



2019 Mornsun

P r o d u c t K n o w l e d g e

ACDC Product Line Introduction

MORNSUN Guangzhou Science & Technology Co.,Ltd



01 AC DC Product Line Introduction and Layout

02 Open Frame Product Line(LS+LO)

03 Module Converter Product Line (LDE/LHE)

04 Enclosed Switching Power Supply (DIN-rail LI + LM caged power supply)

05 High Voltage Input Power(PV/PVA)

06 Other Industry Product Line(Three-phase and Four-wire Power Supply/ Medical Power Supply)

CONTENT



1

AC DC

Product Line

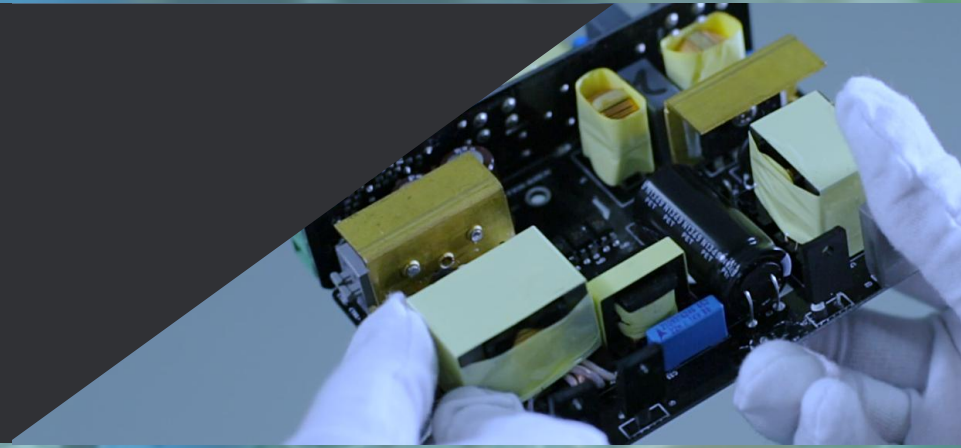
Introduction and Layout

1. AC DC Product Line Introduction and Layouts

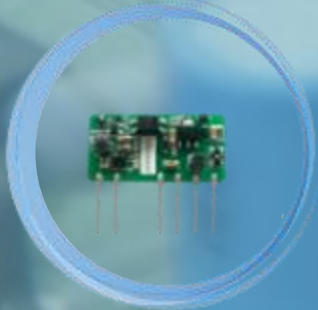
1.1 Type of AC-DC converter

Features:

- Power: 1-350W
- Industrial grade operating temperature & low ripple
- Standby power consumption as low as 0.5W
- EMC/EMI performance: Class B
- High reliability & multiple protections
- High electromagnetic compatibility (Level three)



1-15W
cost-effective
LS(C) Series



5-60W
cost-effective
LHE Series



2-20W
compact size
LDE Series



3-65W
open frame
LO Series



30-240W
DIN-Rail
LI Series



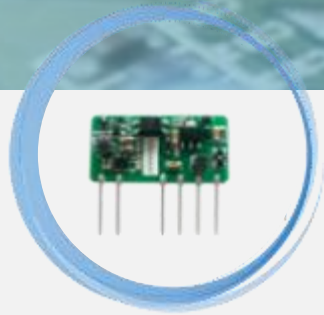
35-350W
enclosed
LM Series



1. AC DC Product Line Introduction and Layouts

1.2 Characteristic of AC-DC converter

1-8W
Cost-effective
LS Series



- Small size, low cost
- Specific for smart home
- EMC can be DIY

5-60W
High Reliability
LHE Series



- Slightly larger dimension
- Excellent EMC, better than LDE
- Up to +85 °C operating temp.

1-60W
Compact Size
LDE Series



- Small size
- Good EMC
- Small size is the market trend

30-240W
DIN-Rail
LI Series

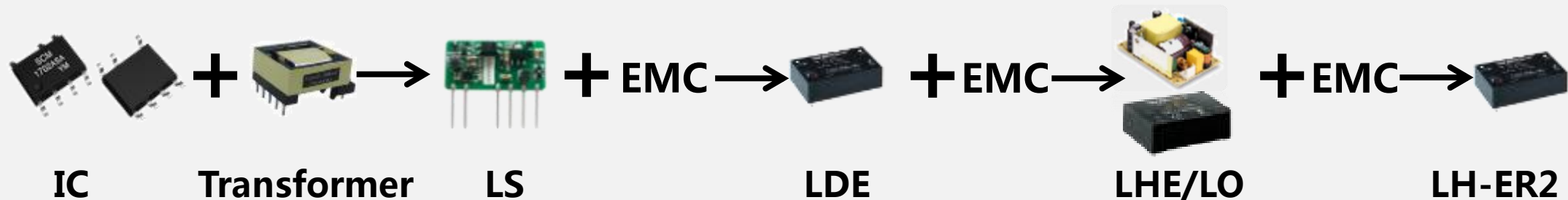


- No PFC, low Cost
- Compete with MEAN WELL
- Add PFC product line

35-350W
Enclosed AC1DC
LM Series



- No PFC, low Cost
- Compete with MEAN WELL
- Add PFC product line



1. AC DC Product Line Introduction and Layouts

1.3 Product tree

**Mornsun
ACDC**

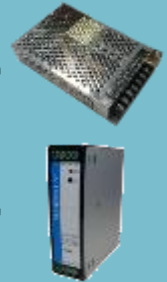
Module power supply



LDE/LHE series(2--60W)
85-264Vac , 85-305Vac
Single or multiple output

LDE-W series(3-5W)
85-264Vac

Enclosed power



LM series(35-350W-500W)
85-264Vac , 165-264Vac,
Single or multiple output

LI series(30-500W)
85-264Vac

Open Frame



LS series (1-10W)
LSC series (15W) Core board
Non-isolated ACDC

LO series (3-400W)
85-264Vac, 165-264Vac

AC high voltage input



PVA series (40W/70W/120W)
85-900Vac , 460-1400Vac,

Package expansion



Chassis/DIN-Rail

Medical power supply



(-MU series) 5W-25W
85-264Vac

Three-phase power supply



LD-26B (3W-20W)
90-528Vac

LS-26B (3-5W)
90-528Vac

LO-26B (10-20W)
85-264Vac , 165-264Vac,

Integrated 485/CAN



(TLA series)3W
85-305Vac

DC high voltage input



PV series (5-40W/45W-60W)
100-1000Vdc , 200-1500Vdc

Open frame/Potting/rail/Voltage
PV series (120W-200W)
200-1100Vdc , 300-1500Vdc

1. AC DC Product Line Introduction and Layouts

1.4 Product line

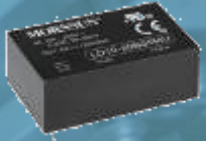
Red: New products in 2019

Blue: New products in 2018/2017

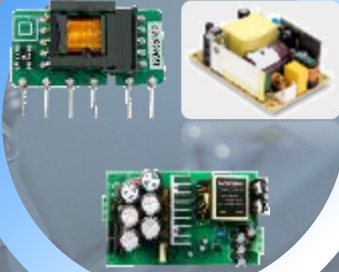
Black: Old product which will be discontinued

Power	Module power supply			Enclosed power			Open Frame		Medical	Three-phase	High voltage input	
	LD/LHE	LH/LHE	LHE multiple output	Din-rail LI	Enclosed LM	LM multiple output	LS	LO	LH/LD	LS/LD	PV	PVA
350W					LM350-10/12B			LO400			PV350	
240W				LI240-10B							PV200-27/29B	
200W					LM200-10/12B			LO200				
120W				LI120-20B-R2 LI120-10/13B	LM150-20/22B LMF150-20B						PV120-27B	PVA120-27B
90W				LI100-20B-PR2	LM100-20/22B	LM100-10C/D		LO100				
75W					LM75-20/22B	LM75-10C/D					PV75-36D	PVA70-27B
60W	LDE60-20B	LHE60-23B LHE60-20B LH60-20B		LI60-20B-PR2	LM50-20/22B	LM50-10C/D		LO65-10B			PV60-27D	
40W	LDE45-20B	LHE40-23B LHE40-20B LH40-10B	LH40-10A/D					LO45-10B			PV40-27/29B PV45-29D	PVA40-27B PVA40-26B
30W				LI30-20B-PR2	LM35-20/22B	LM35-10C/D		LO30-10B LO30-10C				
25W		LHE25-23B LHE25-20B LH25-10/13B							LH25-20B-MU			
20W	LDE20-20B LD20-10B	LHE20-20B LH20-10/13B	LHE20-20A/C/D				LSC20-20M	LO20-10C			LD20-26B	
15W	LDE15-20B	LHE15-23B LHE15-20B LH15-10/13B	LHE15-20A/C/D				LS15-13B	LO15-10B	LH15-20B-MU	LO15-26D LSC15-26D	PV15-27/29B PV15-29C	
12W	LD12-20B											
10W	LDE10-23B LDE10-20B LD10-20B/13B	LHE10-23B LHE10-20B LH10-10/13B	LHE10-20A/C/D				LS10-13B LS08-13B		LD08-20BY4	LO10-26D LD10-26B	PV10-27B PV10-27C	
5W	LDE06-20B LDE05-23B LDE05-20B LD05-20B/23B	LHE05-20B LH05-10/13B	LHE05-20A/C/D				LS05-13B LS05-15B	LO05-12B	LD05-20B-MU	LS05-26B	PV05-27B	
3W	LDE03-20B LD03-10B-R2						LS03 Non-isolated LS05-15B	LO03-10B		LS03-16B		
1W	LDE02-23B LD01/LD02-10B						LS01-15B					

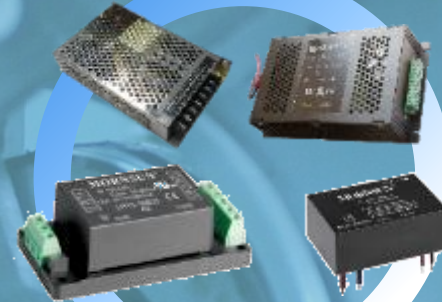
Potting
(DIP potting)



Open frame
(SIP, board mount, DIP)



Chassis
(Enclosure, lead wire)



DIN-Rail
(5-65W)



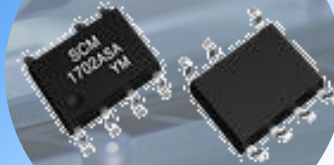
Common mode inductance
(DIP)



Transformer
(DIP or SMD)



IC
(SMD)






1. AC DC Product Line Introduction and Layouts

1.5 Package of AC-DC converter

1. AC DC Product Line Introduction and Layouts

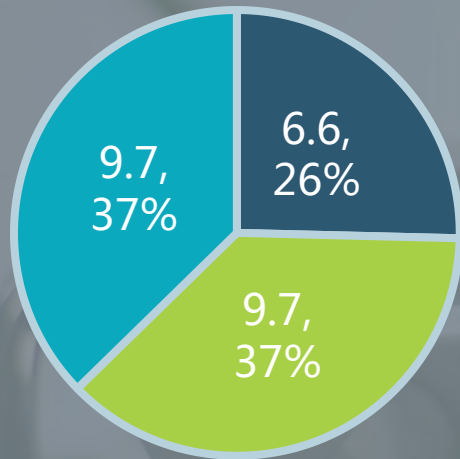
1.6 Common parameters of ACDC power supply

Package	Picture	Series	Input Voltage Range	Power	Number of outputs	Isolation
Module type		LHE	85-264VAC	5-60W	A, B, C, D	3000VAC
		LDE	85-305VAC	1-20W-60W	B(single)	3000VAC
		PV	200-1500VDC	5-200W	B(single)	4000VAC
Enclosed/ DIN-Rail		LI	85-264VAC	30-240W	B(single)	3000VAC
		LM	85-264VAC	35-350W	B (single) C (triple)	3000VAC 4000VAC
SIP/Open frame		LS/LO	85-264VAC	1-5W-10W	B(single)	3000VAC
			90-528VAC	3-20W	B(single)	4000VAC

1. AC DC Product Line Introduction and Layouts

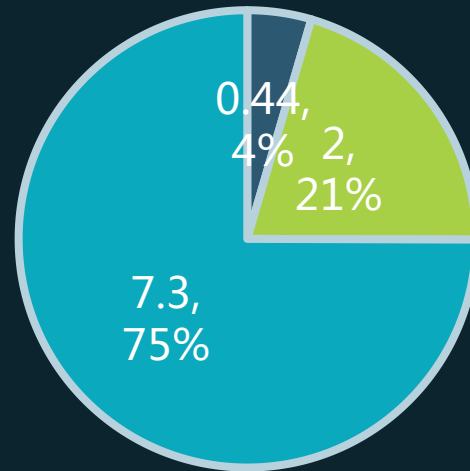
1.7 Market of AC-DC converter

Market of AC-DC converter(billion USD)



- Self-built
- Adapter
- CPS+FES

CPS+FES (billion USD)



- ≤60W module
- 60-500W module
- Others

01

ACDC has a capacity of 25.3 billion USD

02

The average annual growth is about 2%. MORNSUN involves 2.5 billion USD.

03

The potting standard module is mainly concentrated within 60W(\$500 million)

04

Main application fields are: Industrial control, Charging pile, Rail, Instruments, Electric power, Medical.

1. AC DC Product Line Introduction and Layouts

1.8 Market of AC-DC converter

Construction of commercial, industrial, industry, and multi-purpose product families



●Open frame

●Module power supply

●Enclosure power supply

●Rail power supply

●High voltage power supply

●Medical power supply

●LS series

●LSC core board

1. AC DC Product Line Introduction and Layouts

1.9 Application environment of AC-DC converter



Outdoor general
environment



Indoor
civil



Indoor
dedicated



Outdoor harsh
environment



Ocean
engineering

Different environments have different requirements in high temperature, cold, EMC, moisture resistance, pressure resistance, volume, price, etc.



Plateau



Indoor
industry



Cold

For details, please refer to <Highly Reliable Isolated Power Risk Assessment and Design>





2

LS+LO

Open Frame

Product Line

2. Open Frame Product Line (LS+LO)

2.1 The development background of LS open frame

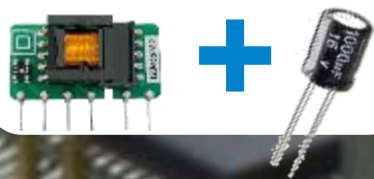
Target market: customers have high requirements in **cost and dimension**, such as smart home, IOT, etc.
The main solution is IC self-built, the core board LSC self-built and LS is self-built, etc.

Market capacity $\leq 30W$	Major industries	Critical demand	Mornsun products
0.38 billion for module type	<ul style="list-style-type: none">• Industrial control• Electric power• Meter/Instruments• Charging pile	<ul style="list-style-type: none">• High reliability	<ul style="list-style-type: none">• The potting standard module: LDE/LHE, etc.
1.4 billion for self-build	<ul style="list-style-type: none">• IOT• Smart home• Small appliances• Consumer Electronics	<ul style="list-style-type: none">• low cost• Small size• Small input range• Low standby power consumption and large transient power	<ul style="list-style-type: none">• Complete open frame: LO series• The smallest system: LS, LSC power core board, device (IC, MOS, transformer, filter)• Non-isolated: LS(K) series

2. Open Frame Product Line(LS+LO)

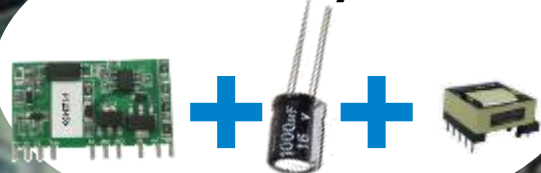
2.1 The development background of LS open frame

1. LS1-15W



External Capacitor

2. LSC15/20



Smallest system

Power core board

Component IC/MOS/transformer/filter

3. Original IC+Transformer



Cost objective: Meet the cost targets of self-improved customers

Performance improvement: the power from 1-3W to 10W

Key features

- Versatile product
- Supporting solutions for different environments
- Small, Flexible layout, customer can DIY
- Low cost of use for customers

- Smallest system: For modules or devices with basic key functions, customers need to combine power supply solutions with different application requirements by adding different peripheral circuits.
- Versatile product: According to the "five major systems, eight environments" supporting peripheral circuits, power modules can meet different application requirements

1. 2. Open Frame Product Line(LS+LO)

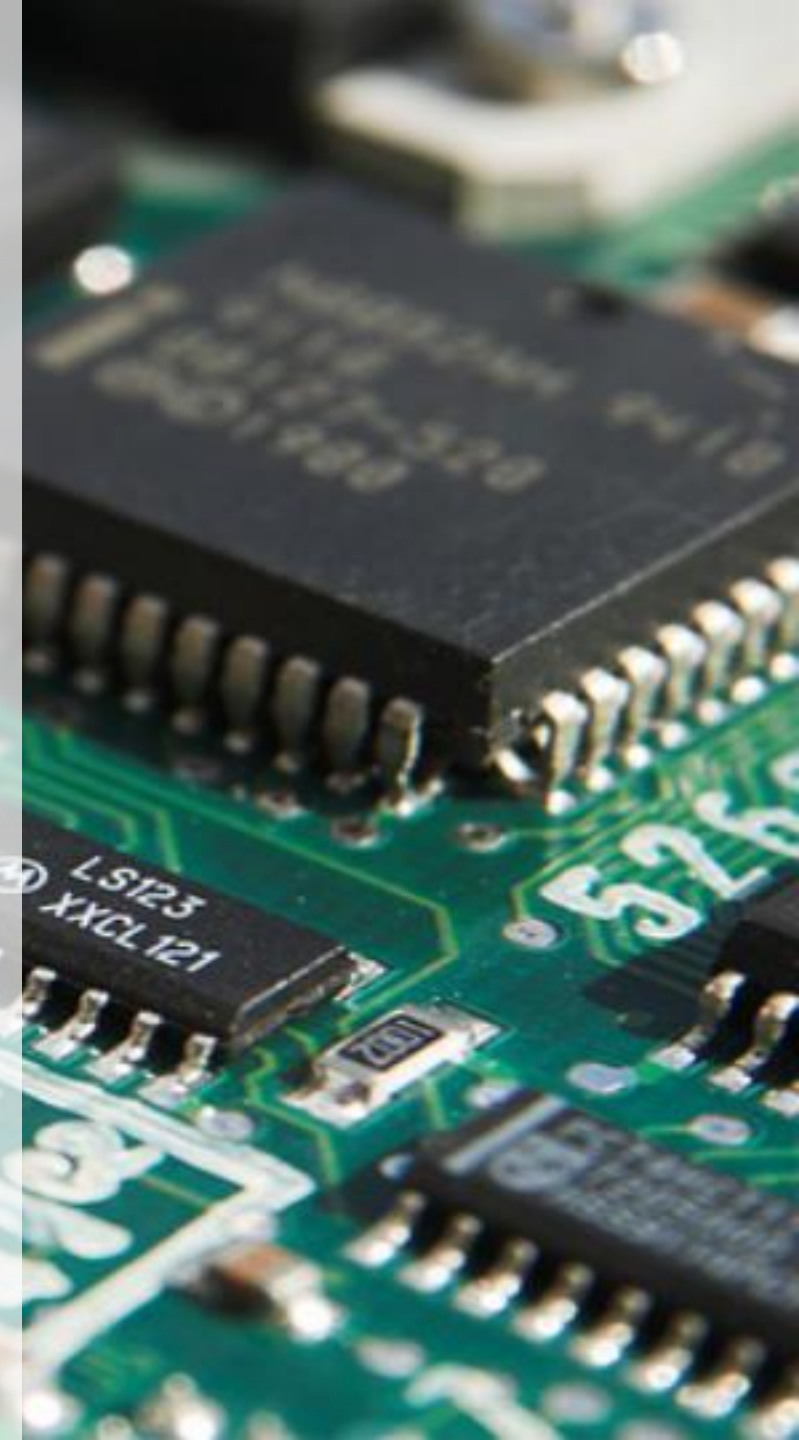
2.2 The product layout of LS open frame

Black: original recommended/optional product

Blue: new products launched in 2018

Red: new products launched in 2019.

Power	85~264VAC	85~305VAC	90~528VAC	Non-isolated ACDC
20W	LSC20-20M(core board) (2019.6~8)			
15W		LS15-13B-SS(-F) (2019.12)	LSC15-26M(core board) (2019.6)	
10W		LS10-13B-SS(-F)		
8W		LS08-13B-SS(-F)		
5W	LS05-15B-SS(-F)	LS05-13B-SR2S(-F)	LS05-26B-SS(-F)	LS05-K
3W		LS03-15B-SR2S(-F)	LS03-16B-SS(-F)	LS03-K
1W		LS01-15B-SS(-F)		LS01-K



1. 2. Open Frame Product Line(LS+LO)

2.3 The Characteristics of LS open frame-new product

Series	Power	Input voltage range	Size	Isolation	Operating temp.	Safety Cert	备注Remarks
LS05-13B-SR2S(-F)	5W	85~305VAC 70~430VDC	35*18*11	3000VAC	-40~+85°C	1. CE/UL/CB62368 pending 2. Meet EN60335 standard	Power extension to 5W based on 3W size
LS08-13B-SS(-F)	8W	85~305VAC 100~430VDC	44.5*24*15				Power extension based on LS05-15B-SS (old product)
LS10-13B-SS(-F)	10W						

Features

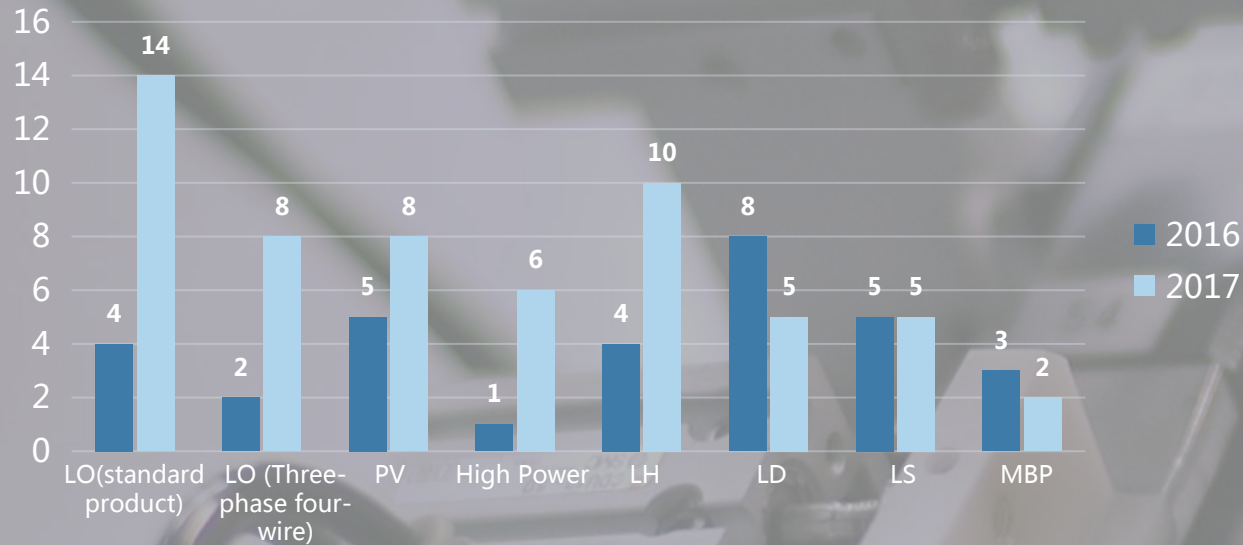
1. Input voltage range: 85 - 305VAC
2. AC and DC dual-use
3. Operating temperature range : -40°C ~ +85°C
4. Small size

5. Low power consumption, environmentally friendly
6. OSCP, OCP, OVP
7. IEC/UL/EN 62368 pending
8. Meet IEC/UL/EN 60335

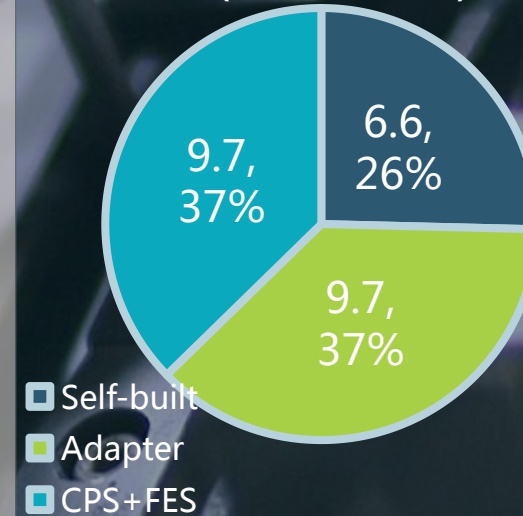
1. 2. Open Frame Product Line(LS+LO)

2.4 The Development background of LS open frame

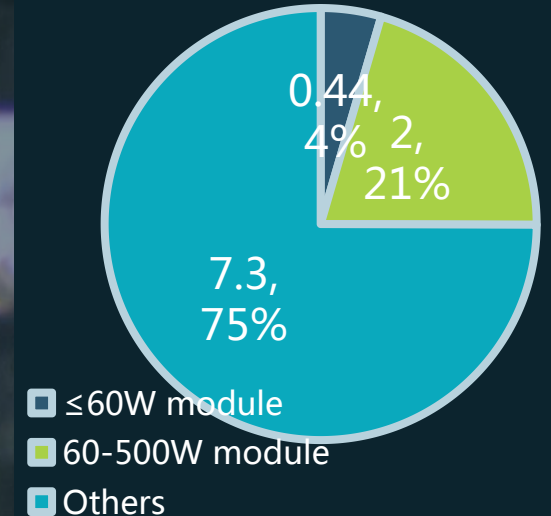
ACDC customized demand situation from 2016 to 2017



Market of AC-DC converter(billion USD)



CPS+FES (billion USD)



- Open frame' s customization needs are frequent: Low-price competition is fierce, LDE/LHE mid-end standard products can not meet the low price demand
- The market capacity is large, and foreign countries, especially vending machines, have large demand and need to meet the EN60335 certification.

Target: Transformer design reuse, Remove redundant designs, Generalization of low-cost material platforms

The layout of 3~65W economical open frame products meet the needs of the low-end markets.

1. 2. Open Frame Product Line(LS+LO)

2.5 The layout of LO open frame

LO03-10B/LO05-12B series 42*16*17mm



LO15-10B series 63.5*45.7*19mm



LO30-10B series 76.2*50.8*27mm



LO45/65-10B series 76.2*50.8*27mm



Future development:
200W/400W and
higher power.

Power	Series	Input voltage range	Output voltage	Indicator light
3W	LO03-10B	85~264VAC/100~370VDC	3.3/5/9/12/15/24	No
5W	LO05-12B	165~264VAC/230~370VDC	3.3/5/9/12/15/24	No
15W	LO15-10B	85~264VAC/100~370VDC	3.3/5/9/12/15/24	Yes
30W	LO30-10B	85~264VAC/100~370VDC	3.3/5/9/12/15/24/48	Yes
45W	LO45-10B	85~264VAC/100~370VDC	3.3/5/9/12/15/24/48	Yes
65W	LO65-10B	85~264VAC/100~370VDC	5/9/12/15/24/48	Yes

2. Open frame product(LS+LO)

2.6 Characteristics of Lo open frame

Characteristics

Universal input Voltage: 85-264VAC/100-370VDC

(LO05: 165 - 264VAC/230 - 370VDC)

- Temperature range: -25°C to 70°C
- Isolation : 3000VAC
- Output short circuit、 over current and over voltage protection
- LO15~65W complies with IEC/EN/UL62368 safety standards
(LO03~05 needs to modify the transformer wire to meet the certification)
- LO15/30W complies with the requirements of white goods EN60335
- LO15-65 series has work indicator
- EMC performance complies with CISPR32/EN55032 CLASS B (LO03~05 CLASS A)

" Low price " doesn' t mean poor reliability
Through the optimization of the material platform and optimization of process automation design, Circuit design optimization, capacitance reliability evaluation;

2. Open frame product(LS+LO)

2.7 LO open frame application in the industry



Application:

Smart home, household appliances, smart agriculture



Product:

LO15/30 meets the requirements for white goods certification; Low price demand



Competitor:

MW open frame and caged more applications in vending machines.

Temperature rating		EMS
Level 1	-5~45°C	Level 3
Level 2	-25~55°C	Level 4
Level 3	-40~70°C	Level +4+
Level 4	-40~85°C	EMI
Level 5	-40~125°C	CLASS A
		CLASS B

Suitable environment	Representative industry	temperature range	EMI	EMS
Indoor civil equipment universal power supply	Smart home, household appliances	-5 ~ 45°C	Class B	Level3
Indoor industrial equipment universal power supply	Intelligent buildings, smart agriculture	-25 ~ 55°C	Class B	Level3
Indoor industrial equipment power supply	Medical equipment	-25 ~ 70°C	Class B	Level3
Outdoor industrial environment universal power supply	Intelligent transportation, video surveillance, charging pile	-40 ~ 70°C	Class A	Level4
	Communication, security	-25 ~ 70°C	Class A	Level4
Special power supply for outdoor harsh industrial environments	Trackside equipment	-40 ~ 85°C	Class A	Level4
	Agriculture, animal husbandry	-25 ~ 70°C	Class B	Level4
	Power single-phase voltage, lightning surge	-40 ~ 70°C	Class A	Level+4+
	Power three-phase four-wire, lightning surge	-40 ~ 70°C	Class B	Level+4+
Outdoor cold environment universal power supply	Environmental monitoring, communication base station	-40 ~ 85°C	Class A	Level+4+
	electric power	-40 ~ 70°C	Class A	Level+4+
Outdoor high altitude environment power supply	electric power	-40 ~ 85°C	Class A	Level+4+
Marine equipment special power supply	Marine equipment, island equipment	-40 ~ 70°C	Class B	Level4



3

LDE+LHE

Module Converter

Product Line

3.module power supply product (LDE/LHE)

3.1 Development background (LDE/LHE)



**Low cost
Material platform**
(The average cost of
the new LDE/LHE
series is $\geq 20\%$
compared to the LD/LH
series)

**Automation
Process platform**
(Transformer
automation, some
devices implement
automatic plug-in
operation)

**Performance
improvement
Selling
point breakthrough**
(Power density,
isolation withstand
voltage, derating, etc.)



1. Principle: Mainly reduce the cost of LD/LH, and optimize some performances simultaneously, focusing on "high reliability, high cost performance "

2. Cost target: Reduce costs by more than 20%, automated import.

**New growth in sales growth
A powerful weapon against competitors**

3. Performance improvement :
The same volume to do more power products, the same power volume reduction

4. Isolation withstand voltage from 3000VAC to 4000VAC;
5. 85 °C degrees work, derating performance improved;

3.module power supply product (LDE/LHE)

3.2 Product layout(LDE/LHE)

- The first batch of 3~25W single circuit listed at the end of 2017
 - Copy development mode, check and fill the gap in 2018: Q3 first batch of 5~20W multi-circuit listed, Q4 second batch of LDE02/LHE40/60 single circuit
 - The third batch in the first half of 2019 (in this release): 5~60W 305V input, LDE45/60W
- Black means old version
 - Green means new listing product in2017
 - Blue color means new listing products in2018
 - Red color means new listing products in2019

category	ACDC high reliability module layout			
	LD series (old products)	LDE series (new products)	LH series (old products)	LHE series (NEW products)
60W		LDE60-20B	LH60-20B	LHE60-20B/LHE60-23B
40W		LDE45-20B	LH40-10B	LHE40-20B/LHE40-23B
30W				
25W			LH25-10/13B	LHE25-20B/LHE25-23B
20W	LD20-10B	LDE20-20B	LH20-10/13B/Multiple circuits	LHE20-20B-Multiple circuits
15W		LDE15-20B	LH15-10/13B/Multiple circuits	LHE15-20B-Multiple circuits/LHE15-23B
12W	LD12-20B			
10W	LD10-20B/LD10-13B	LDE10-20B/LDE10-23B	LH10-10/13B/Multiple circuits	LHE10-20B-Multiple circuits/LHE10-23B
5W	LD05-20B/LD05-23B	LDE05-20B LDE05-23B	LH05-10/13B/Multiple circuits	LHE05-20B/Multiple circuits
3W	LD03-10B-R2	LDE03-20B		
1~2W	LD01-10B/LD02-10B	LDE02-23B		

3.module power supply product (LDE/LHE)

3.2 Product layout(LDE/LHE)

Key difference	Input voltage range 85~264VAC		Input voltage range 85~305VAC	
	The price is slightly lower		The price is slightly higher	
	Small	Wide operating temperature range	Small	Wide operating temperature range
Series	LDE Series	LHE Series	LDE Series	LHE Series
60W	LDE60-20B	LHE60-20B		LHE60-23B
40W	LDE45-20B	LHE40-20B		LHE40-23B
25W		LHE25-20B		LHE25-23B
20W	LDE20-20B	LHE20-20B/Multiple circuits		
15W	LDE15-20B	LHE15-20B/Multiple circuits		LHE15-23B
10W	LDE10-20B	LHE10-20B/Multiple circuits	LDE10-23B	LHE10-23B
5W	LDE05-20B	LHE05-20B/Multiple circuits	LDE05-23B	
3W	LDE03-20B			
1~2W			LDE02-23B	

3.module power supply product (LDE/LHE)

3.3 Product characteristic (LDE/LHE)

5~10W LDExx-23B

- Input voltage range: 85-305VAC/100-430VDC
- Temperature range : -40°C to +70°C
- **4000VAC** High isolation voltage
- Regulated output, low ripple noise
- High reliability, high power density, high efficiency
- Output short circuit, over current, over voltage protection
- EMI performance meets CLASS B (bare machine)
- Comply with **IEC/UL/EN62368** (under certification)

45~60W LDExx-20B

- Conventional input voltage: 85-264VAC/100-370VDC
- Temperature range : -40°C ~ +70°C
- **4000VAC** High isolation voltage
- Regulated output, low ripple noise
- High reliability, high power density, high efficiency
- Output short circuit, over current, over voltage protection
- EMI performance meets CLASS B (bare machine)
- Comply with **IEC/UL/EN62368** (under certification)

10~60W LHExx-23B

- Input voltage range: 85-305VAC/100-430VDC
- temperature range : -40°C ~ +85°C(LHE40/60:+70°C)
- **4000VAC** High isolation voltage
- Regulated output, low ripple noise
- High reliability, high power density, high efficiency
- Output short circuit, over current, over voltage protection
- EMI performance meets CLASS B (bare machine)
- Comply with **IEC/UL/EN62368** (under certification)

Series	LDE05-23B	LDE10-23B	LDE45-20B	LDE60-20B	LHE10-23B	LHE15-23B	LHE25-23B	LHE40-23B	LHE60-23B
Size mm (L*W*H)	50.8*25.4*15.36	53.8*28.8*19		87*52*29.5	55*45*21	62*45*22.5	70*48*23.5	89*63.5*25	109*58.5*30



4

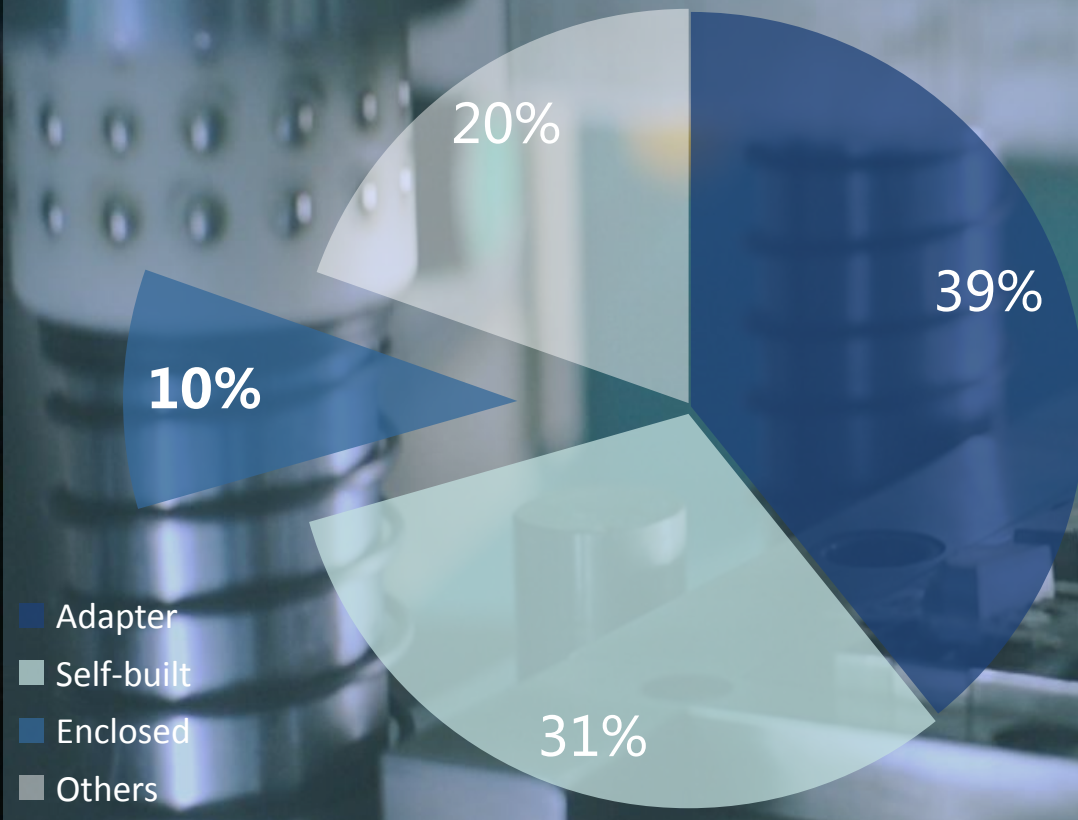
LI+LM

Enclosed Switching
Power Supply

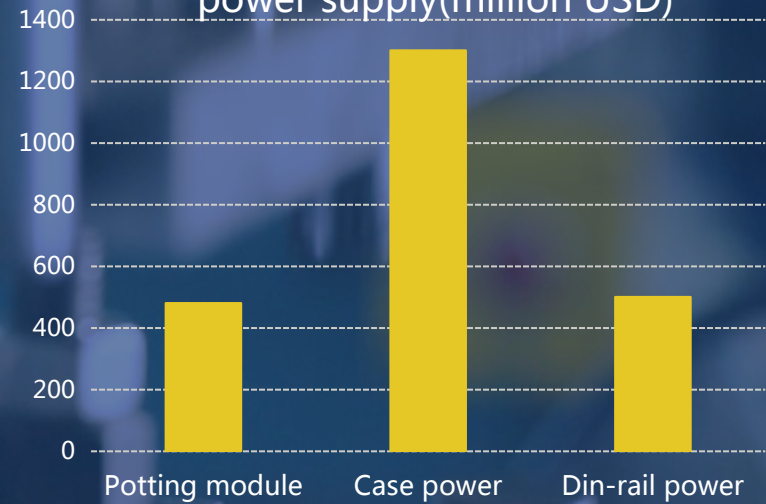
4. Enclosed Switching Power Supply (LI + LM)

4.1 Development background of Squirrel-cage LM

Global market capacity (billion USD)



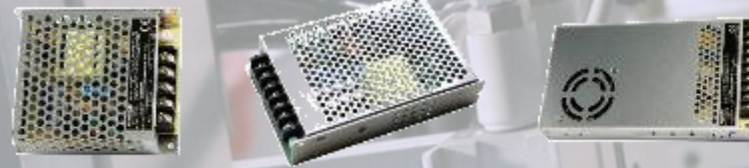
Industrial/commercial embedded power supply (million USD)



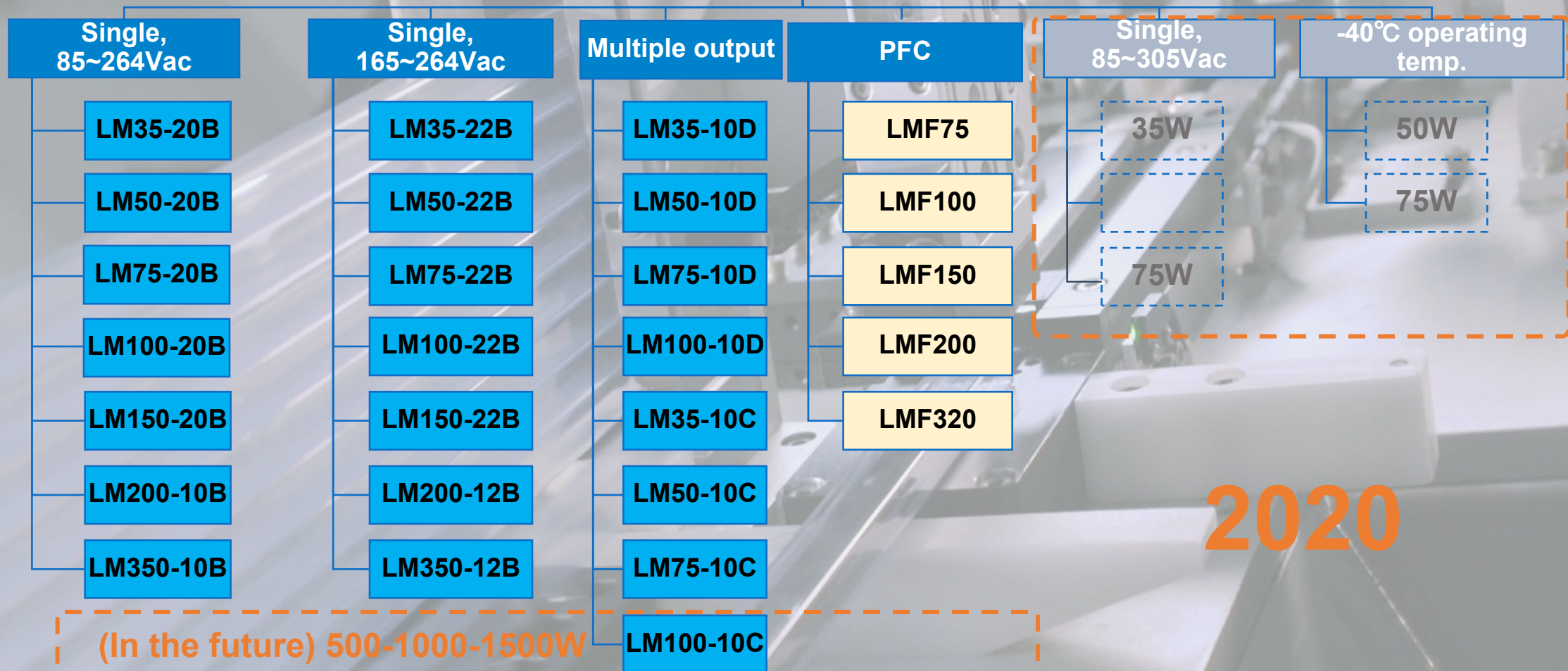
Enclosed (30~5KW)	2017 (100 Million yuan)	DIN Rail (30~960W)	2017 (100 Million yuan)
Total amount	80	Total amount	31
MW	23	MW	3
TDK	14	TDK	2.5
COSEL	8	PULS	10
POWERLD	3	OMRO	2

4. Enclosed Switching Power Supply (LI + LM)

4.2 Squirrel-cage LM product layout



2019 has been listed



2020

4. Enclosed Switching Power Supply (LI + LM)

4.3 Squirrel-cage LM product characteristics

Features

- Meet CE standard: [EN62368/EN60355](#)
- High reliability with 3 years warranty
- Withstand 300VAC Input surge for 5s
- Excellent EMC performance
- Withstand 5g vibration
- Ambient temperature -30 °C ~ + 70 °C
- Operating altitude up to 5000m
- Output voltage indicated and adjustable

4. Enclosed Switching Power Supply (LI + LM)

4.4 Development background of rail LI

Characteristics of rail products

- Highly consistent
- Thinner
- Plastic shell
- Variable width, multiple increases

- Used in cabinets and chassis
- No drilling required
- No soldering iron is required for wiring
- Replaceable, easy to disassemble
- Power LED
- Adjustable output voltage and compensation of line loss
- Meet the usage habits of the project site

4. Enclosed Switching Power Supply (LI + LM)

4.4 Development background of rail LI

Why it is a stepped outer shell?

- Developed according to DIN 43880 "built-in electrical installation, dimensions and associated mounting dimensions"
- 1SU=17.5mm in width, increasing width by 0.5 times
- Matching with EN50022 standard cabinet.

Advantages:

Compactness;
Space availability;
Easy to install and operate;
Low price;

- Meet EN50022
- **TS-35/7.5 or TS-35/15**
- Place direction cannot be reversed



Encapsulation expansion

LI120-10BXX

LI72-20BXX

LI24-10BXX

Stepped DIN rail LI

4. Enclosed Switching Power Supply (LI + LM)

4.5 Layout of DIN rail products

- The listed products are LI30~100W sub-mini stepped DIN rail
- The As the power increases, the width increases, the height and thickness remain the same.

LI30-20BxxPR2
5/12/15/24/48V

LI60-20BxxPR2
5/12/15/24/48V

LI100-20BxxPR2
12/15/24/48V

LI120-10/13Bxx
12/24/48V

LI240-10B
24/48V



Width 2SU
90*58*35mm



Width 3SU
90*58*52mm



Width 4SU
90*58*70mm



Height* Depth* Wdth
125*112.7*35mm



Height* Depth* Width
125*120*60 mm

4. Enclosed Switching Power Supply (LI + LM)

4.6 Characteristics of LI rail product

Features

- Universal voltage: 85-264VAC/120-370VDC
(Input anti-ovoltage: withstand 300VAC input last for 5s)
- Operating Temp : -40°C to 70°C (Competitor only reached -30 °C)
- Isolation: 4000VAC
- Security level : Class II; plastic shell, ultra-small size, stepped type, suitable for narrow spaces, compact structure, standard size
- Adjustable output voltage range (Adj knob), power LED
- Output short circuit, over current, over voltage protection
- *Design meets with UL/CE/CB 62368 (CE is pending)*
- EMC performance meets bare machine CISPR32/EN55032 CLASS B





5

PV+PVA

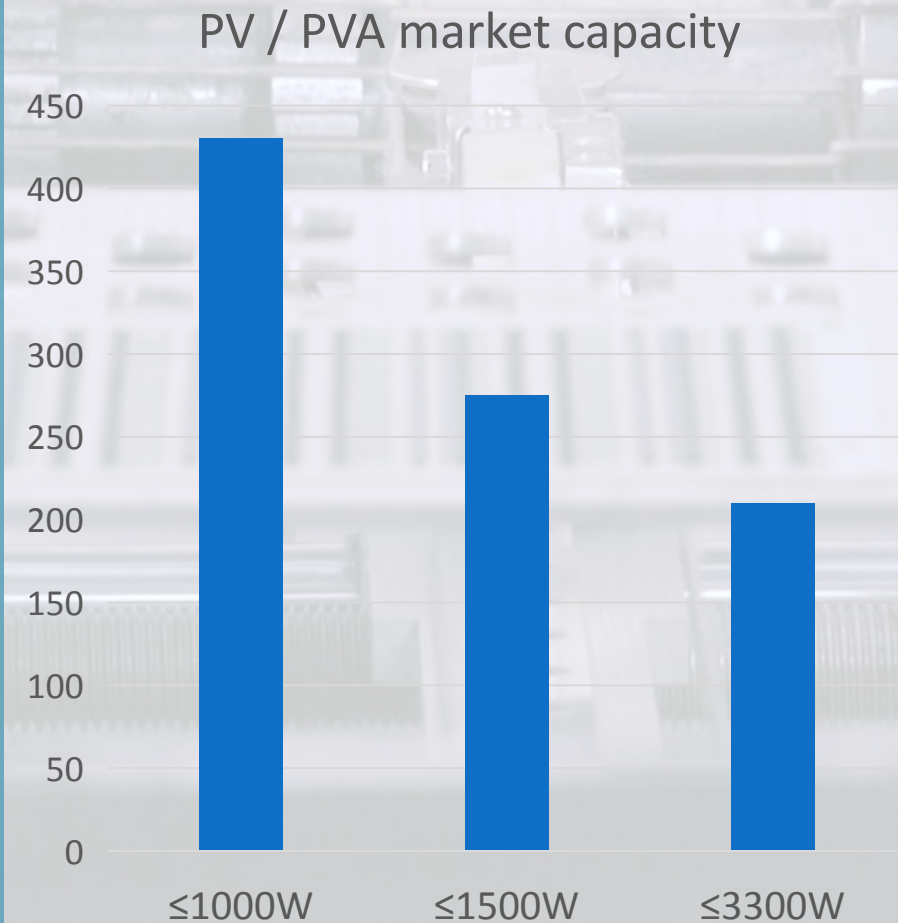
High voltage

input power

5. High voltage input power(PV/PVA)

5.1. Development background of High voltage input power

- Potential capacity of PV market is 915 million and the demand is continue rising
- As front-runner, our company need to expand the layout and set the threshold.
- Layout direction: high power, high voltage, multi-channel



1. Photovoltaic, wind power, BMS systems, high voltage inverter and other fields

2. Header box, SVG, rail transit, combiner boxes, inverters, etc.

3. Ultra-high voltage UPS, flexible DC transmission, high voltage circuit breaker, etc..

5. High voltage input power(PV/PVA)

5.2. Development background of PVA

Solution 1: multi-tap power frequency transformer

—>AC rectification—>DCDC

Problems :

- It is not convenient to change the line, and it is easy to damage the system when it is connected incorrectly;
- The transformer is larger and cumbersome; the risk of insulation failure is high;
- The cost of the transformer is not cheap and the competitiveness is not high;
- There are trends in miniaturization and convenience in the industry.

Solution 2: power frequency transformer -> ACDC -> DCDC

Problems:

- It is not convenient to change the line, and there is a risk of wrong connection;
- Transformer is bulky and heavy; insulation failure
- The cost of transformer + ACDC is high;
- The overall program is less competitive

Mainstream power solution in the future :

high-pressure ACDC->DCDC for coal mine, smaller, high insulation system, simple wiring

High voltage input power(PV/PVA)

4.6 Characteristics of PVA

Features

- Input voltage: 85-900VAC, (460~1400VAC is under development)
- output voltage 24V-28VDC/28-32VDC/32-35VDC (Adjustable)
- 4000VAC high isolation voltage
- Out put short-circuit, over-current, over-voltage protections
- EMS $\pm 4\text{KV}$ surge/EFT
- High reliability, high efficiency, long life
- Reduce power frequency transformers and simplify design;



PVA40, PVA70, PVA120
120W-170 x 107 x 52mm
70W-155 x 95 x 45mm
40W-138 x 82 x 32mm



6

**Other Industry
Product Line**

**Three-phase and Four-wire Power
Supply/ Medical Power Supply**

6. Other industry power supplies

6.1. Development background of three-phase and four-wire power supply

Situation analysis: The market is demanding on the cost of three-phase and four-wire products. Our existing LO multi-channel three-phase four-wire power supply is less favourable in cost of materials and time as well as less competitive on products.

Target: We take the approach of providing design solutions for the extremely low cost requirements of the market. By providing the core control module of the product, the customer can reduce the customer cost by self-improve some peripheral circuits.

Method: The control module and the primary power device are integrated into the control board to form an independent control module. The customer can complete the low-cost three-phase four-wire power supply design by external EMC circuit, input filter circuit, transformer and output power circuit.

Market demand price is 1USD



6 . Other industry power supplies

6.2. Product characteristics of supplies(Three-phase and four-wire power supply)

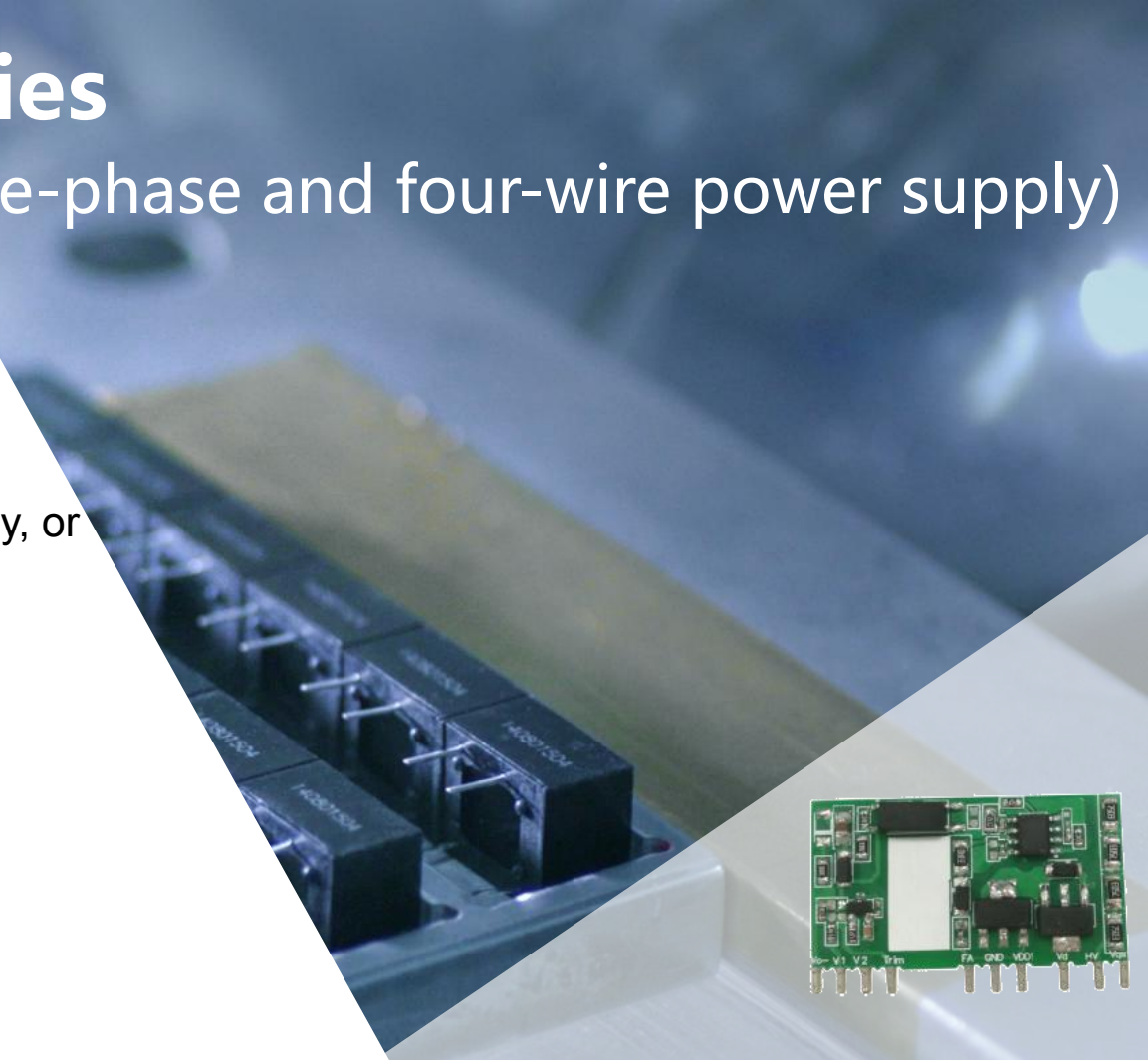
Features

- Ultra-wide input voltage range: 57 - 528VAC/80 - 745VDC
- Application circuit can realize three-phase and four-wire power supply, or any two-wire power supply4000VAC high isolation voltage
- Conduction / Radiation Disturbance: CISPR32/EN55032 CLASS B
- Pulse group, surge immunity: ± 4 KV Perf. Criteria B
- Output short circuit, over current, over voltage protection
- High efficiency and high reliability
- Low ripple & noise, low standby power consumption

Core features

- Internally integrates two MOS tubes to withstand stress up to 1300V
- Integrated dedicated high voltage start controller
- Controllable cost
- Flexible solution
- Quality is guaranteed,

Other three-phase and four-wire product features can be found in the manual (90-528VAC input)












6. Other industry power supplies

6.3. Development background of medical power supply

- Situation analysis: After the change of the certification standard in the medical industry in 2012, the Chinese CFDA updated the medical industry quality standard ISO13485 in 2016, which significantly tightened the quality control.
- [UL60601-1 Edition 3 \(Latest third edition \)](#)
- [IEC 60601-1-2 4th Ed. EMC \(Latest fourth edition \)](#)
- Target : Preserve existing medical customers and also manage competitive substitutions such as ARCH, TRACO, TDK, COTECK, SL, XP, COSEL, MW;
- Method: We develop hot-selling 1W/2W, wide voltage, 6W power, ACDC_5W/15W/25W for medical power supply.

6. Other industry power supplies

6.4. Product layout of medical power supply

Type	Power	Vin	Vout	Output	Isolation	Package	Dimension	Certification	
URH_P-6WR3	6	9~36,1 8~75(4:1)	5,6,9,12,1 5,24	1	6000	DIP	31.6*2 0.3*10.2	CE	
LH15-20BxxMU	15	85~264	5,12,15,1 8,24	1	4000	DIP	62.00*4 5.00*22.5 0	CE	
LH25-20BxxMU	25	85~264	5,12,15,1 8,24	1	4000	DIP	70.00*4 8.00*23.5 0	CE	
LD05-20BxxMU	5	100~370	5,12,15,2 4	1	4000	DIP	53.80*2 8.80*19.0 0	CE C RU US	
LD10-20Bxx	6.6~10	85~264	3.3~24	1	4000	DIP	53.80*2 8.80*19.0 0	CE C RU US	
G_S-1WR2	1	5,12,2 4(±10%)	±5,±9,±1 2,±15	2	6000	SIP	19.50*9.8 0*12.50	CE C RU US	
H_S-1WR2	1	3.3,5,12,2 4(±10%)	3.3,5,12,1 5	1	6000	SIP	19.50*9.8 0*12.50	-	
G_S-2WR2	2	5,12,2 4(±10%)	±5,±9,±1 2,±15	2	6000	SIP	19.50*9.8 0*12.50	CE C RU US	
H_S-2WR2	2	5,12,2 4(±10%)	5,12,15	1	6000	SIP	19.50*9.8 0*12.50	CE C RU US	



6. Other industry power supplies

6.5.Characteristics of medical power supply

Feature:

- Universal voltage :85~264VAC/100~370VDC
- Low no-load power consumption $<0.1W$
- Operating temperature: $-40 - +70^{\circ}C$
- Isolation : 4000VAC
- Efficiency up to 89%
- Output short circuit, over current, over voltage protection
- EN60601-1, ANSI/AAMI ES60601-1 certification (2xMOPP)---
CSA/CE(pending)
- Various installation methods like PCB, wiring and rail type, etc.
- Leakage current: less than 0.1mA RMS typ./240VAC/63Hz
- 5000m Working at high altitude: 5000m

The background image shows a close-up of a network switch port with a red laser light reflecting off one of the ports. The entire image is framed by a large, semi-transparent blue circle.

THANK YOU

MORNSUN Guangzhou Science & Technology Co.,Ltd