

# SUNGHO ELECTRONICS

Film Capacitor Total Solution Provider

<b>Name</b>	Sungho Electronics Corp
<b>Established</b>	May, 1973 (46 years old)
<b>Capital</b>	12M USD
<b>Employee</b>	1,100 (Global)
<b>Sales</b>	Yr 2019 => 98M USD Yr 2020 (Est) => 120M USD
<b>Capacity</b>	200M pcs/ Month (Top in Korea)
<b>Location</b>	HQ => Seoul, Korea Factory 1 => Zhuhai, Guangdong, China Factory 2 => Weihai, Shandong, China

Items	Details	Remark
Law Material	Direct production of film	
	Direct production of plastic case	
Facility	70% of direct designing and manufacturing	
Technology	Mass production of pattern film from year 2009	Diverse pattern: Diamond, T, Half T, and more
	Mass production of anti-humidification products	85/85, 1000hr, Rated voltage
	Guarantee 125°C	
	World class cutting-edge technology of removing acoustic noise	

**Raw Material**  
(Weihai, China)

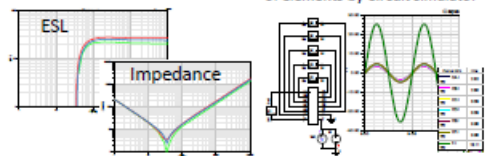


**Design/R&D Simulation**  
(Seoul, Korea)

Electrical Performances Analysis

Impedance analysis

Current distribution analysis  
of elements by Circuit simulator



Reference  
VDA6.3

**Reliability Test**  
(Zhuhai & Weihai)

Reference  
AEC-Q200

**Auto Machine**  
(Zhuhai, China)



**Mass Production & Inspection**  
(Zhuhai & Weihai)

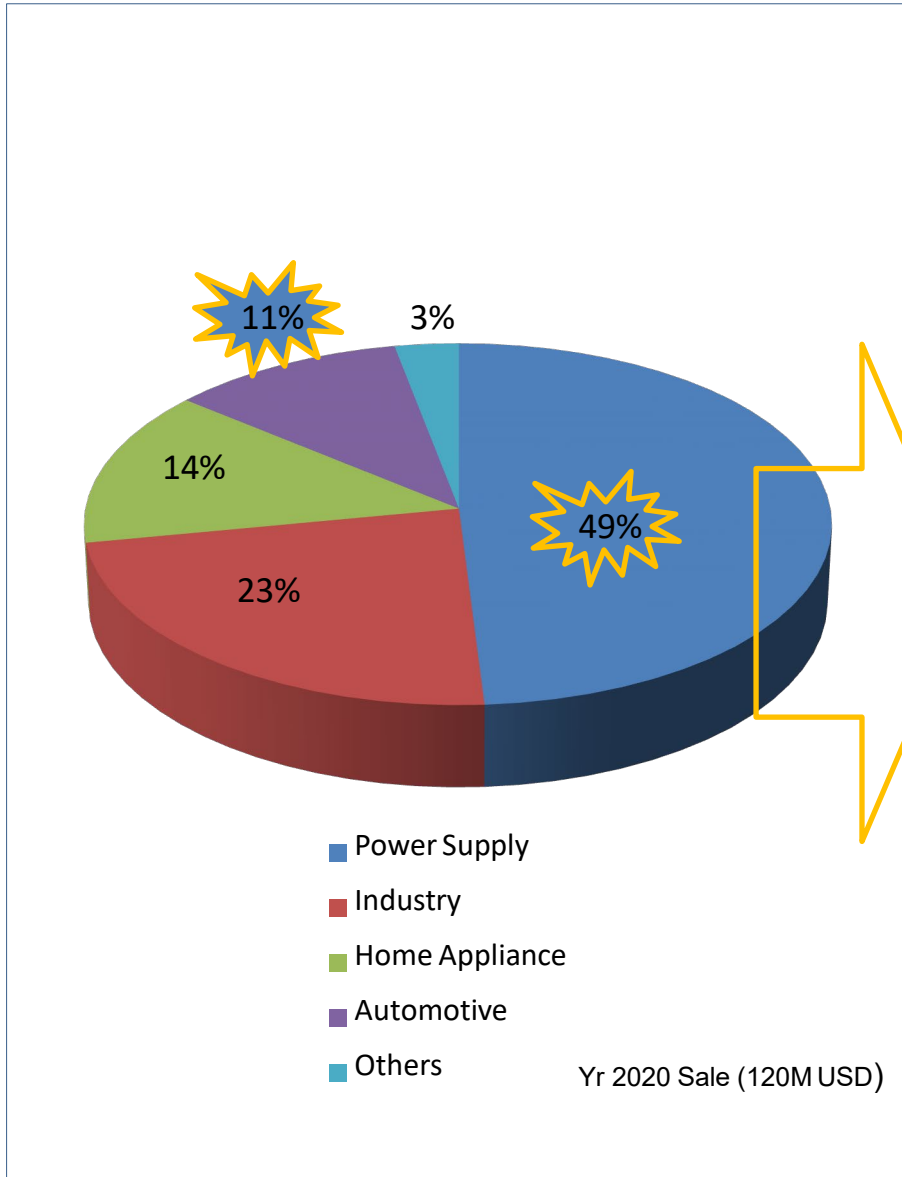


Reference  
IATF16949 &  
ISO9001  
ISO14001  
QC080000  
VDA6.3

Reference  
AEC Q-001  
AEC Q-002  
JESD 50

**Global Sales**





## Power Application & Customers (49%)

Application	Customer
5G Base Station	Advanced Energy(Artesyn), Nokia
Data Center	Amazon, Google, Facebook, Apple
UPS	Delta, Lite-on
Networking, Server	Delta, Artesyn (Emerson), Lite-on, FSP, Acbel
Green Energy	Delta, Dasstech, DongYang ENP
Industrial	ABB, Sanken, Murata
Medical	Radian Q Bio

## Automotive Application & Customer (11%)

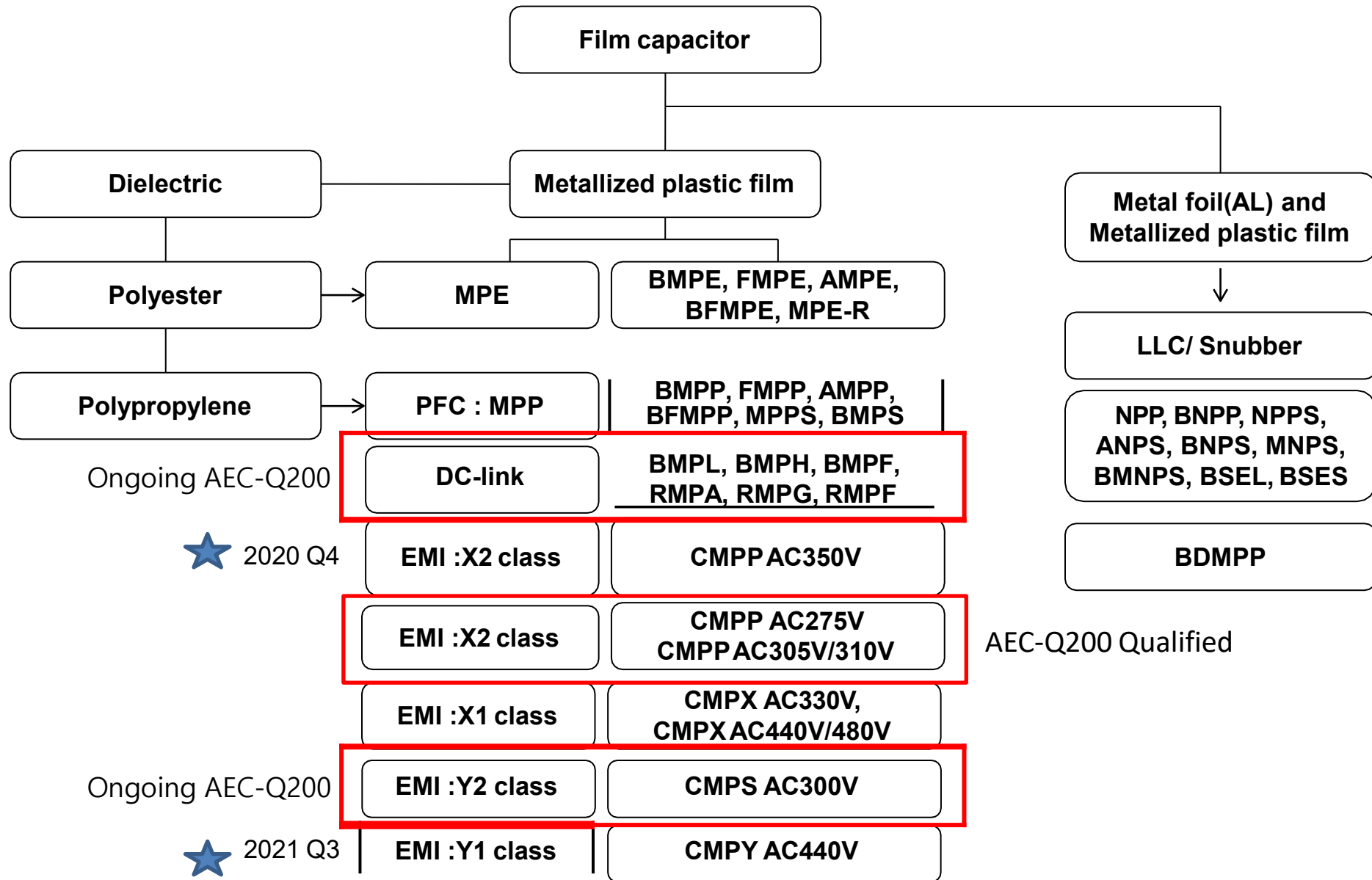
Application	Customer
Brush Holder	HYUNDAI/KIA, GE
Wiper Motor	HYUNDAI/KIA
Electric Sheet	HYUNDAI/KIA
Charger (Inc. Portable)	HYUNDAI/KIA

# World Top Power Supply Manufactures

Rank	PS Manufacturers	2015	2016	2017	% of Power Supply Sales
1	Delta Electronics	4,854	4,877	5,186	17%
2	Schneider Electric	3,250	3,250	3,400	In process
3	Emerson(Artesyn)	3,550	3,350	3,075	5%
4	Eaton Corp	2,050	1,950	1,950	
5	Liteon Technology	1,620	1,500	1,600	18%
6	ABB with GE	1,490	1,388	1,240	1%
7	SMA Solar Technology	1,100	990	1,068	
8	Mean Well	703	783	926	6%
9	Chicony Power	875	904	920	5%
10	Flextronics	875	800	825	6%
11	Salcomp	638	524	745	
12	Advanced Energy			671	
13	TDK	540	530	550	
14	Acbel	625	570	534	9%
15	FSP Group			521	6%

(USD in Millions)

# Film Cap Portfolio

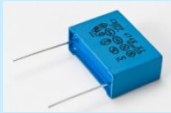


## Functional Applications

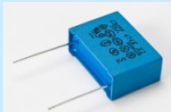
- ✓ EMI/RFI Suppressor
  - Across the line
  - X1 class

- ✓ EMI/RFI Suppressor
  - Across the line
  - X2 class

## Characteristics



- 0.0047uf~6.8uf
- 10mm~37.5mm pitch
- -40°C~110°C



- 0.0047uf~10uf
- 7.5mm~37.5mm pitch
- -40°C~110°C

### CMPP275VAC

40°C/93%RH 275VAC , Pitch10~37.5mm  
 500hrs:  $\Delta C/C$  limit:  $\leq \pm 10\%$ , 1000hrs:  $\leq \pm 30\%$

### CMPP310VAC-AA

40°C/93%RH 310VAC , Pitch10~37.5mm  
 500hrs:  $\Delta C/C$  limit:  $\leq \pm 10\%$ , 1000hrs:  $\leq \pm 30\%$

### CMPP275VAC-R / CMPP310VAC-R

85°C/85%RH 275VAC&310VAC  
 1000hrs  $\Delta C/C$ :30%

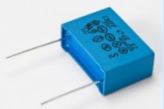


### CMPP310VAC-RR

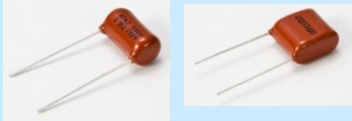
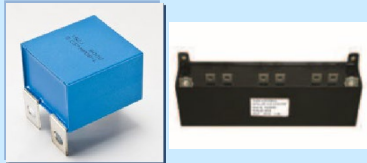

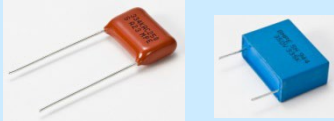
85°C/85%RH 310VAC  
 1000hrs  $\Delta C/C$ :10%

## Series Name

- CMPX 330VAC
- CMPX 440VAC
- CMPX 480VAC
- CMPP 275VAC
- CMPP 305VAC
- CMPP 310VAC
- CMPP 310VAC-AA
- CMPP275VAC-R
- CMPP310VAC-R
- CMPP310VAC-RR



Functional applications	Characteristics	Series name
<ul style="list-style-type: none"> <li>✓ EMI/RFI Suppressor                             <ul style="list-style-type: none"> <li>- Line to ground</li> <li>- Y1 Class</li> </ul> </li> </ul>	 <ul style="list-style-type: none"> <li>- 470pF~4700pF</li> <li>- 15mm pitch</li> <li>- -40°C~115°C</li> </ul>	<ul style="list-style-type: none"> <li>- CMPY 440VAC</li> </ul>
<ul style="list-style-type: none"> <li>✓ EMI/RFI Suppressor                             <ul style="list-style-type: none"> <li>- Line to ground</li> <li>- Y2 Class</li> </ul> </li> </ul>	 <ul style="list-style-type: none"> <li>- 0.001uf~1uf</li> <li>- 10mm~37.5mm pitch</li> <li>- -40°C~105°C</li> </ul>	<ul style="list-style-type: none"> <li>- CMPS 300VAC</li> </ul>
<ul style="list-style-type: none"> <li>✓ EMI/RFI Suppressor                             <ul style="list-style-type: none"> <li>- X2 Class</li> <li>- Spark quenching</li> <li>- CR unit (single resistor included)</li> </ul> </li> </ul>	 <ul style="list-style-type: none"> <li>- 0.01uF~1.0uF</li> <li>- 15mm~27.5mm pitch</li> <li>- -40°C~85°C</li> </ul>	<ul style="list-style-type: none"> <li>- CMPR 250VAC</li> <li>- CMPR 300VAC</li> </ul>
<ul style="list-style-type: none"> <li>✓ AC &amp; Pulse                             <ul style="list-style-type: none"> <li>- Resonant</li> <li>- Switching / Snubber</li> </ul> </li> </ul>	 <ul style="list-style-type: none"> <li>- High current</li> <li>- High frequency</li> <li>- High Pulse</li> </ul>	<ul style="list-style-type: none"> <li>- NPPS/BNPS/ANPS</li> <li>- NPP/BNPP</li> <li>- MNPS/BMNPS</li> <li>- BDMPP</li> </ul>

Functional applications	Characteristics	Series name	
<ul style="list-style-type: none"> <li>✓ PFC Input                             <ul style="list-style-type: none"> <li>- Filtering</li> </ul> </li> <li>✓ AC motor running</li> </ul>		<ul style="list-style-type: none"> <li>- Ultra low noise</li> <li>- Capacitance stability</li> <li>- Low dissipation factor</li> </ul>	<ul style="list-style-type: none"> <li>- MPP/MPP(R)/BMPP</li> <li>- FMPP/FMPP(R)</li> <li>- MPE/BMPE/FMPE</li> </ul>
<ul style="list-style-type: none"> <li>✓ Power Electronic                             <ul style="list-style-type: none"> <li>- DC –link / Switching</li> <li>- Filtering</li> <li>- Snubbing</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>- High ripple current</li> <li>- Capacitance stability</li> <li>- Long life</li> <li>- 2pins / 4pins / Lug terminal</li> </ul>	<ul style="list-style-type: none"> <li>- BMPL, BMPS</li> <li>- BSEL, BSES</li> <li>- AMPP</li> </ul>
<ul style="list-style-type: none"> <li>✓ Power Electronic                             <ul style="list-style-type: none"> <li>- DC –link</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>- High ripple current</li> <li>- Capacitance stability</li> <li>- Long life</li> <li>- Al case</li> </ul>	<ul style="list-style-type: none"> <li>- RMPA, RMPG, RMPF</li> </ul>
<ul style="list-style-type: none"> <li>✓ General Purpose                             <ul style="list-style-type: none"> <li>- Blocking / Coupling</li> </ul> </li> </ul>		<ul style="list-style-type: none"> <li>- High insulation resistance</li> <li>- Low inductance</li> </ul>	<ul style="list-style-type: none"> <li>- MPE/FMPE/BMPE</li> <li>- NPP</li> </ul>

# Market Analysis-Power Film Application



## Renewable Energy Systems

An important part of the energy generation mix is growing globally due to legislation for clean power.

## Variable Speed Drives

Demand for energy efficiency proposition, their automation and the increase in productivity as a result of installation.



## White Goods

Reflects greater energy efficiency as well as growing penetration of variable speed drives into the segment.



## Traction

Electric rail, fast and efficient mass transit solutions. Emerging countries represent 30% of revenues for electric rail systems.

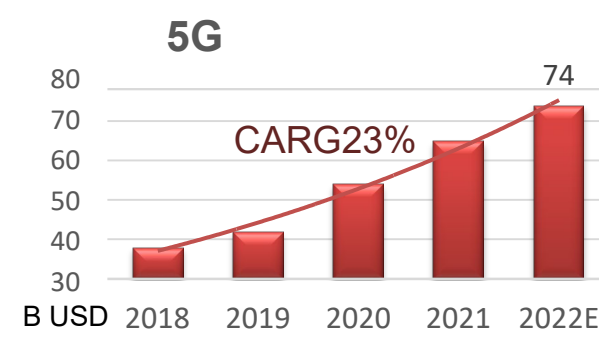
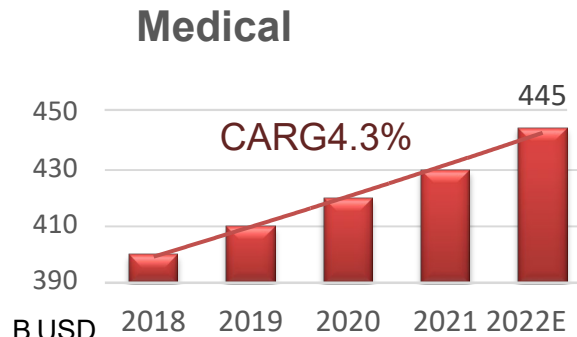
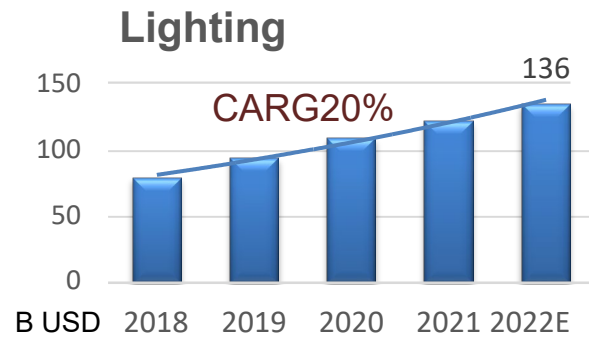
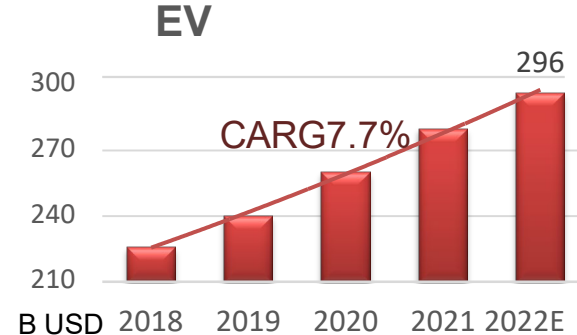
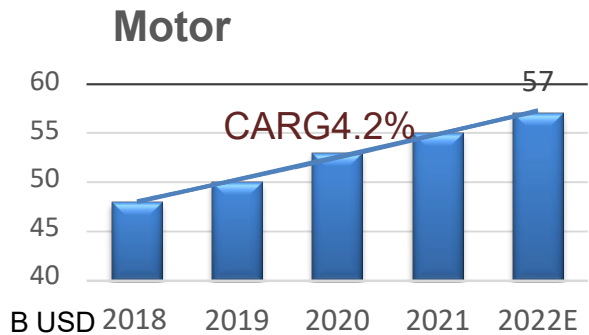
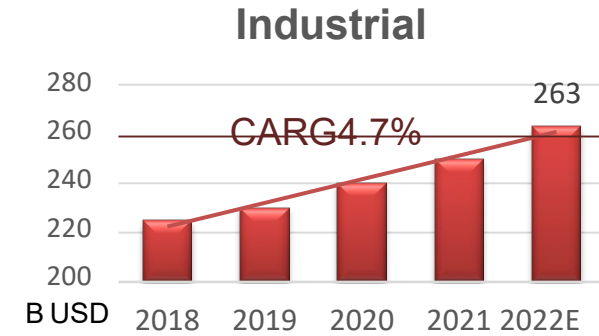
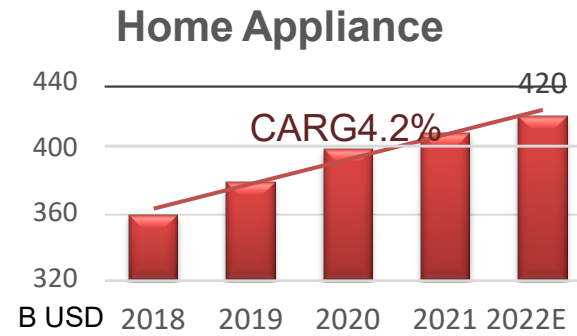
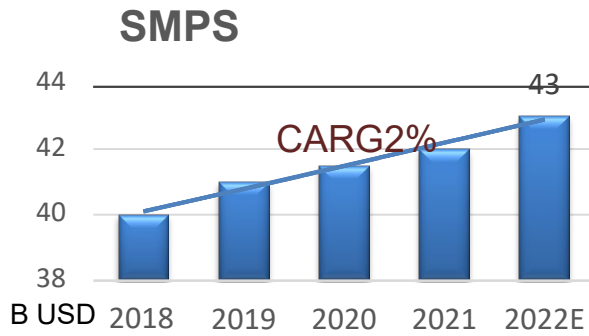


## Charging Stations

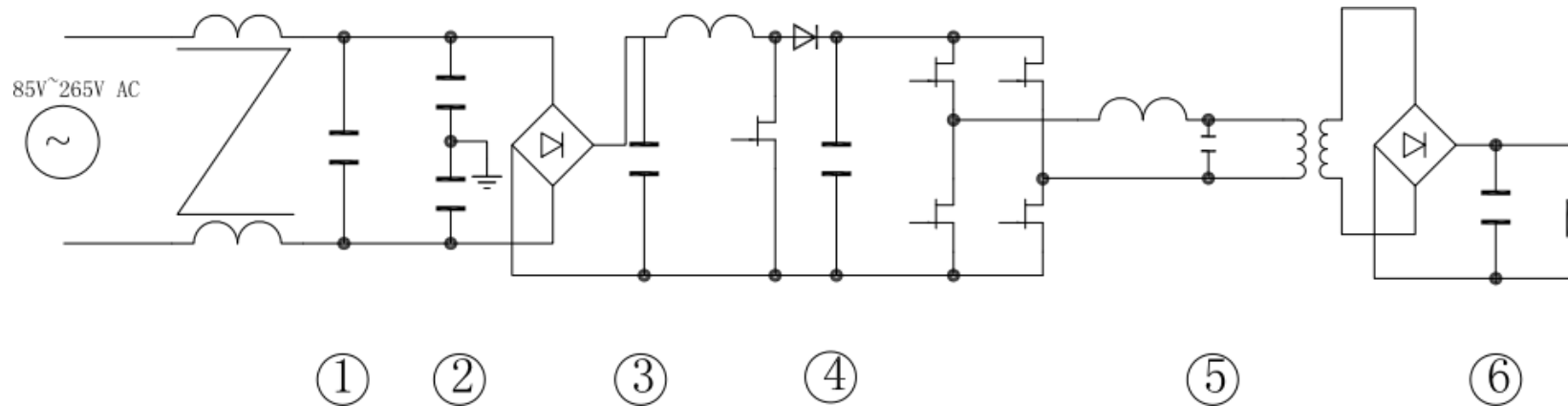
Focus for research and development will be energy efficiency, charging time, and compactness.

Source: Paumanok Publ., Paper & Plastic Capacitor: World Markets, Technologies & Opportunities: 2019-2023

# Market Analysis



# Application – On Board Charger



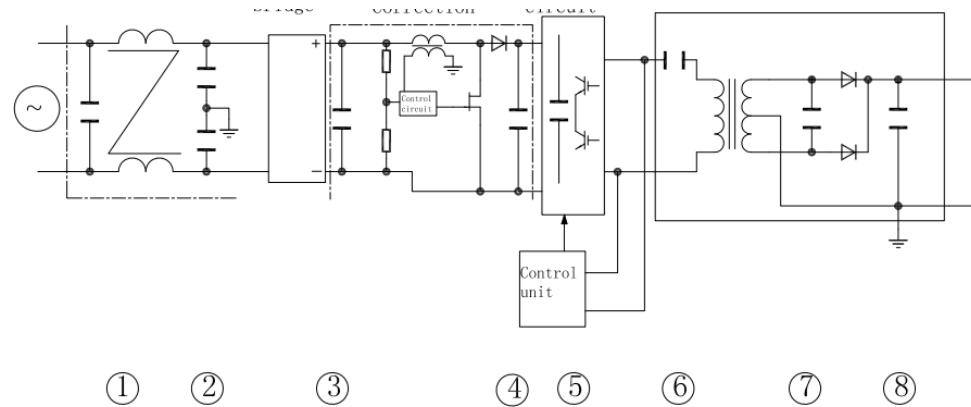
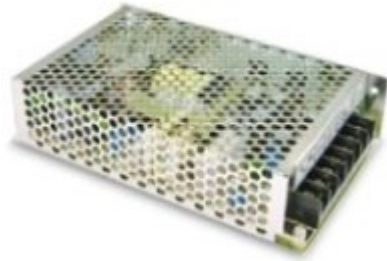
Charging station



On Board Charger ( OBCM )

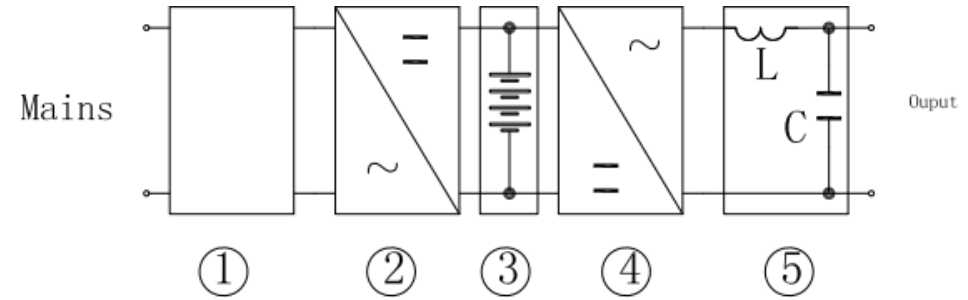
No.	Series Name	Performance	UNIT
1	CMPP 310VAC	RFI	EMI Filter
2	CMPS 300VAC	RFI	EMI Filter / Surge
3	BMPP	PFC	PFC Circuit
4	BMPL	DC-link	PFC Circuit
5	BNPS/BDMPP	Resonance	Resonant circuit
6	BMPL/RMPA	DC-Filter	Output DC-Filter

# Application – Networking, Server Power



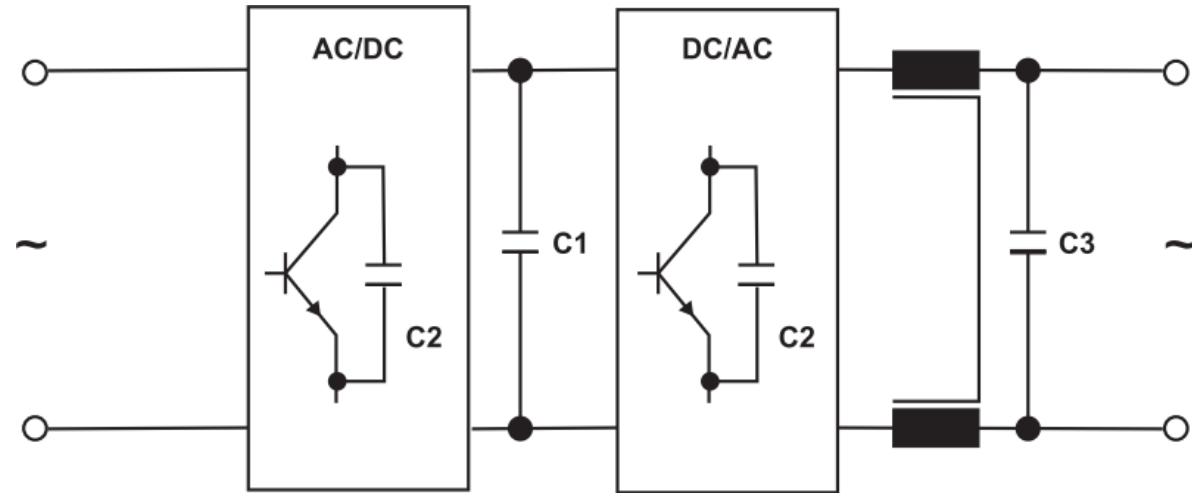
No.	Series Name	Performance	UNIT
1	CMPP 310VAC	RFI	EMI Filter
2	CMPS 300VAC	RFI	EMI Filter / Surge
3	BMPP	PFC	PFC Circuit
4	BMPP/BMPL	DC-LINK	PFC Circuit
5	BNPS/BDMPP	Snubber	Switching Circuit
6	BMPP/BDMPP	Coupling	Output Circuit
7	BMPP/BDMPP	Snubber	Output Circuit
8	BMPE	Filter	Output Circuit

# Application – UPS



No.	Series Name	Performance	UNIT
1	CMPP CMPX	RFI	EMI
2	BMPL/BMPP/RMPA	DC-LINK	AC-DC Battery Charger
3			Battery Bank
4	BDMPP/BNPS/BSES	Snubber	DC-AC Inverter
5	BMPP	AC-Filter	Output AC-Filter

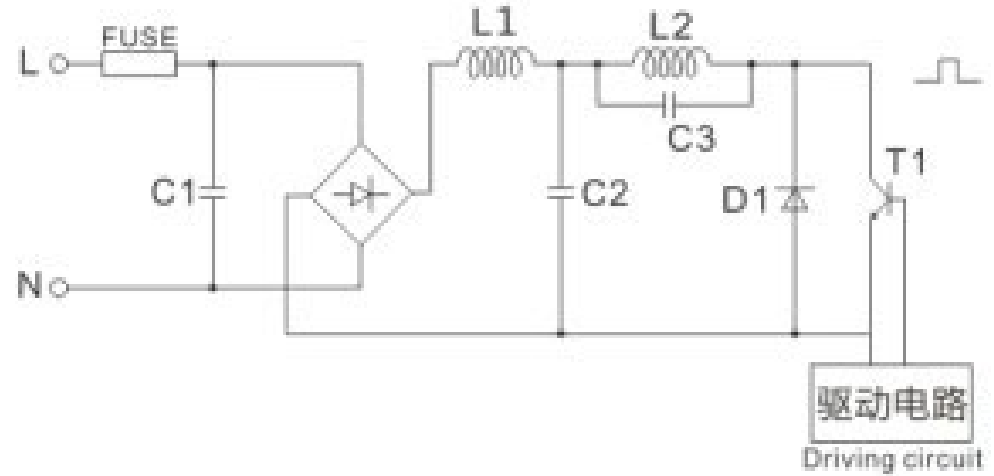
# Application – Green Energy (Solar, Windmills)



No.	Series Name	Performance	UNIT
1	RMPA	DC-link	AC/DC DC-Filter
2	BSES/BNPS/BDMPP	Snubber	DC/AC Converter
3	BMPP(AC)	Output AC-Filter	AC-Filter

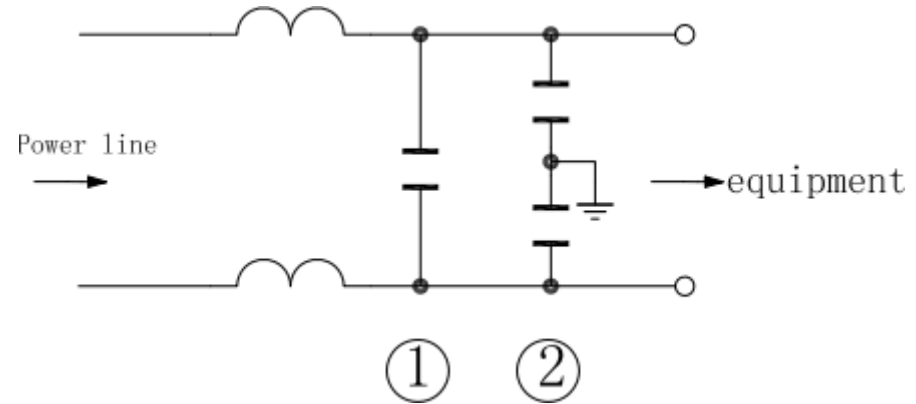


# Application – Induction Cooker



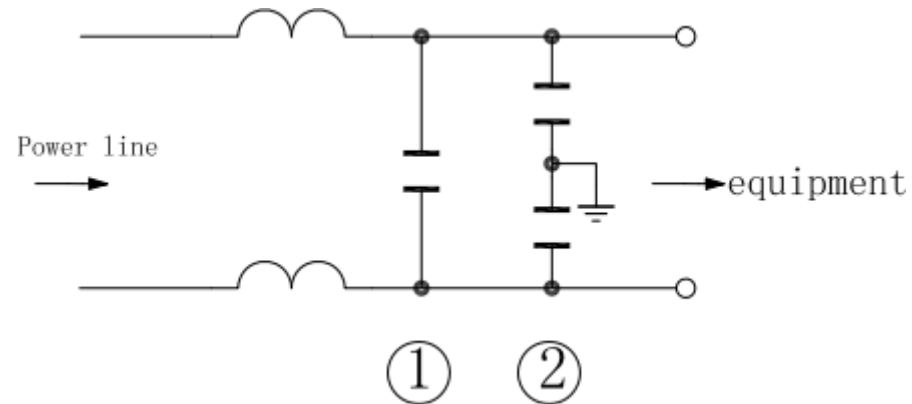
No.	Series Name	Performance	UNIT
1	CMPP	EMI	RFI
2	MPP/BMPP	DC-Filter	PFC/DC-Filter
3	AMPP/AMPS/BDMPP/ BMPP	Resonant	Inductive heating

# Application – Home Appliance



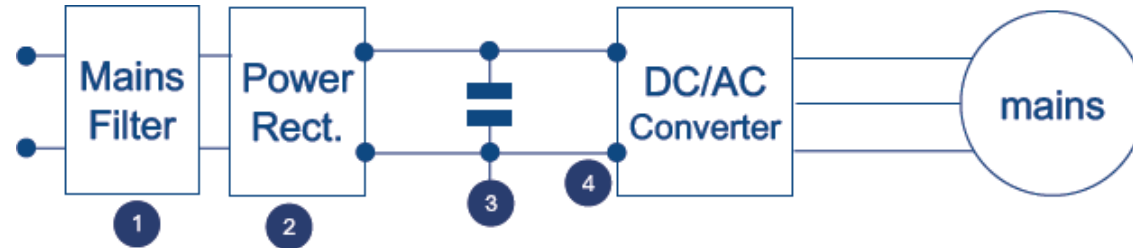
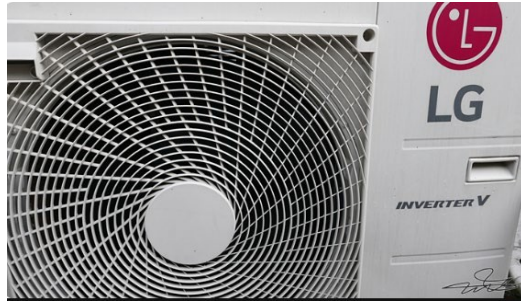
No.	Series Name	Performance	UNIT
1	CMPP	RFI	EMI
2	CMPS	RFI	EMI
4	BMPP/MPP	PFC	Power correction

# Application – Energy Meter



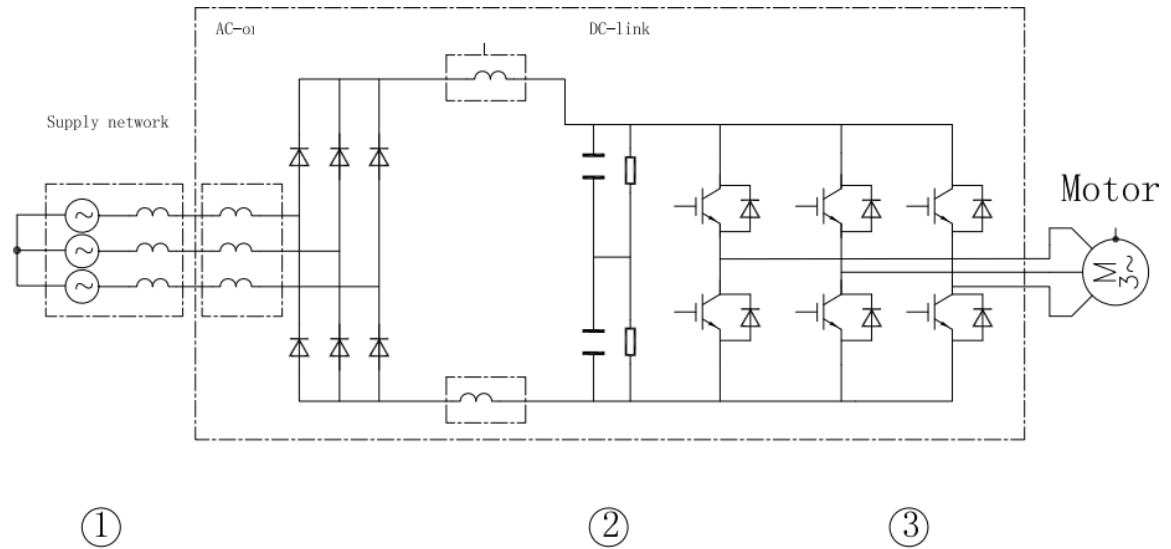
No.	Series Name	Performance	UNIT
1	CMPP	RFI	EMI
2	CMPS	RFI	EMI

# Application – Air Conditioner



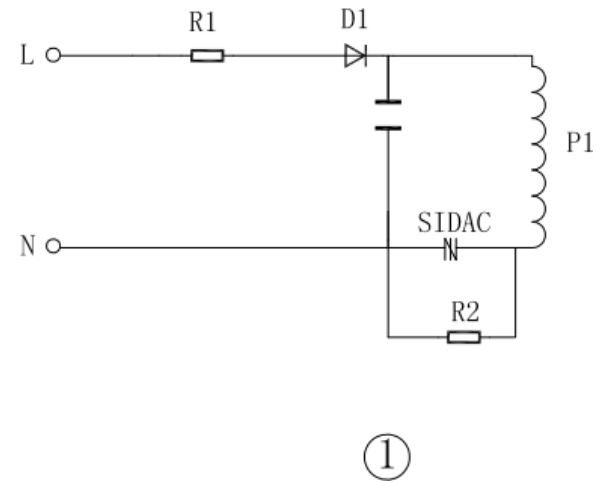
No.	Series Name	Performance	UNIT
1	CMPP/CMPS	RFI	EMI
2	BMPP	PFC	Power Rectifier
3	BMPL	DC-link (Alternative electrolytic capacitor)	DC-Filter
4	BNPS/BDMPP/BSES	Snubber	DC/AC Converter

# Application – Motor Driver



No.	Series Name	Performance	UNIT
1	CMPP	RFI	EMI
2	BMPL/RMPA/BMPP	DC-link/DC-Filter	AC-DC
3	BNPS/BSES/BDMPP	Snubber	DC/AC

# Application – Gas Ignition



No.	Series Name	Performance	UNIT
1	MPE/BMPE	Charge&Discharge	Ignition Unit

# | Application – Welder



No.	Series Name	Performance	UNIT
1	CMPP	RFI	EMI
2	BMPL/RMPA/BMPP	DC-link	AC-DC
3	BNPS/BSES/BDMPP	Snubber	DC/AC

# | Application performance for AEC

Customer	Qty/year	Application
Samwon	5,000,000	Brush holder
Dongah Electric Equip	2,000,000	Brush holder
Munhwa Tech	1,000,000	Wiper motor
Delta Electronics	1,000,000	EV Charger
LITE-ON	500,000	EV Charger
Acbel	300,000	EV Charger
<b>Total</b>	<b>9,800,000</b>	



ELEKTRONIK  
**Blume**

Alexander Stillig

BLUME ELEKTRONIK DISTRIBUTION GMBH

TECCENTER 1 | 31162 | BAD SALZDETFURTH

FON:(0 50 63) 27 12-227 | FAX:(0 50 63) 27 12-12

EMAIL: STILLIG@BLUME-ELEKTRONIK.DE

[www.blume-elektronik.de](http://www.blume-elektronik.de)

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