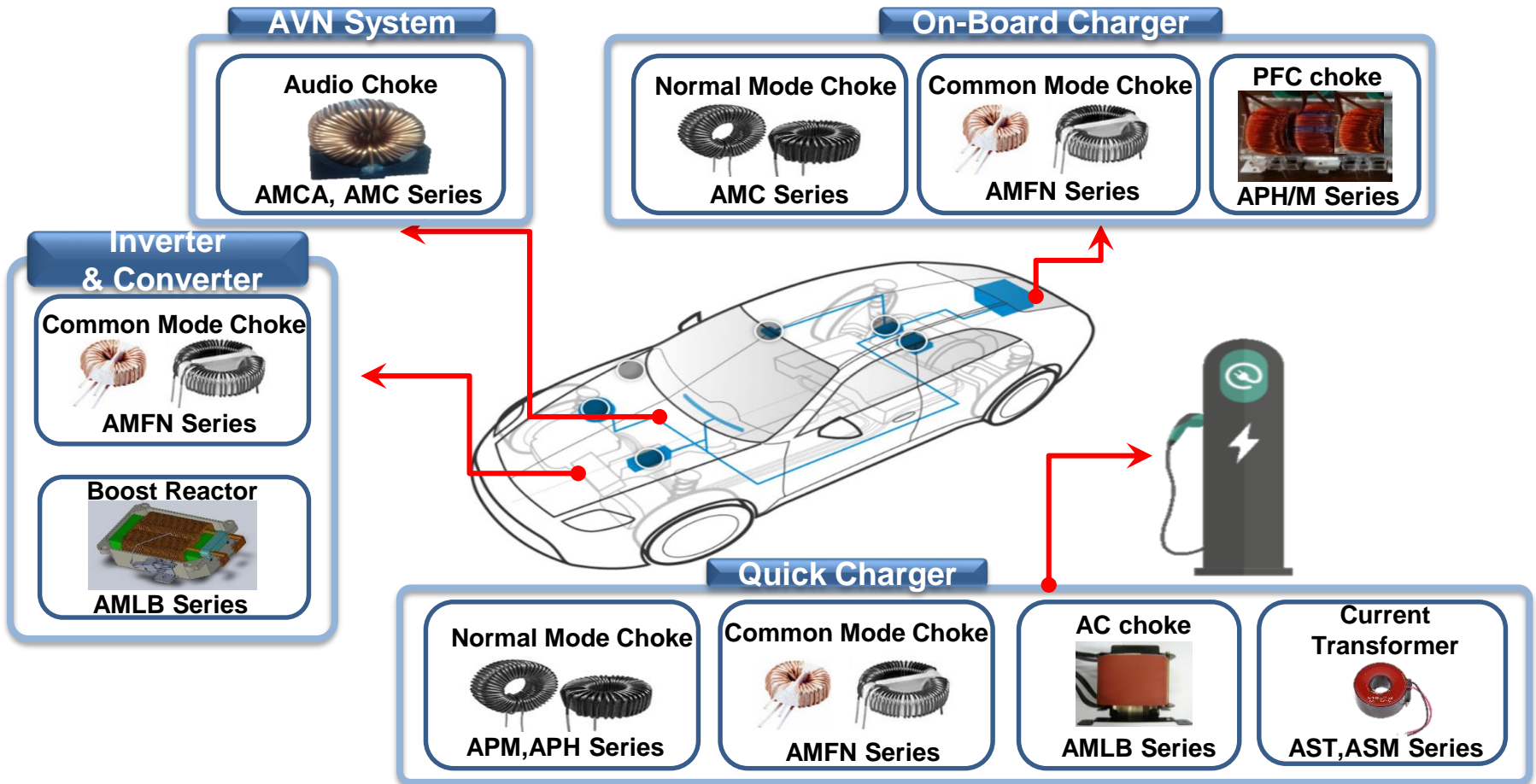
# EV & Charging

Advanced Materials Technologies

The high efficiency magnetic material

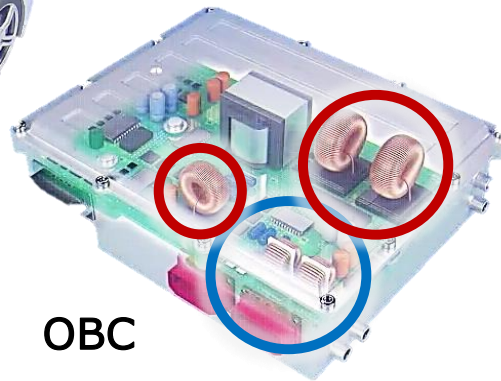
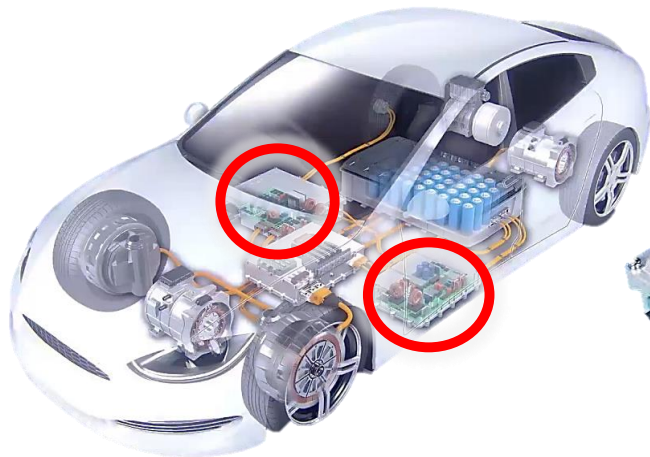


# Solution for EV & Charger

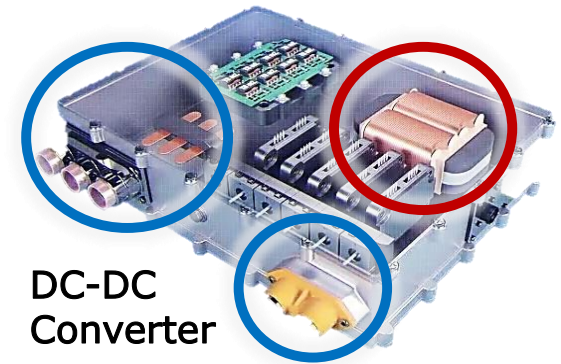


# Solution for EV & Charger

## On board charger / DC-DC converter



OBC

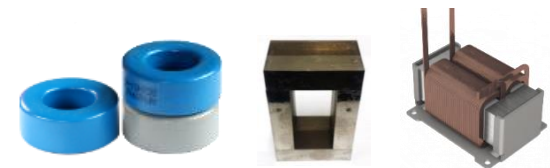


DC-DC  
Converter



### Noise reduction part

- Common mode choke core : AMFN
- Choke core : AMC



### Inductor part

- Inductor core : AMLB, AMCU, APH, APM
- Choke core : AMC

# EMI filter core

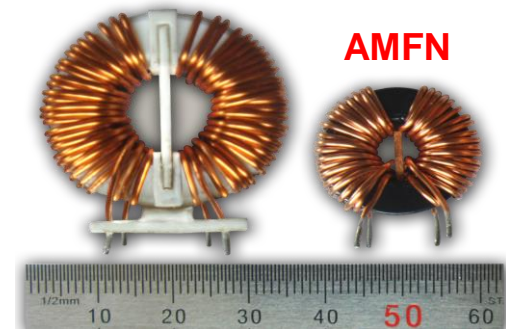
## Features

1. High permeability & Compact in size
2. Reliability on high temperature



Ferrite

AMFN



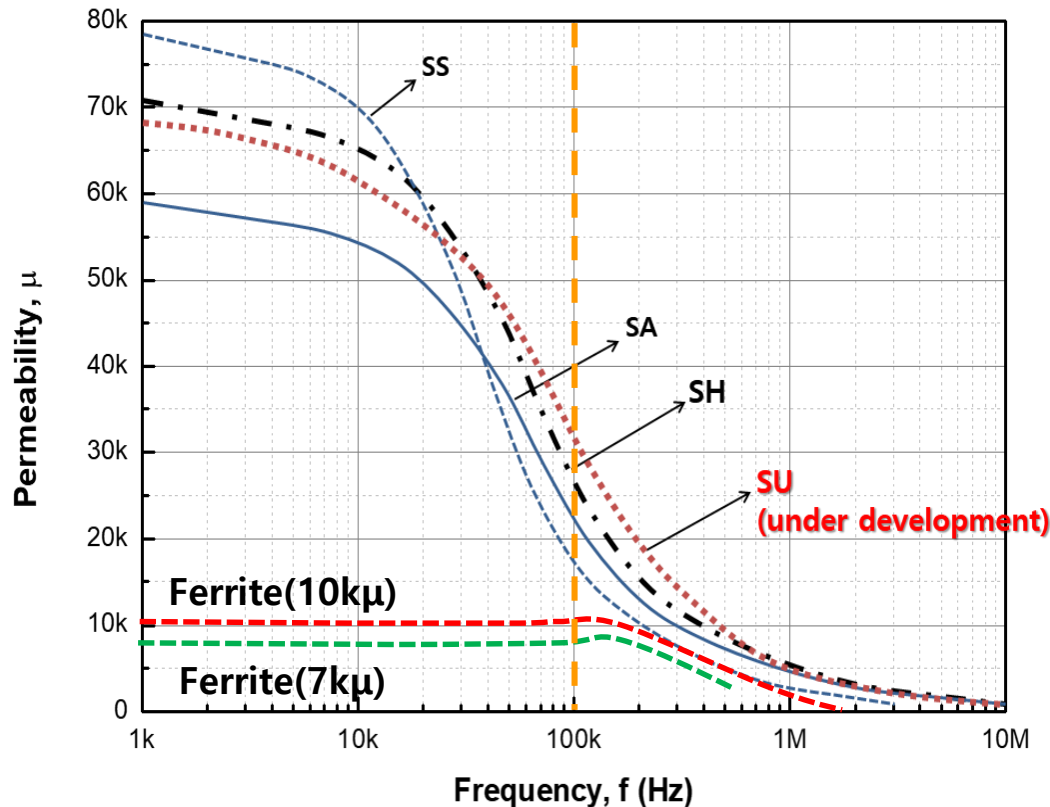
Parameters	AMFN	Ferrite
Permeability( $\mu$ )	80,000~100,000	10,000
Size	Small	Big
No. of Turns	Fewer	More
Core loss	Low	Low
High Impedance Range	Wide	Narrow
Operating Temperature	High	Low



# Strength of AMFN-series

## ① High permeability & Compact size

Tested sample : 36.5x28x20mm toroidal core



Ribbon type	Permeability(μ) @100kHz
SU	35,000
SH	28,000
SA	23,000
SS	18,000

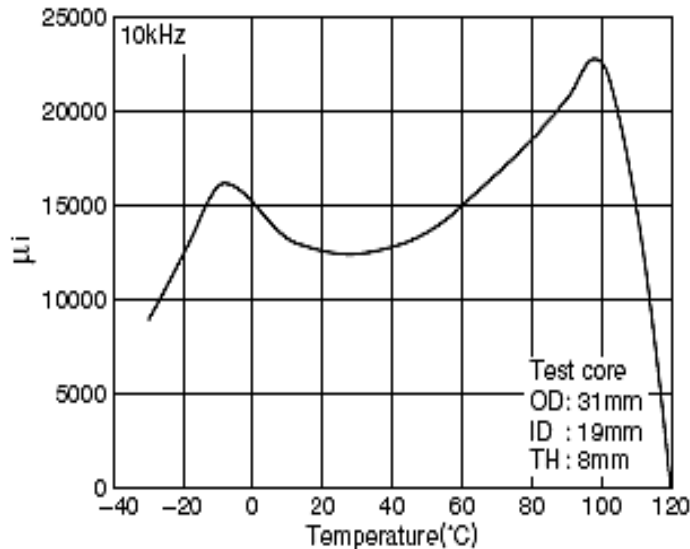
- ▶ Reduction of size and winding turns
- ▶ High impedance over the wide range of frequency

[Permeability dependence on Freq(AMFN-series Vs Ferrite)]

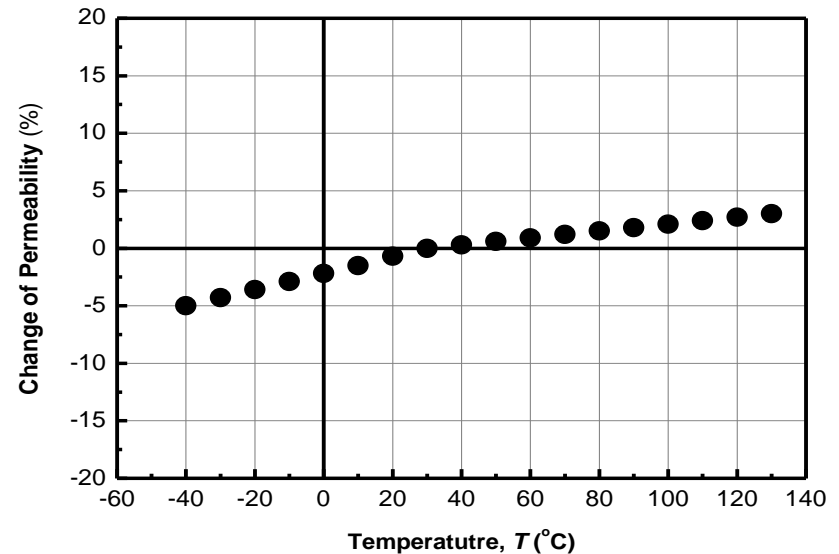
# Strength of AMFN-series

## ② Reliability on high temperature

[Permeability dependence on temperature]



Mn-Zn Ferrite



AMFN-Series

Properties	AMFN™ series	Ferrite (Mn-Zn)
Curie Temperature, $T_c$ (°C)	570	150
Operating Temperature(°C)	≥150	~100

# Standard product list

P/N (core), AMFN	Core Dimension [mm]			L <sub>Fe</sub> [mm]	A <sub>Fe</sub> [mm <sup>2</sup> ]	Mass [g]	Inductance, A <sub>L</sub> (μH)		Cross product	
	O.D	I.D	H.T				10kHz	100kHz	H社	V社
161006SS	16	10	6	40.8	13.5	4.0	33.5	7.0		
161006SA	16	10	6	40.8	13.5	4.0	25.0	9.6		
161006SH	16	10	6	40.8	13.5	4.0	43.0	10.1		W403
201208SS	20	12.5	8	51.0	22.5	8.4	45.0	10.0		
201208SH	20	12.5	8	51.0	22.5	8.4	55.2	13.6		
201208SA	20	12.5	8	51.0	22.5	8.4	34.0	13.0		W409
252010SS	25	20	10	70.7	18.8	9.7	27.0	6.0		
252010SA	25	20	10	70.7	18.8	9.7	17.0	7.5		
252010SH	25	20	10	70.7	18.8	9.7	28.4	7.3		W523
251504SA	25	15	4	62.8	15.0	6.9	18.5	7.0		
251610SS	25	16	10	64.4	33.8	15.9	47.0	10.0		
251610SA	25	16	10	64.4	33.8	15.9	40.0	15.0		
251610SH	25	16	10	64.4	33.8	15.9	65.5	15.5		W380
302010SS	30	20	10	78.5	37.5	21.5	49.0	10.5		
302010SA	30	20	10	78.5	37.5	21.5	40.0	14.0		
302010SH	30	20	10	78.5	37.5	21.5	59.3	14.0		W423
302015SH	30	20	15	78.5	56.3	32.2	15.7	14.1		V129
312115SS	31	21	15	81.6	56.3	33.5	70.0	16.0		
312115SA	31	21	15	81.6	56.3	33.5	53.0	20.0		
372415SS	37	24	15	95.8	73.1	51.1	77.0	18.0		
372415SA	37	24	15	95.8	73.1	51.1	60.0	27.0	F3724E	
372820SA	36.5	28	20	101.3	63.8	47.1	48.0	18.5		
382612SA	38	26	12	100.5	54.0	39.6	32.0	15.0		
403215SH	40	32	15	113.0	45.0	37.1	47.2	11.1		W422
452520SS	45	25	20	109.9	150.0	120.3	130.0	30.0	F4424G	
504020SS	50	40	20	141.3	75.0	77.4	54.0	12.0		
504020SA	50	40	20	141.3	75.0	77.4	45.3	14.0		W516
543020SS	54	30	20	131.9	180.0	173.3	130.0	30.0		
604520SA	60	45	20	164.9	112.5	135.4	68.0	17.0	F6045G	
6350525SS	63	50	25	177.4	121.8	157.8	69.1	15.6		W517
906020SV	90	60	20	235.5	225.0	386.8	81.0	25.1		W518
1008020SH	100	80	20	282.6	150.0	309.4	47.5	12.0	F10080G	
14010030SS	140	100	30	376.8	450.0	1237.79	110.0	24.0	F140100	



# Application Reference

Appl.	Part No.	Image
4kW OBC Input EMI	AMFN372415SA	
4.6kW OBC OPC	AMC-271525C	
4.6kW OBC Input EMI	AMFN564415SA	
250kW Drive inverter EMI	AMFN1005025TR	
5kW OBC Input EMI	AMFN543020SS	
62kW Fast charger Input EMI	AMFN906020SV	

# Example of Case



[ Toroid ]


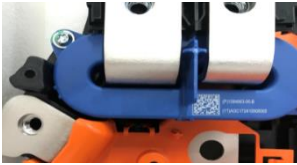



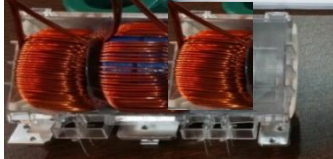

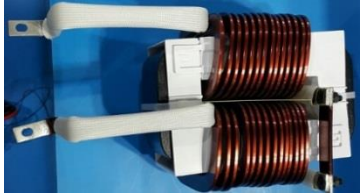




[ Track ]







[ Square ]

## The Case of Applications

Project	Product		
Drive Inverter			  
OBC	 		
Power Pack	  		

# PFC & DC Output Choke core

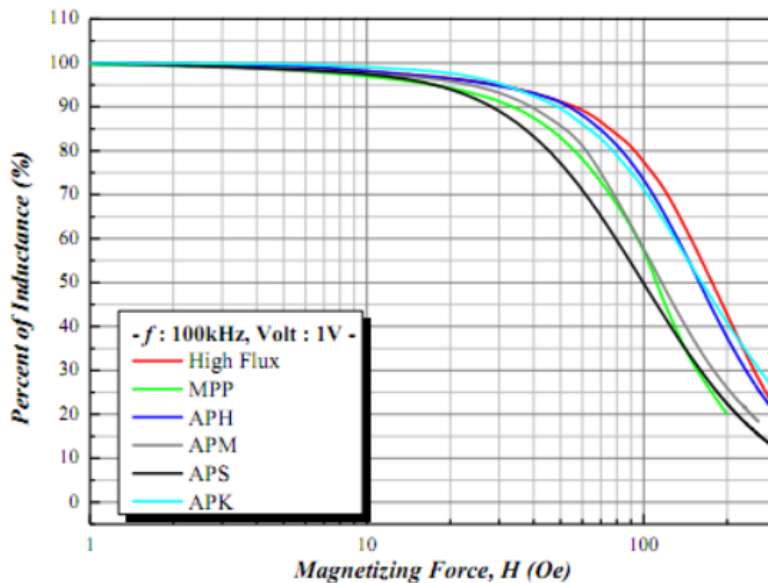
## Basic characteristics

Product	APH series	APM series	APK series	APS series	Amodust series
Material Alloy	Fe-Amorphous	Nanocrystalline	Fe-based metal	Fe-based metal	Fe-based metal
Composition	Fe-Si-B	Fe-Si-B-Nb-Cu	Fe-Si	Fe-Si-Al	Fe-Si-Al
Permeability ( $\mu$ )	60, 90 $\mu$	26, 60, 90, 125 $\mu$	26, 40, 60, 75, 90 $\mu$	26, 60, 90, 125 $\mu$	26, 60, 90, 125 $\mu$
Size(mm)	Ø13~57	Ø13~57	Ø13~100	Ø13~132	
Curie Temp.	395°C	570°C	700°C	500°C	500°C
Features	Good DCB Low core loss	Lowest core loss	Low cost Good DCB	Low cost Low core loss	Good formability Low core loss
Color					TBD

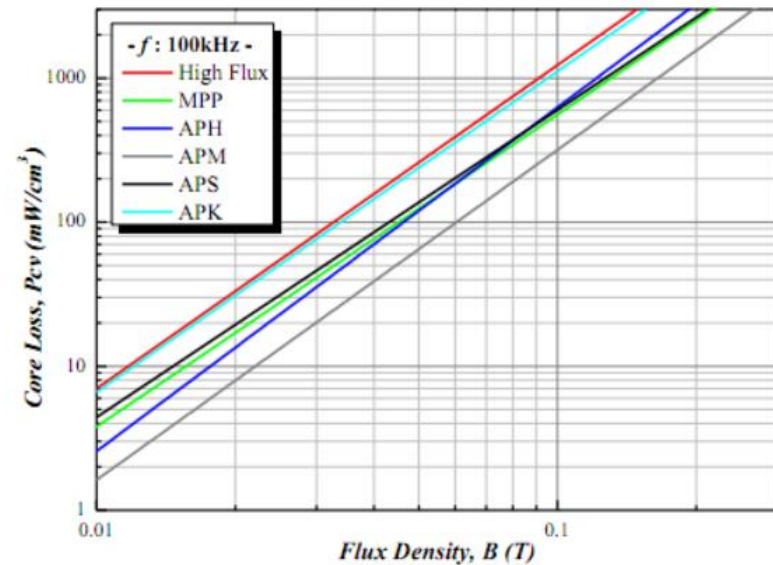
# Strength of powder core

- ▶ APH - Good DCB & Low core loss
- ▶ APM - The lowest core loss
- ▶ APK - Low cost & Good DCB
- ▶ APS - Low cost & Low core loss

## ➤ Inductance with DC bias current



## ➤ Core loss curves



*Note: The properties are typical value measured.(60μ)*

# Comparison data

Property	Amorphous Line		Metal Line			USA company (reference : catalog, 2018)		
	APH FE-AMORPHOUS	APM NANO-CRYSTALLINE	APK Fe-based metal	AMODUST Fe-based metal	APS Fe-based metal	High Flux	MPP	Sendust
Saturation Flux Density Bs(Gauss)	15,000	12,000	16,000	12,000	10,000	15,000	7,500	10,000
Core Loss @100kHz, 0.1T (mW/cm <sup>3</sup> )	600 ~700	300 ~400	1200 ~1300	500 ~ 600	600 ~ 700	1100 ~1200 (700 ~ 800)	600 ~700	700 ~800
Perm. vs DC Bias @100Oe	73%	53 %	70%	57%	50%	78% (80%)	55%	45%
Relative Cost	Medium	Med-Hi	Low	Lower	Lowest	High	Highest	Low

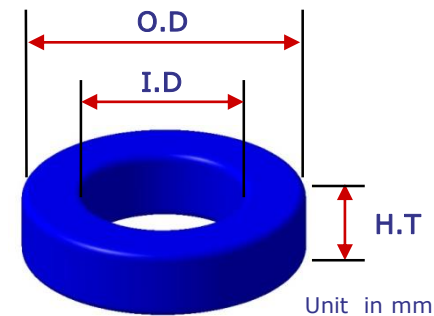
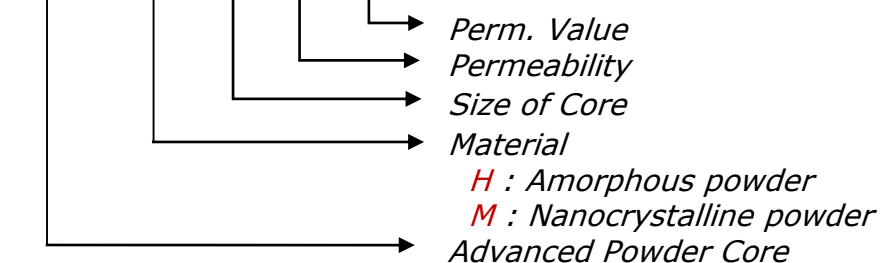
\* Note : The properties are typical value measured.(60μ)

( ) : Best in the market.

# Standard product list

Part no.	Size (Finished) (OD×ID×HT)	APH™		APM™				L <sub>e</sub> (cm)	A <sub>c</sub> (cm <sup>2</sup> )	Vol (cm <sup>3</sup> )	Cross reference ("C")
		A <sub>L</sub> (nH/N <sup>2</sup> )		A <sub>L</sub> (nH/N <sup>2</sup> )							
		60	90	26	60	90	125				
13P XX	13.5 × 7.0 × 5.5	27	40	12	27	40	56	3.12	0.11	0.36	CH/CM127
17P XX	17.4 × 9.5 × 7.1	35	52	15	35	52	72	4.11	0.19	0.79	CH/CM166
18P XX	18.0 × 9.0 × 7.1	43	64	19	43	64	89	4.14	0.23	0.96	CH/CM172
20P XX	21.1×12.1× 7.1	32	49	14	32	49	68	5.09	0.23	1.15	CH/CM203
23P XX	23.6 × 13.4 × 8.4	43	65	19	43	65	90	5.67	0.33	1.88	CH/CM229
24P XX	24.3 × 13.8 × 9.7	51	76	22	51	76	105	5.88	0.39	2.28	CH/CM234
27P XX	27.7×14.1 × 12.0	75	113	32	75	113	157	6.35	0.65	4.15	CH/CM270
33P XX	33.8×19.3×11.6	61	-	28	61	92	127	8.15	0.67	5.48	CH/CM330
36P XX	36.7×21.5×11.3	56	-	24	56	84	117	8.98	0.68	6.09	CH/CM358
40P XX	40.7×23.3×15.4	81	122	35	81	122	168	9.84	1.07	10.55	CH/CM400
46P XX	47.6×23.3 × 18.9	135	-	59	135	203	-	10.74	1.99	21.37	CH/CM467
50P XX	51.7×30.9 × 14.4	73	-	32	73	-	-	12.73	1.25	15.93	CH/CM508
57P XX	58.0×25.6 × 16.1	138	-	60	138	-	-	12.50	2.29	28.63	CH/CM571

**AP X XX P 60**



# New type core – Shape core

## Line-Up

Item	Features	Size	Fig.	Material
UIU	<ul style="list-style-type: none"> <li>2.4kW PFC</li> <li>High DCB</li> </ul>	<ul style="list-style-type: none"> <li>AUIU2016</li> <li>- U core: 20.3 x 15.9 x 20.3mm</li> </ul>		<ul style="list-style-type: none"> <li>AMODUST</li> </ul>
EO	<ul style="list-style-type: none"> <li>PFC / OPC</li> <li>Easy winding</li> </ul>	<ul style="list-style-type: none"> <li>AEO2619</li> <li>AEO3222</li> <li>AEO3626</li> </ul>		<ul style="list-style-type: none"> <li>AMODUST</li> </ul>
EQI	<ul style="list-style-type: none"> <li>Output choke for high power(2kW~)</li> <li>Low profile</li> </ul>	<ul style="list-style-type: none"> <li>AEQI2619</li> <li>AEQI3222</li> <li>AEQI3626</li> </ul>		<ul style="list-style-type: none"> <li>AMODUST</li> </ul>
FT Core	<ul style="list-style-type: none"> <li>Square shape for low power(~1kW)</li> <li>High performance</li> </ul>	<ul style="list-style-type: none"> <li>AFT3027</li> </ul>		<ul style="list-style-type: none"> <li>APH/APM</li> <li>AMODUST</li> </ul>
EE (EER)	<ul style="list-style-type: none"> <li>PFC choke for high power</li> <li>High current (30A~)</li> </ul>	<ul style="list-style-type: none"> <li>AE4116-60</li> <li>AE4321-60</li> </ul>		<ul style="list-style-type: none"> <li>APK</li> <li>AMODUST</li> </ul>
Round block core (Cylinder)	<ul style="list-style-type: none"> <li>Various Size &amp; properties</li> <li>Good assembly</li> </ul>	<ul style="list-style-type: none"> <li>ARBC10035</li> <li>- Round block : 100.5 x 35mm</li> <li>- Cylinder : <math>\varnothing 35</math></li> </ul>		<ul style="list-style-type: none"> <li>APK</li> </ul>

# Application Reference

Appl.	Circuit	Part no	Image
OBC	PFC(3.7kW)	APM40P60	
	PFC(4kW)	APH40P60	
	PFC(4.6kW)	APH46P60	
	PFC(5.6kW)	APH33P60	
Fast charger	Boost choke	ARBC10035-40	



# High efficient reactor core



AMLB series



AMCU series

## Features

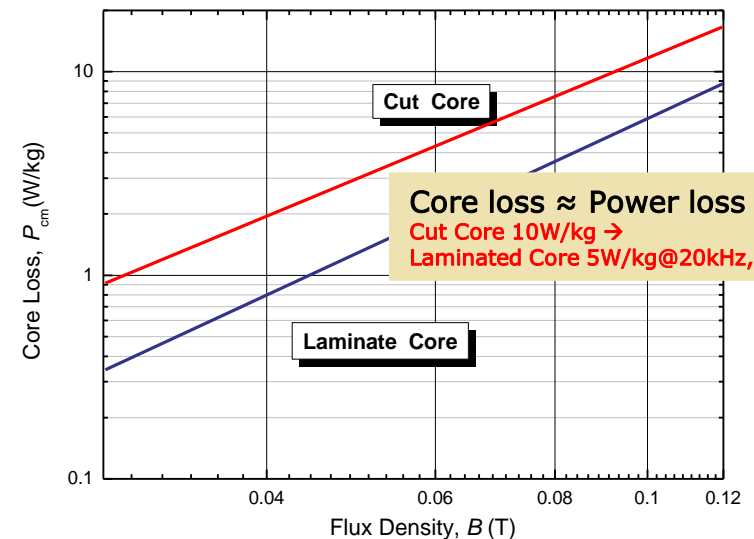
- Low eddy current loss and hysteresis loss
- High Saturation Flux Density
- Multiple gap core
- Made of Amorphous ribbon(25um)

## Benefits

- High efficiency
- Stable temperature dependency
- Compact component size
- Size flexibility(Laminate core)

## Material properties

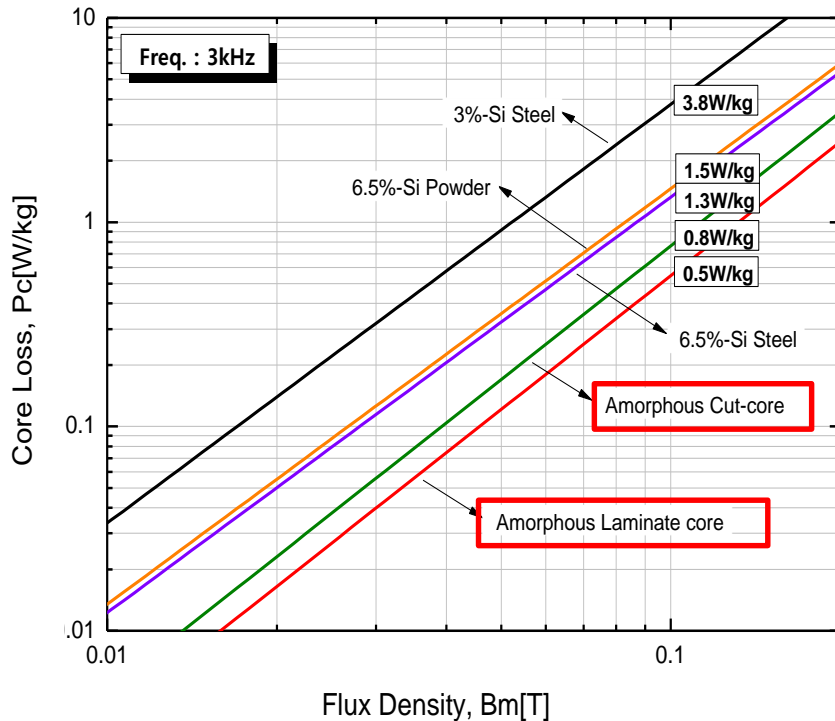
Properties	Fe-Amorphous
Material composition	Fe-Si-B
Saturation flux density $B_s$	1.56T
Permeability	200~7,000 $\mu$ i
Coercivity(Static, A/m)	2<Hc<3
Curie temperature $T_c$	395°C



# Strength of AMLB/AMCU series

## ① Lowest Core loss

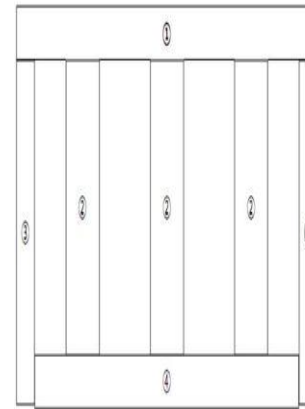
AMLB/AMCU series have much lower core loss in comparison with other materials.  
-> It will give you **higher efficiency** on your application.



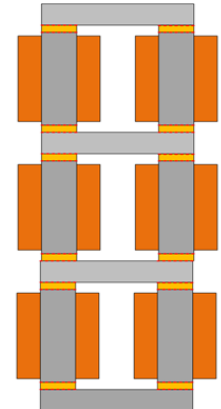
## ② Flexible design

It enables you to offer a various of core shape through block combination compared to cut Core.

<AC choke>



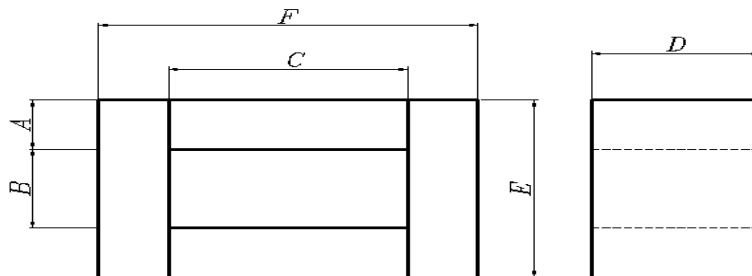
<DC/AC Inductor>



# Standard product list

Part Number	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	F (mm)	Mass (g)	L <sub>m</sub> (mm)	A <sub>c</sub> (mm <sup>2</sup> )	V <sub>e</sub> (mm <sup>3</sup> )	W <sub>A</sub> (mm <sup>2</sup> )
<b>AMLB-6320*</b>	20	20	60	30	60	100	920	240	534	24000	1200
<b>AMLB-7320*</b>	20	30	70	30	70	110	358	280	178	28000	2100
<b>AMLB-8320*</b>	20	40	80	30	80	120	1227	320	534	32000	3200
<b>AMLB-200</b>	19	25	84	49	63	122	1749	294	829	39984	2100
<b>AMLB-500</b>	25	40	85	54	90	135	3019	350	1202	55300	3400
<b>AMLB-800</b>	25	40	85	85	90	135	4753	350	1891	77000	3400
<b>AMLB-1000</b>	33	40	105	85	106	171	7521	422	2482	99592	4200
<b>AMLB-1700</b>	50	50	150	100	150	250	19171	600	4450	180000	7500

\* : These models are 1block standard type product



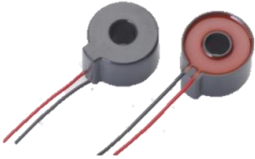
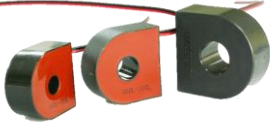

# Comparison data

Property		AMLB-Series	Super-E	Si-Steel	BK
B <sub>s</sub> (T)		1.56	1.80	1.87	1.60
Core Loss [W/kg]	@0.1T, 20kHz	7.8	20.9	51.6	18.2
L <sub>DC</sub> / L <sub>0</sub> (%) @ 100Oe		Dependent of gap size			
Size		Middle	Middle	Middle	Middle
Material		Fe-Si-B (Sheet)	Fe-Si(6.5%) (Sheet)	Fe-Si(3.5%) (Sheet)	Fe-Si(6.5%) (Powder)
Adaptive frequency (kHz)		18~80	~30	~13	~100
Price		Middle	High	Low	Middle

Note : Core loss is typical value at 100 kHz,0.1 T

# Current Sensor

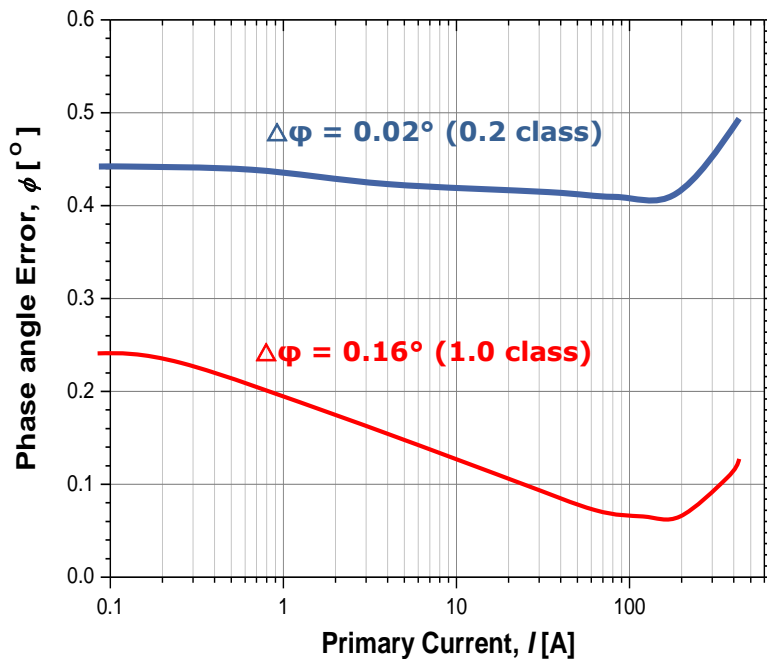
## Basic characteristics

Product	AST Series	ASM series	ASLC series
Material Alloy	Nanocrystalline	Amorphous	Ferrite
Permeability( $\mu$ )	$\sim 160k$	$30k \sim 40K$	$10k$
Bs [T]	$\sim 1.2$	$\sim 1.5$	$\sim 0.4$
DC-immune	No	Yes	No
Features	High Accuracy & Low ratio error	Excellent linearity and precision	Split type CT
Remark	IEC62053-22 ANSI C12.xx	IEC62053-21, IEC62053-23	-
			

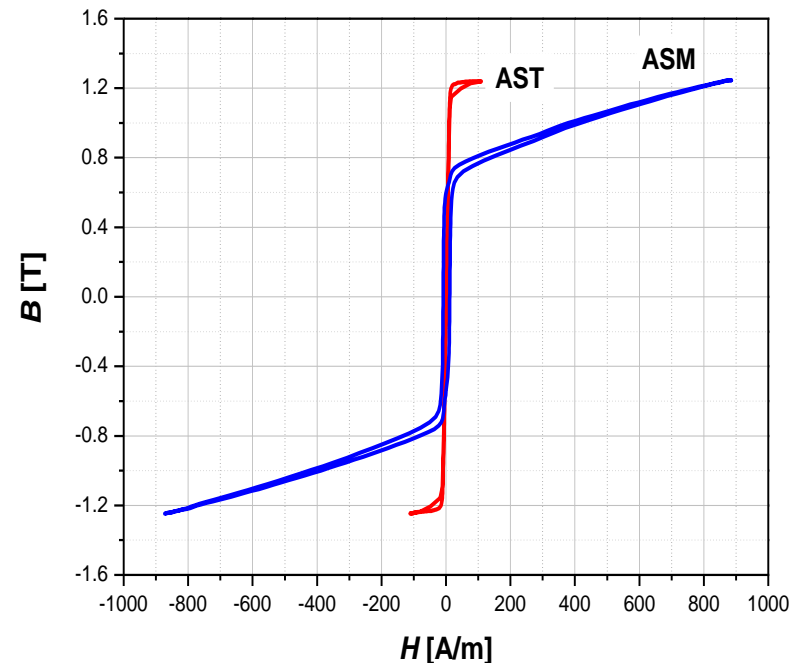
# Strength of AST & ASM-series

- ▶ AST - **Excellent accuracy** in current sensing
  - Very small and high linear phase and amplitude error
- ▶ ASM - **No saturation in DC factor**
  - Excellent linearity and precision

### [Phase angle error]



### [B-H loop of CT-series]



# Standard product list

Part number (P/N)	Primary current range		Turns ratio 1:[]	Errors		Characteristics			Dimensions		Cross Product  √社
	$I_N$ (A <sub>rms</sub> )	$I_{DC,MAX}$ (A <sub>op</sub> )		Phase $\Phi$ (°)	Amplitude  F  (%)	L (H)	$R_{cu}$ ( $\Omega$ )	$R_B$ ( $\Omega$ )	$\Phi$ (mm)	Width x height (mm x mm)	
AST-005P/L	5	-	2500	0.30	0.02	183	152	150	6	24.5 x 11.1	
AST-005PA/LA	5	-	2500	0.38	0.02	183	236	150	7.7	23.2 x 10.8	
AST-006P	6	-	2000	0.25	0.02	156	114	30	6.3	24.5 x 11.5	E4622-X501 / E4622-X503
AST-040P/L	40	-	2500	0.17	0.01	183	152	18.75	6	24.5 x 11.1	E4623-X002
AST-060P	60	-	2500	0.09	0.01	143	63	12.5	7.7	31.1 x 15.3	E4624-X502
AST-080P/L	80	-	2500	0.14	0.03	226	160	9.375	8.9	26.1 x 17.1	E4622-X002
AST-120L	120	-	2500	0.10	0.04	180	68	6.25	12.2	39.0 x 17.6	E4626-X002
ASM-040L	40	40	2500	0.18	0.02	149	147	18.75	7	26.3 x 17.3	E4623-X101
ASM-060L	60	60	2500	0.22	0.02	156	160	12.5	8.5	26.0 x 17.5	E4624-X101
ASM-120L	120	120	2500	0.17	0.02	133	103	6.25	14.5	38.4 x 15.0	E4627-X101

AS□ - □□□□□□□ ...

Extra words (changed spec. etc)

Terminal structure: L=Lead type; P=Pin type

Rated current in ampere (rms)

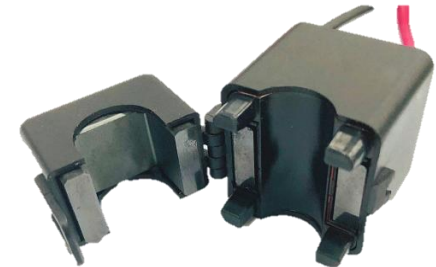
The '040' means it measures up to 40 Amperes in rms current (typical).

Type of DC-tolerance: D=with DC-tolerance; T=without DC-tolerance; M=combined...

# Split type CT

## Strength

- ▶ **ASLC** - Easily installed and removed
- No necessary to disconnect the primary cable



## Line-up

Part no.	Input current [A]	Output current [mA]	Turns ratio [:1, Ts]	Burden resistance	Error range [%]
ASLC-060L	0~50	0~16.67	2000	20Ω	±0.5~1.0
ASLC-120L	0~100	0~33.33	3000		
			4000		
			5000		
ASLC-150L	150	5000	30	1VA	1.0



# Application Reference

Appl.	Part no	Image
Quick Charger	AST-005PA	
Gate Way	AST-100L-3CT	
	ASLC-100LS-1	
EV charging station	ASM-060LD (350mm)	
ESS	AST-200L4-2CT	

For **Customer**

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**Thank you**