



TC CHARGER

Tiecheng Inf.Technology Co.Ltd
铁城信息科技有限公司





01 YILIDA Group

02 TC Charger Introduction

03 Global Sales

04 R&D Center

05 Intellectual Property

06 Products Catalog

07 Taizhou Production Base



- The well-known influential brand of HVAC ventilator in Asia
- The national new and high-tech enterprise
- A member of Air Movement and Control Association (AMCA) in 2002
- Listed in Shenzhen Stock Exchange (Stock Code:002686)
- 11 subsidiaries
- The group brands include: "Yilida", "Wolter", "Fulihua", "ESSENTEC", "AMMT", "TC charger"
- 1.9 Billion CNY sales turnover in 2022



01 YILIDA Group

02 TC Charger Introduction

03 Global Sales

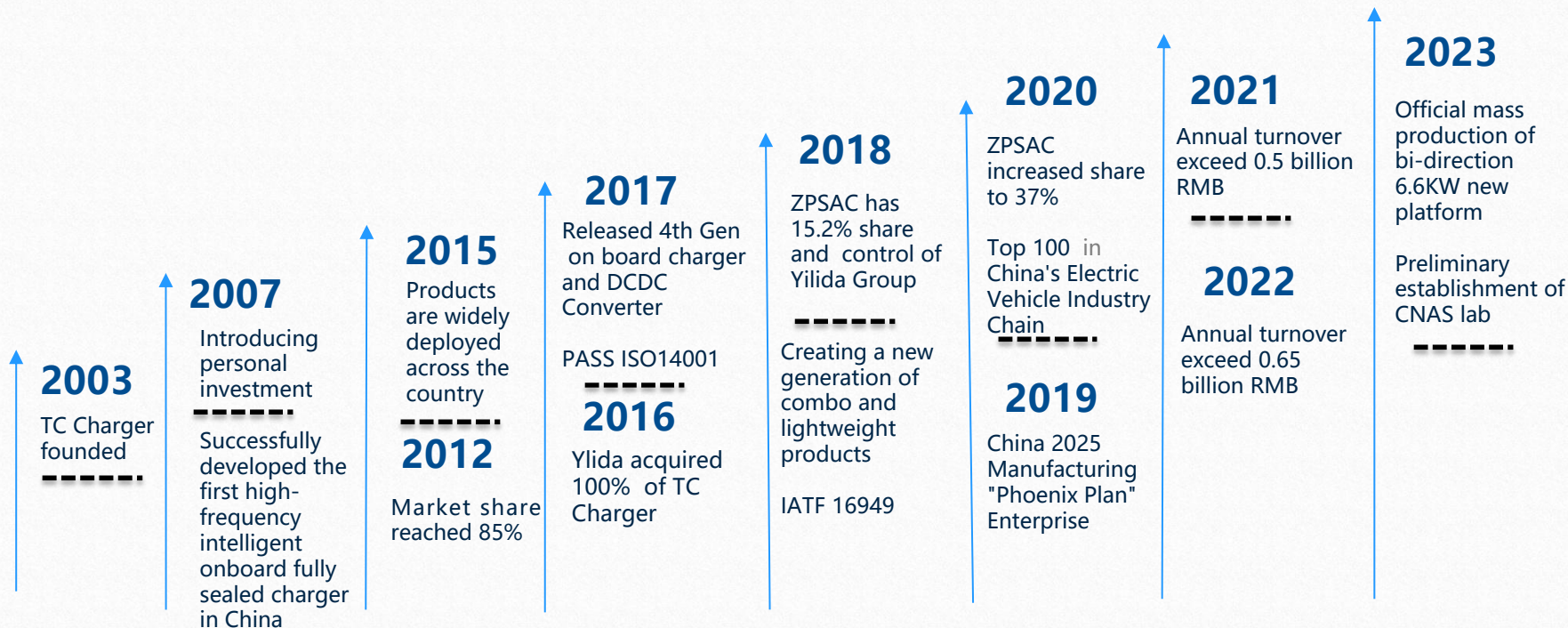
04 R&D Center

05 Intellectual Property

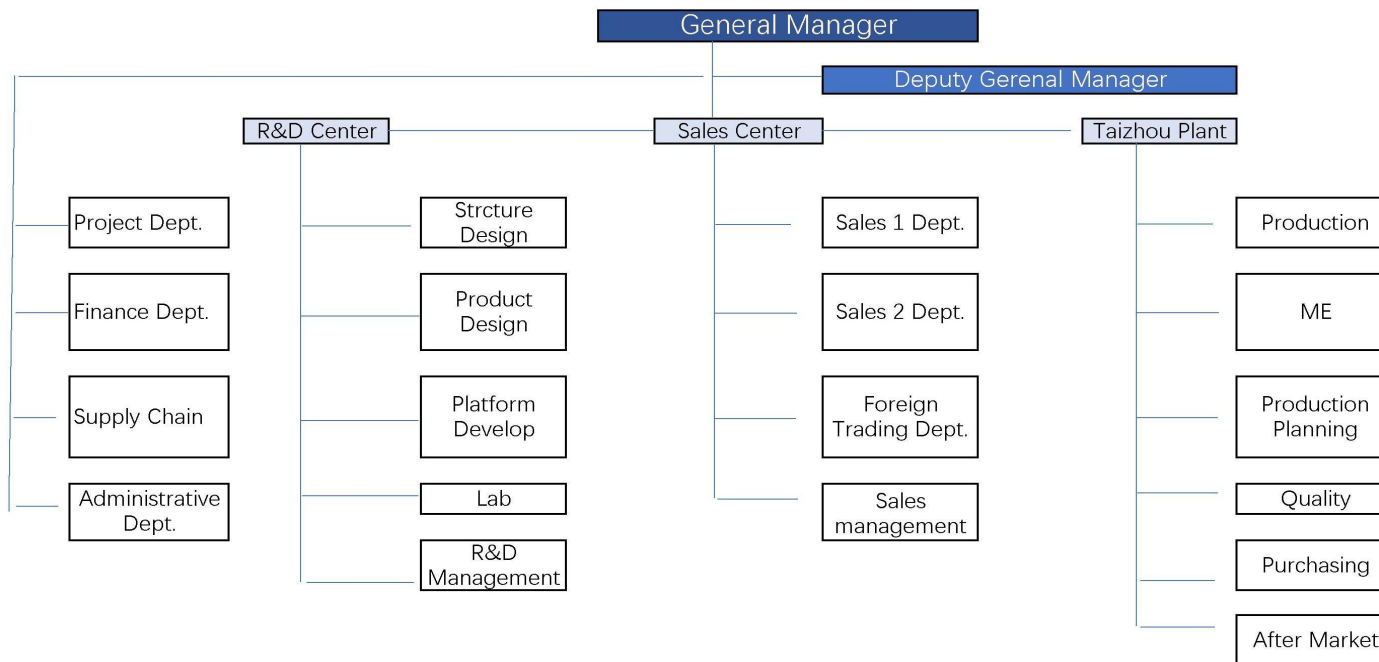
06 Products Catalog

07 Taizhou Production Base

History: Since 2003



TC Charger Introduction



- Founded in 2003
- Products:OBC,DCDC Converter,Integrated products

- Sales in 2023: 350 million CNY
- Total Employees :499



01 YILIDA Group

02 TC Charger Introduction

03 Global Sales

04 R&D Center

05 Intellectual Property

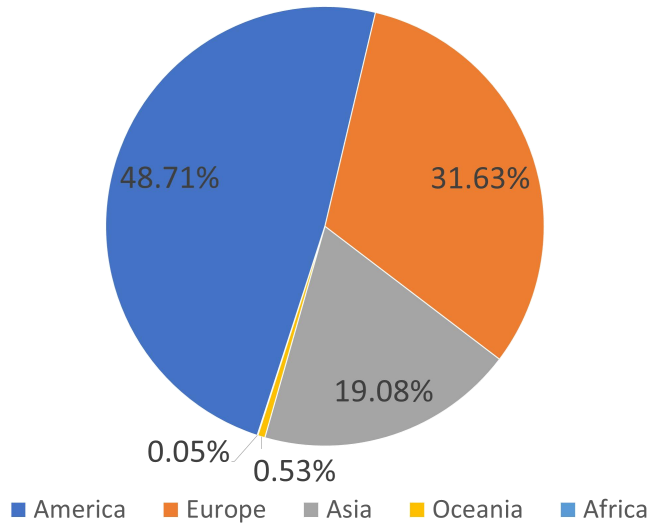
06 Products Catalog

07 Taizhou Production Base

Global sales avenue



Market Ratio



3 Main Markets

- America Market:Accounted for 48.71%
- Europe Market:Accounted for 31.63%
- Asia Market:Accounted for 19.08%,
Asia Market growing fast since 2024,especially for India Market

Hope to steadily grow these three main markets while expanding the share of the other markets

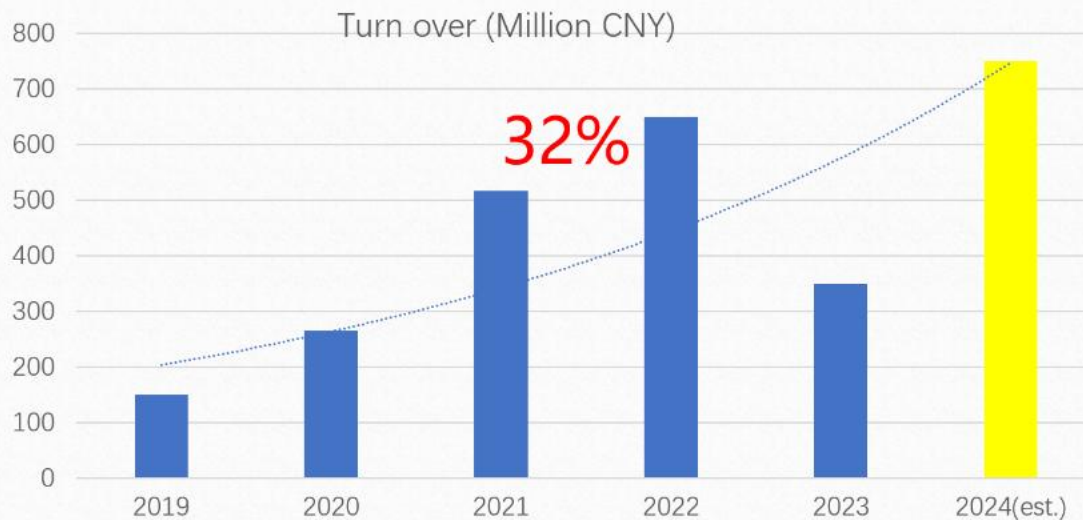
Global Footprint



Turnover 2019-2024 (e)



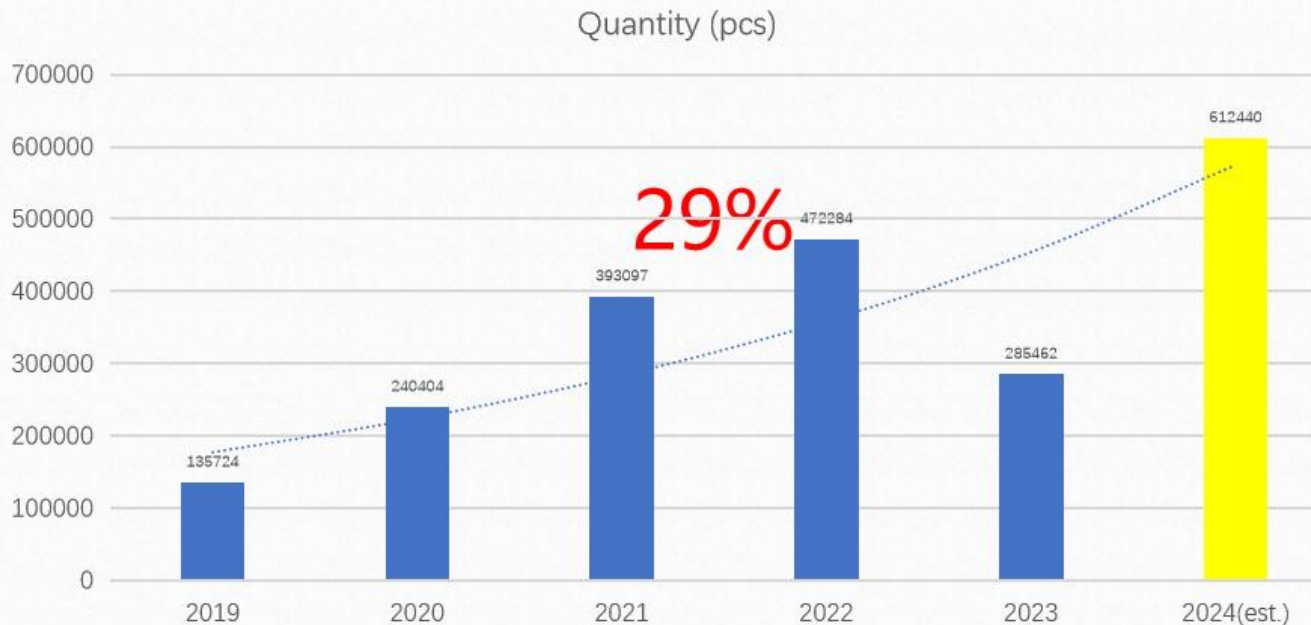
From 2019 to 2024, Ticheng' s average annual growth is **32%**



Delivery 2019-2024 (e)



From 2019 to 2024, Ticheng' s average annual delivery growth is **29%**





01 YILIDA Group

02 TC Charger Introduction

03 Global Sales

04 R&D Center

05 Intellectual Property

06 Products Catalog

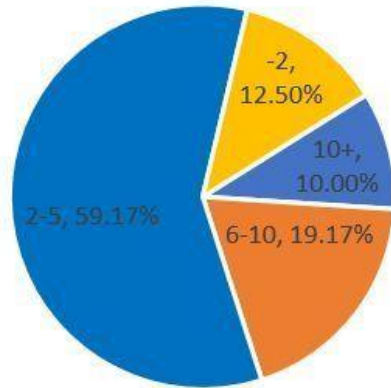
07 Taizhou Production Base

R&D Team



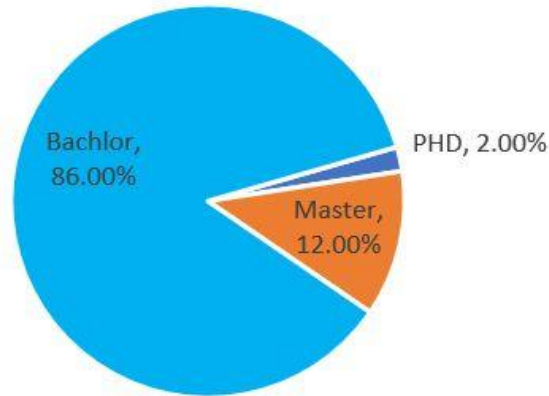
The R&D team consists of 110 people, 7 system maintenance, 45 hardware design, 10 structural design, 12 software programming, and 13 for lab.

Seniority (years)



■ 10+ ■ 6-10 ■ 2-5 ■ -2

Degree



■ PHD ■ Master ■ Bachelor

→ Degree:

- PHD: 2%
- Master: 12%
- Bachelor: 86%

→ Seniority (years):

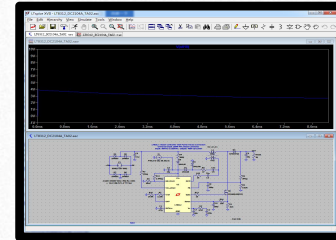
- 10 Years +: 10%
- 6-10 Years: 19.17%
- 2-5 Years: 59.17%
- 0-2 Years: 12.5%

Development Tool

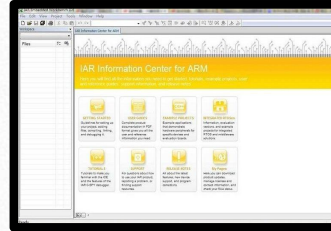
- EDA:Design PCB
- CAD:Drawing
- IAR: Programming software
- CAE :Simulation
- 3D: Drawing



EDA: Altium Designer



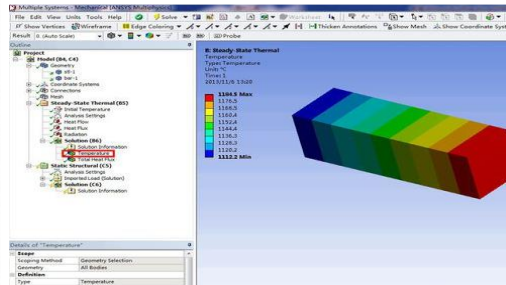
Circuit simulation



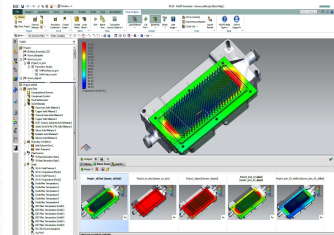
IAR



CAD



CAE Simulation



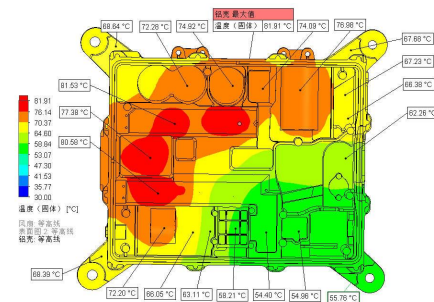
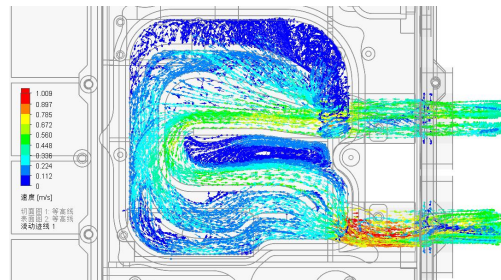
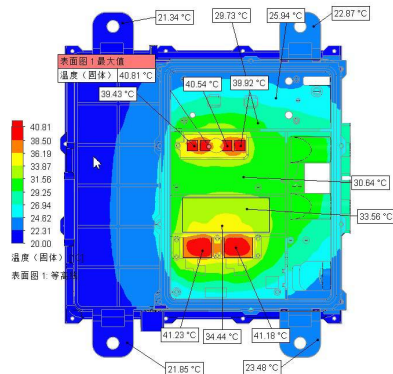
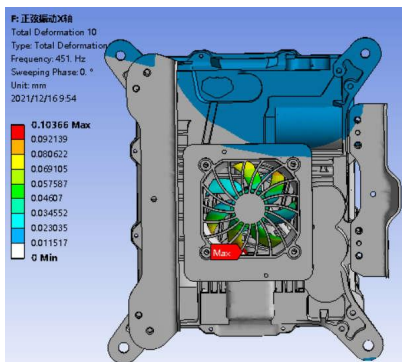
CAE Simulation



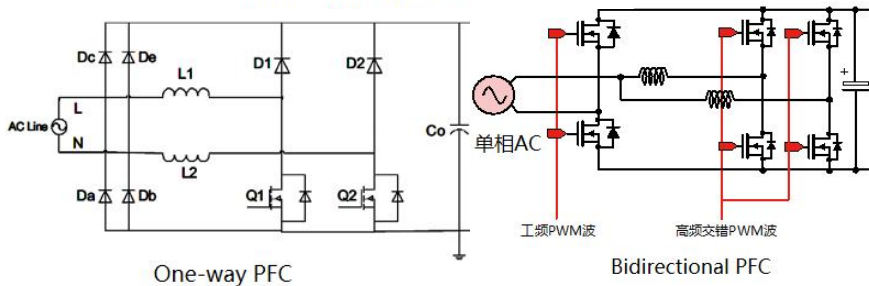
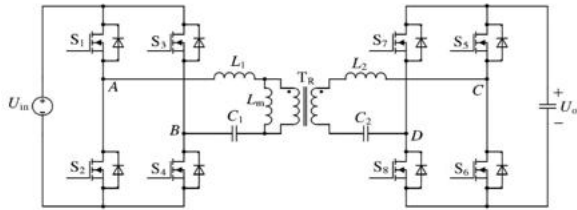
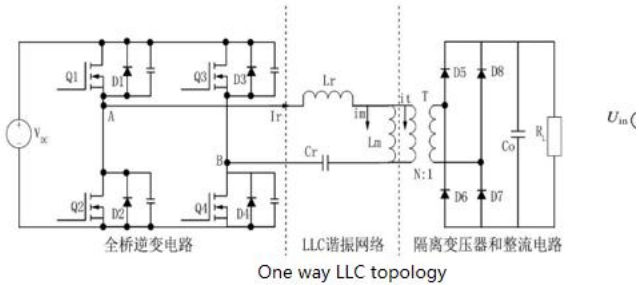
3D Drawing

Simulation Ability

- Hardware design Simulation:Used for product circuit diagram simulation
- Software design Simulation:Used for product loop simulation
- CAE structural strength Simulation:Used for digital model,optimize structure
- CFD Simulation:Used for digital model,optimize heat dissipation and flow resistance



Circuit diagram design



Merits

- High efficiency: Simple circuit, low loss
- Fast cooling: Staggered design, switch tube evenly distributed, heating evenly
- Current low stress: Frequency doubling, low ripple current
- Full range soft switching: Low losses and high efficiency
- Frequency modulation control: Excellent EMC performance
- Digital real-time control: Flexible and efficient control

Software Ability

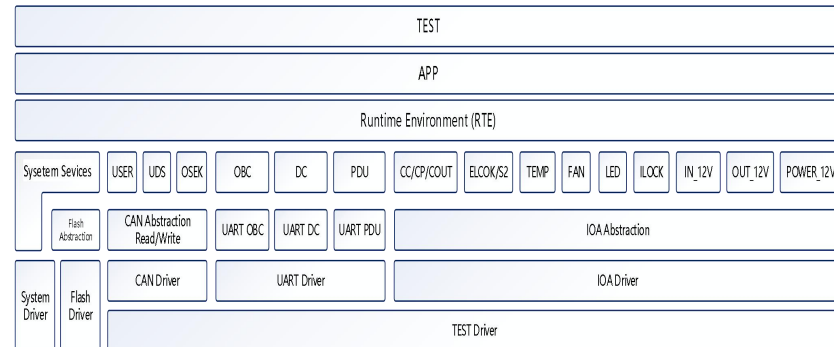
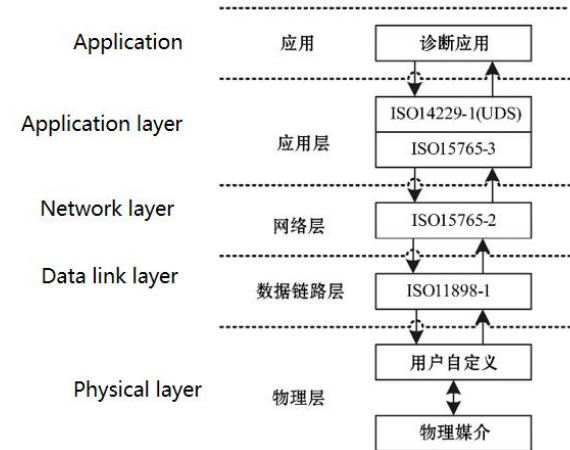


- Framework Design: Based on AUTOSAR
- Independent software development ability and experience
- UDS diagnostic development:
 - Protocol Standards: ISO15765、ISO14229、ISO11898
 - Function Module

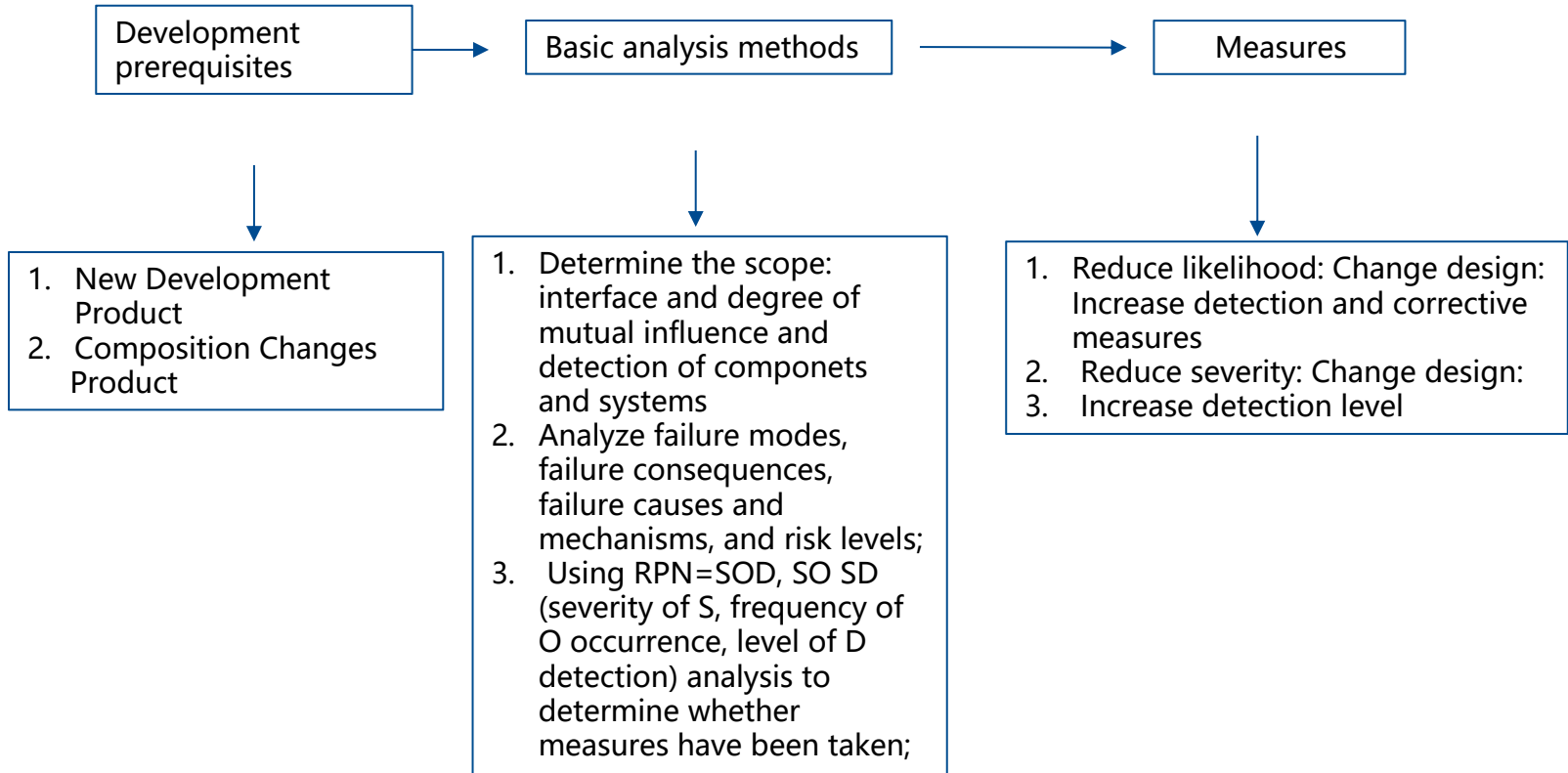
Underlying Bootloader: Implementing App Updates

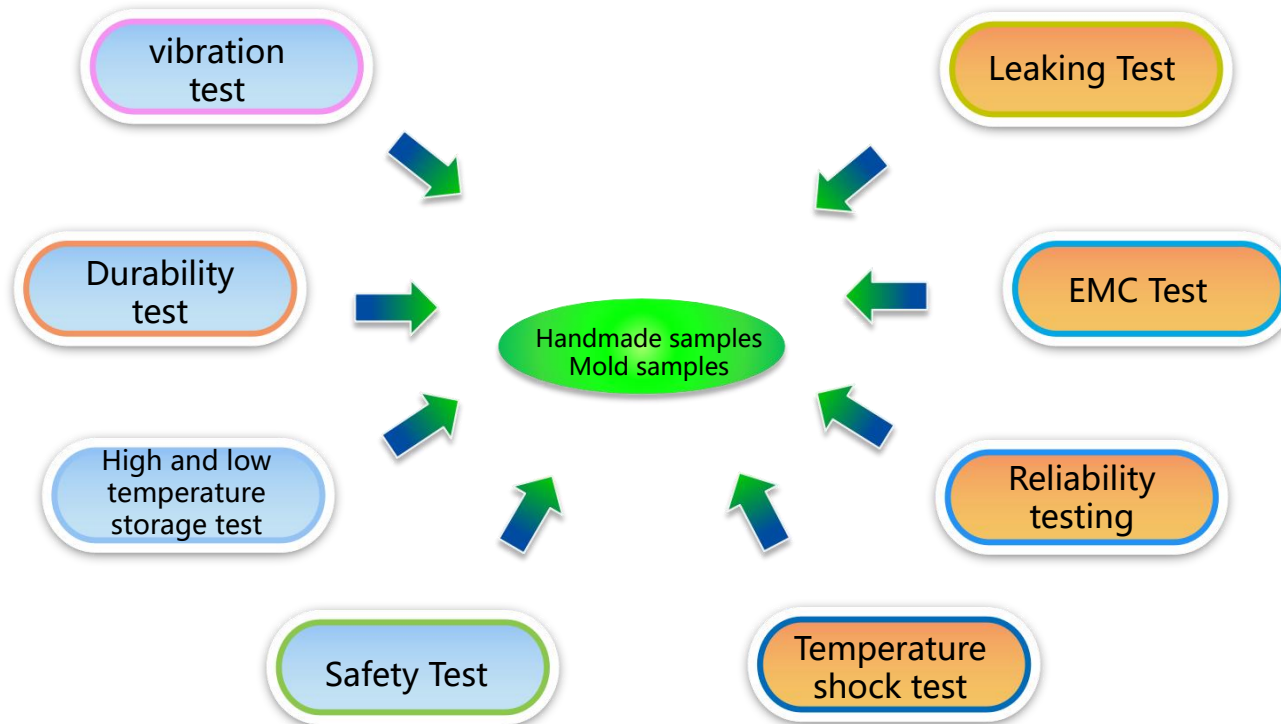
Application layer
App diagnostic service

1. Diagnosis and Communication Management
2. Data transmission
3. DTC storage data
4. IO Control
5. Calling ECU internal preset functions
6. Uploading and downloading



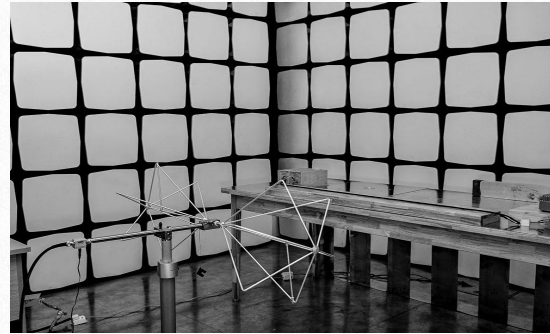
DFMEA-Control Progress





Testing Ability

- Total area : 1,057 m²
- Electrical performance lab
- Environmental lab
- EMC lab
- CNAS applied and under inspection



EMC lab



Electrical performance lab



Environmental lab

Electrical performance lab-test equipment



Electrical performance testing system

- Chroma 8000 programmable detecting system
- Electrical safety performance analyzer
- Seal leak detector, etc



Leak Detector



Electrical safety performance comprehensive analyzer

Electrical performance lab-Test items



OBC input voltage range	OBC startup output overshoot	DC/DC input voltage range	DC/DC input reverse protection	DC/AC DC output current limiting characteristics
OBC input frequency range	OBC output voltage error	DC/DC rated power	DC/DC dynamic response	DC/AC DC output power limiting characteristics
OBC charging function	OBC output current error	DC/DC peak power and duration	DC/DC output voltage limiting characteristics	DC/AC DC output voltage error
OBC voltage limiting characteristics	OBC output voltage ripple factor	DC/DC voltage control accuracy	DC/DC output current limiting characteristics	DC/AC DC output current error
OBC current limiting characteristics	OBC power factor	DC/DC current control accuracy	DC/DC conversion efficiency	DC/AC output voltage ripple factor
OBC power limiting characteristics	OBC charging efficiency	DC/DC overshoot and recovery time	DC/DC high-pressure relief function	DC/AC startup output overshoot
OBC input overvoltage and undervoltage protection	OBC output response time	DC/DC static current	DC/DC power on/off overshoot test	DC/AC output throwing load
OBC output overvoltage and undervoltage protection	OBC startup output overshoot	DC/DC output voltage ripple factor	DC/AC input voltage range	DC/AC power factor
OBC output short circuit protection	OBC output throwing load	DC/DC input overvoltage and undervoltage protection	DC/AC output frequency range	DC/AC AC input overvoltage and undervoltage protection
OBC output reverse protection	OBC over temperature protection	DC/DC output overvoltage and undervoltage protection	DC/AC startup input surge current	DC/AC DC output overvoltage and undervoltage protection
OBC start input surge current	OBC sleep wake-up	DC/DC output short circuit protection	DC/AC DC output voltage limiting characteristics	DC/AC output short circuit protection

Environmental lab-test equipment

- Temperature, humidity, and vibration test box
- High and low temperature test chamber
- Salt spray test chamber
- Temperature shock test chamber
- Aging load Cabinet



Temperature, humidity, and vibration test box



High and low temperature test chamber



Aging load cabinet



Salt spray test chamber



Temperature shock test chamber

Environmental lab-Test items

Test items		Testing ability	Testing equipment
Low temperature storage Low temperature operation High temperature storage High temperature operation Damp heat cycle Steady state damp heat	Resistance to industrial solvents temperature gradient Temperature cycling Condensation test	Temperature range: -60 °C~150 °C Humidity range: 10%~98% RH (standard type) Box size: 100 * 100 * 100cm (W * D * H) Cooling rate: 20 °C~-60 °C/70 min (under no load) Heating rate: 20 °C~+150 °C/45min (under no load) Temperature stability: ± 0.2 °C (control point) Humidity stability: ± 2% (control point)	6 high and low temperature humidity test chambers
Temperature shock	Working dimensions: 700 * 700 * 600 (depth * width * height) Temperature range: -70 °C~180 °C Impact range: -40 °C to 85 °C Studio temperature deviation: ± 2 °C High temperature recovery time: ≤ 5 minutes High and low temperature conversion time: ≤ 2 minutes	Heating rate of high-temperature box: from R.T. Rise to+180 °C ≤ 90 minutes Cooling rate of low-temperature box: from R.T. Drop to 70 °C ≤ 90 minutes	1 three box temperature shock test box
Sweep frequency vibration, random vibration	Rated sinusoidal excitation force: 10KN Rated random excitation force: 10KN Shock excitation force: 20KN (pulse width 4ms) Frequency range: 5-3000Hz Maximum no-load acceleration: 1000m/s ²	Maximum speed: 1.8m/s Maximum displacement: 51mm Maximum load of vertical platform: 300KG Maximum load of the horizontal platform: 91 ± 10KG	2 sets of electric vibration testing systems Two temperature, humidity, and vibration three comprehensive test boxes
Salt spray test	Temperature range: RT+35 °C~55 °C Saturation bucket range: RT+47 °C~63 °C Humidity range: 85-90% R.H Air saturation: RT+10 °C~63 °C	Temperature uniformity: ± 2 °C Temperature fluctuation: ± 0.5 °C Spray sedimentation: 1 ~ 2ml/80cm ² . h Spray mode: continuous	1 salt spray test chamber
IP protection level (waterproof)	Meet the requirements of IPX7		water tank
Noise test	Noise measurement range: 30-130dB		Noise meter
Durability and aging test	Can age 24 samples simultaneously		1 set of aging system

EMC lab

- EMC Lab:Established in 2016
- EMC radiated lab:A standard 1 metres semi-anechoic chamber
All the lab surfaces are installed with absorbing material except for the metal reflector on the ground surface;
Simulate open area test conditions ;
- EMC Conducted Lab:Effective isolation of electromagnetic environment inside and outside the laboratory
Excelent grounding performance;



Anechoic Chamber



Receiver



Electric fast pulse generator



ESD gun

EMC lab-Test items



Test items	Testing ability	Testing equipment
Radiation emission (RE)	Frequency: 150KHz-1GHz Standards: CISPR 25, GB/T 18655, etc	receiver antenna Artificial network
Conducted emission voltage method (CE)	Frequency: 150KHz-108MHz Standards: CISPR 25, GB/T 18655, etc	receiver Artificial network
Conducted emission current method (CE)	Frequency: 150KHz-245MHz Standards: CISPR 25, GB/T 18655, etc	receiver Artificial network Current probe
Conducted Emissions - AC Ports (CE)	Frequency: 150KHz-245MHz Standards: GB/T 9254, GB 4824, etc	receiver Artificial network
Harmonic testing	Power supply terminal: 0-300V/40A/13kW Standards: IEC 61000-3-2, EN 61000-3-2, GB/T 17625.1	High performance programmable AC power supply
Electrostatic discharge (ESD)	Test level: $\pm 0.2\text{kV}$ -30kV Impedance: 330 Ω /150pF/2000 Ω /150pF Standards: ISO 10605, GB/T 19951, GB/T 17626.2, IEC 61000-4-2, EN 61000-4-2	Electrostatic discharge generator
Electric Fast Transient Pulse Group (EFT/Brust)	Power port, signal port Test level: $\pm 0.25\text{kV}$ -5.0kV; AC: 0-260V, 20A (single-phase, three-phase); DC: 0-220V, 20A Standards: IEC 61000-4-4, EN 61000-4-4, GB/T 17626.4	Pulse generator
Surge lightning strike	$\pm 7.0\text{kV}$ (1.2/50us waveform) AC: 0-260V, 20A (single-phase, three-phase); DC: 0-220V, 20A Standards: IEC 61000-4-5, EN 61000-4-5, GB/T 17626.5	Lightning surge generator
AC Dip	Drop level: 100% -0%, 1ms -5000ms AC: 0-300V, maximum 20A (single-phase) Standards: IEC 61000-4-11, EN 61000-4-11, GB/T 17626.11	Zhou wave drop generator



01 YILIDA Group

02 TC Charger Introduction

03 Global Sales

04 R&D Center

05 Intellectual Property

06 Products Catalog

07 Taizhou Production Base

Intellectual Property



- Invention Patents **3**,
- Utility model Patents **33**
- Appearance Patents **17**,
- Software Copyright **19**,
- Trademark **3**





01 YILIDA Group

02 TC Charger Introduction

03 Global Sales

04 R&D Center

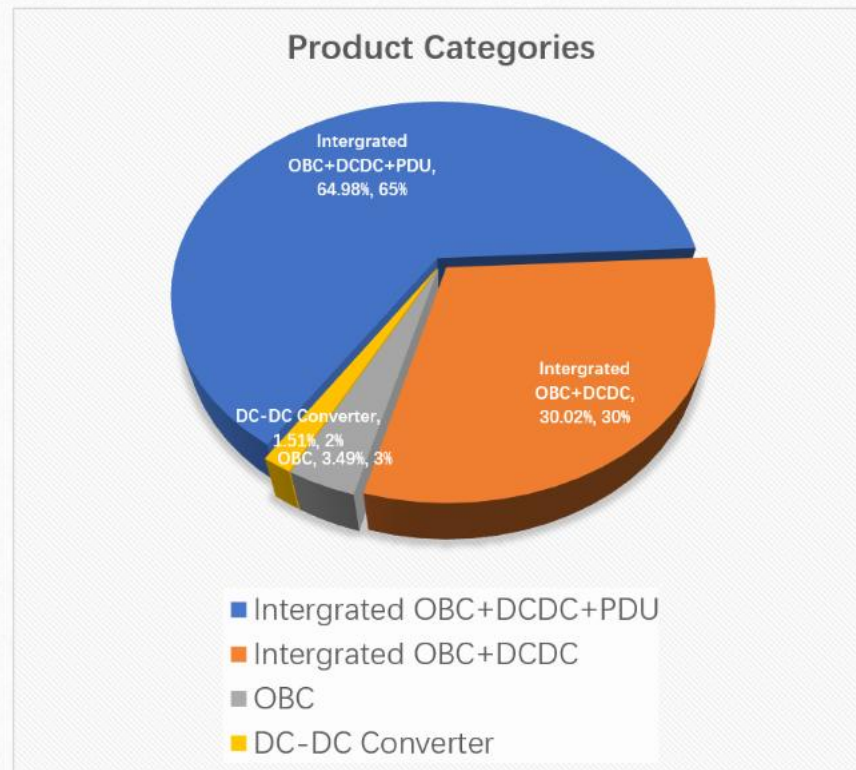
05 Intellectual Property

06 Products Catalog

07 Taizhou Production Base

Product Categories




Product	Year 2023(pcs)	Product Ratio
Intergrated OBC+DCDC+PDU	185,493	64.98%
Intergrated OBC+DCDC	85,696	30.02%
OBC	9,963	3.49%
DC-DC Converter	4,310	1.51%






On-board Charger: 3.3kw series, 6.6kw series



单体OBC

型号	2kW						3.3kW				6.6kW			
														
电压平台	48V	72V	96V	115V	144V	320V	72V	115V	144V	320V	96V	144V	320V	365V
冷却方式	风冷						液冷 / 风冷				液冷 / 风冷			

单体DCDC

型号	1kW				1.5kW				2kW	
										
电压平台	72V	115V	144V	320V	72V	115V	144V	320V	320V	365V
冷却方式	自然冷				风冷				风冷&液冷	

Integrated OBC+DCDC



OBC+DC二合一 (2 in 1)







型号	6.6kW+1.5kW(二合一)	3.3kW+1.5KW(二合一)	6.6kW+2kW(二合一)
----	------------------	------------------	----------------



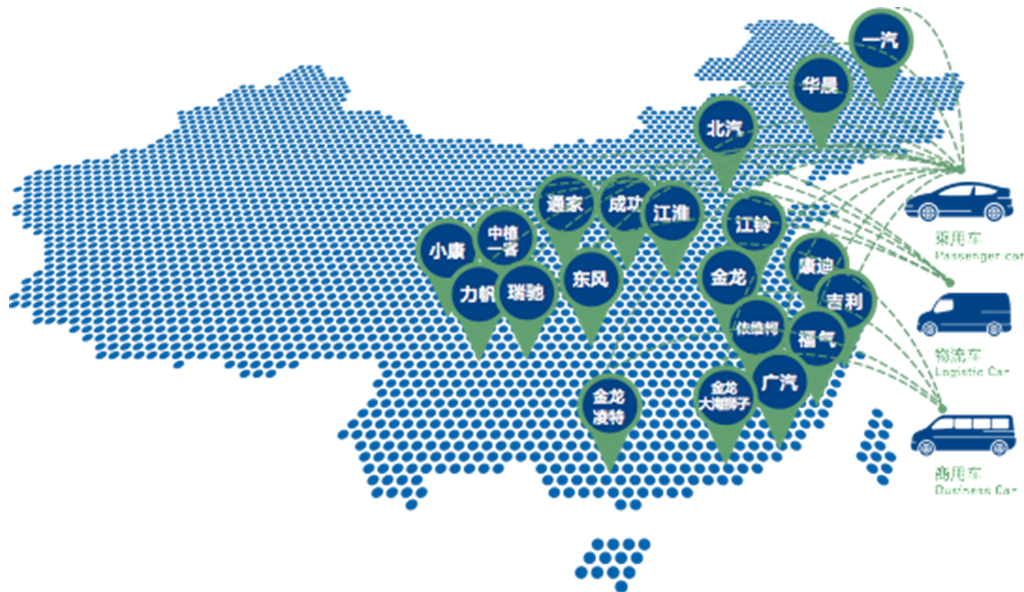
电压平台	96V	119V	144V	320V	144V	320V	114V	320V	360V
冷却方式	风冷				液冷		液冷		

Integrated OBC+DCDC+PDU

OBC+DC+PDU三合一 (3 in 1)

型号	1.5kW+0.8kW+PDU (三合一)					3.3kW+1kW+PDU (三合一)				6.6kW+1.5kW+PDU (三合一)		
												
电压平台	72V	96V	115V	144V	320V	96V	115V	144V	320V	144V	320V	365V
冷却方式	风冷					风冷				风冷&液冷		
型号	2kW+1kW+PDU (三合一)				3.3kW+1.5kW+PDU (三合一)				6.6kW+2kW+PDU (三合一)			
												
电压平台	72V	96V	115V	144V	144V		320V		320V		365V	
冷却方式	风冷				液冷				液冷			

Esteemed Partners



- 100+ Enterprises
- Passenger Vehicle
- Commercial Vehicle
- Motorcycle

Motorcycle



passenger



commercial





01 YILIDA Group

02 TC Charger Introduction

03 Global Sales

04 R&D Center

05 Intellectual Property

06 Products Catalog

07 Taizhou Production Base

Taizhou Production base



- Total area with 23,000 m²
- 337 employees in factory
- Construction concept: digitalization, flexibility and automation
- Monthly production capacity with 100K pcs



Taizhou production base

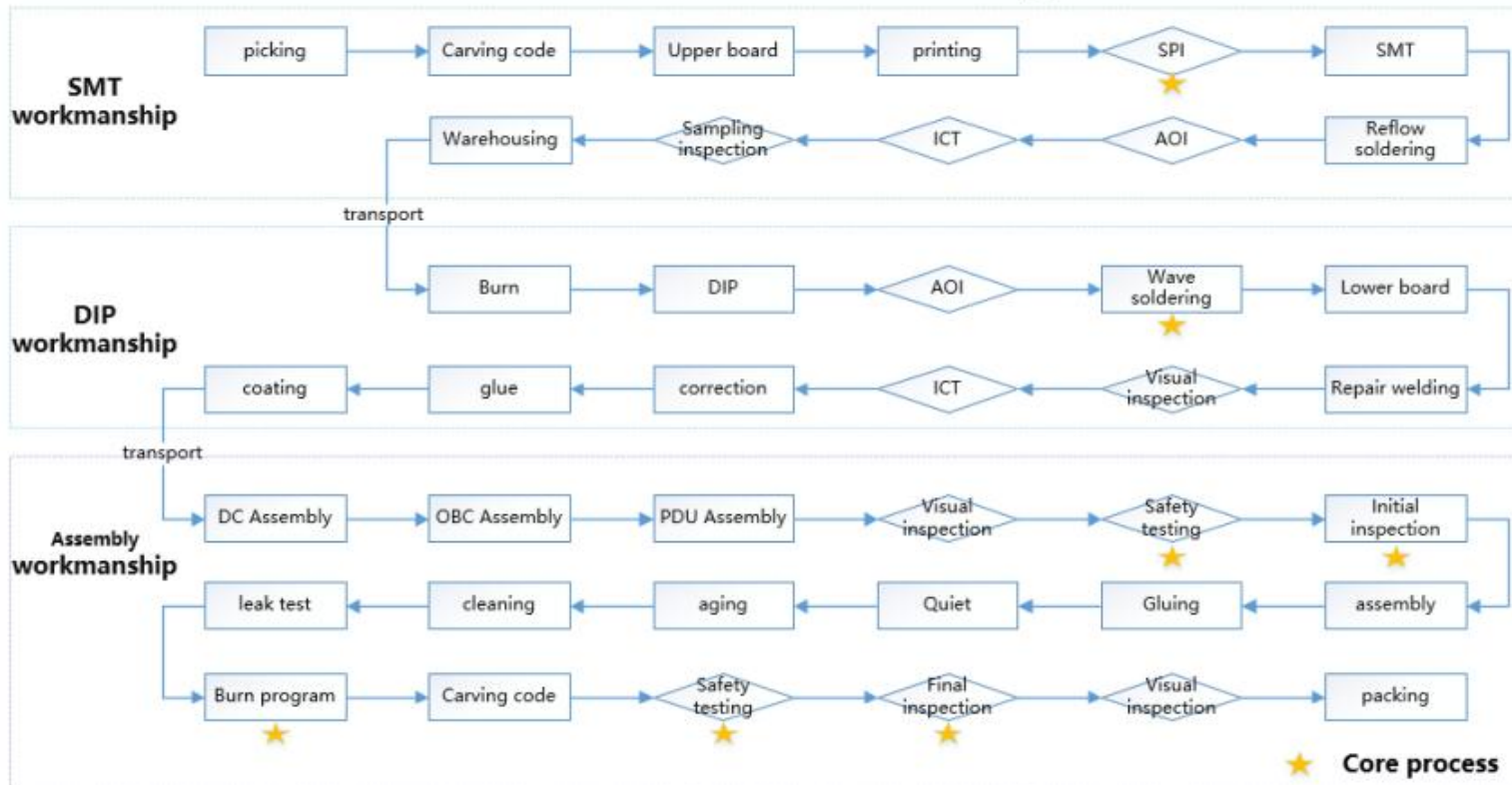


- Passed IATF16949 in2018
- 100K class dust-proof for SMT workshop
- 500K class dust-proof for assembly workshop
- Perfect electrostatic protection system:The air shower door,ESD protection and anti-static floor,etc



Production flow chart

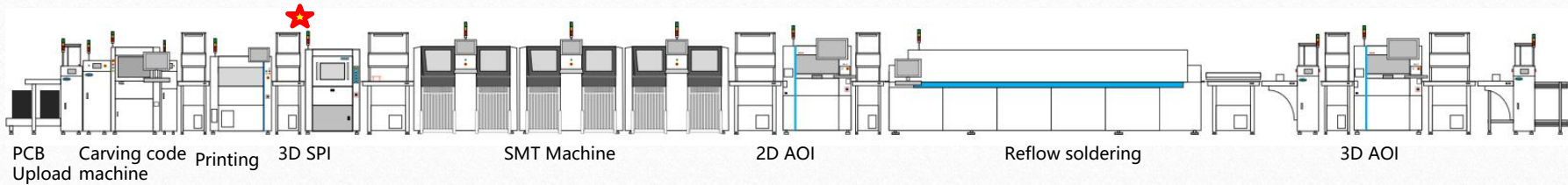
Product Process Flow Diagram



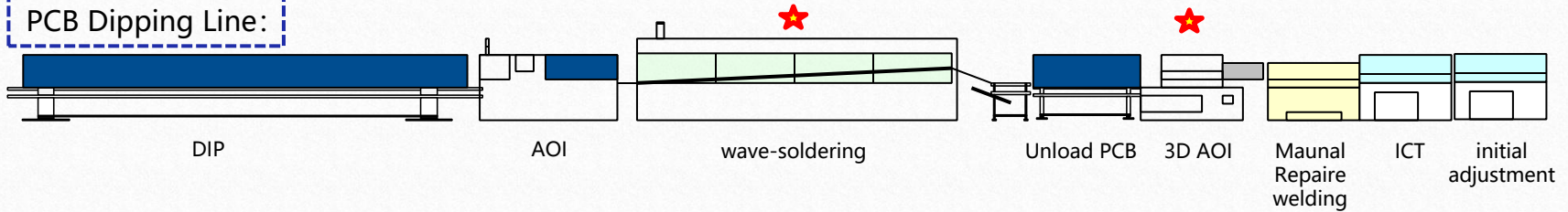
Production Line

SMT Line:

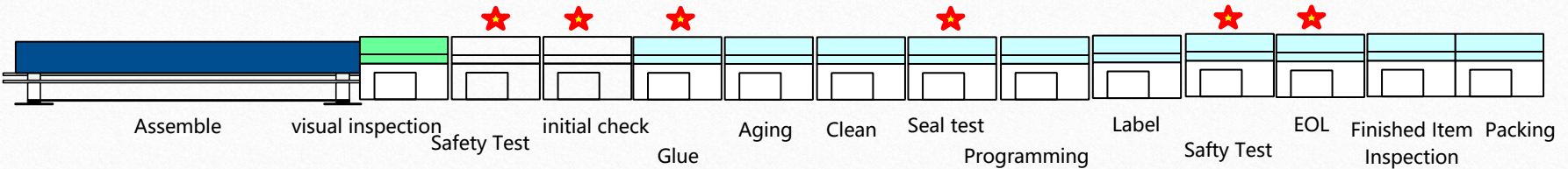
★ Core process



PCB Dipping Line:



Assemble Line:



Production capacity



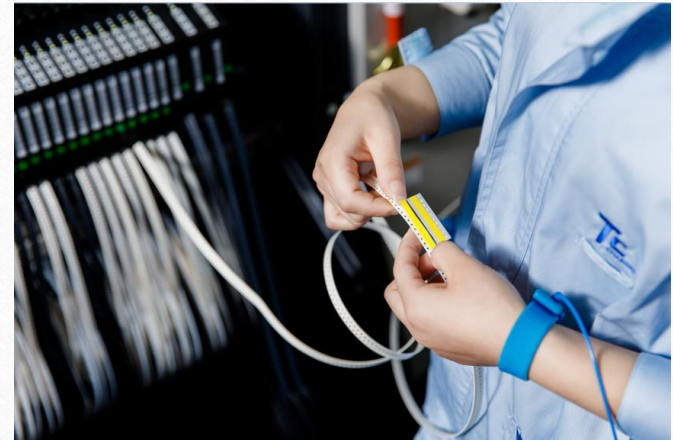
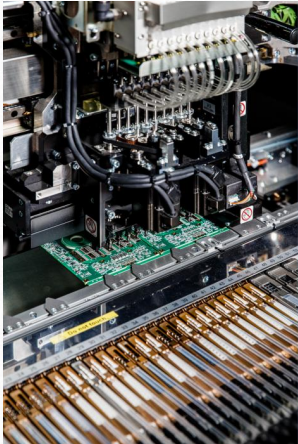
Capacity:Per year

	Production Lines	Capacity	Utilization IN %	Max. Capacity (sets)
SMT	4	573,636	52.20%	1,200,000
DIP	5	512,802	58.65%	1,240,000
Front Assembly	6	255,543	73.04%	948,000
Aging	7 cabin+16 racks	279,127	71.16%	968,000
Rear Assembly	3	241,052	77.47%	1,070,000
Packaging	1	330,301	74.59%	1,300,000

Our existing equipment can meet the technical requirements, control requirements and production capacity requirements of CAT projects.

SMT workshop

- 4 SMT Production lines
- SMT workshops covering area with 1,520 m²
- 100K class dust-proof for SMT workshop
- Monthly production capacity with 100K pcs



SMT workshop-SPI

➤ 3D SPI

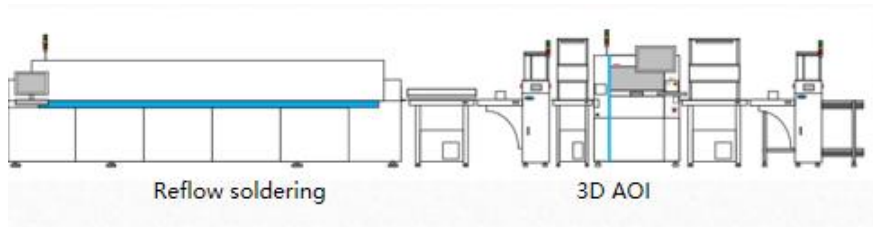
- SPI :Solder Paste Inspection
- 4 pcs of SPI machines
- Detect defective products in printing, improve SMT efficiency
- Test the manufacturing capability of printing



SMT Workshop-AOI

➤ 3D AOI

- AOI :Automated Optical Inspection
- 5 pcs of AOI Machines
- Detect defective products in reflow soldering production, improve assembly efficiency



Assembly workshop:



- Workshops covering area with 3,500 m²
- 6 front assembly lines
- 3 rear assembly lines
- Automatic Flow line, adopts Auto-welded Robot, Auto-screws Robot, JIT, MES, etc.



Assembly shop-Aging room

- Workshop area: 460m²
- 7 Cabins and 16 Racks, 120 stations
- Defect detection of products
- Regular aging time is 1/h for OBC,2/h for integrated

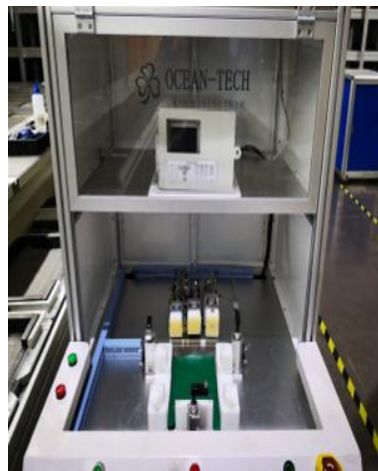


Key Inspection

Safety Inspection Machine



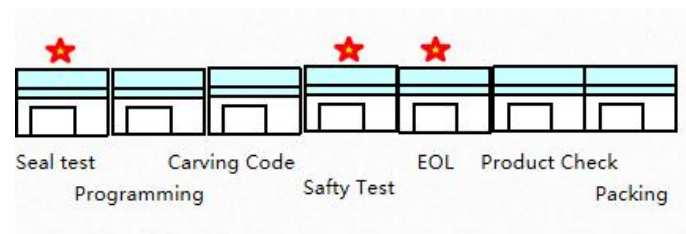
Sealing Inspection Machine



EOL Inspection Machine



- **Sealing test:** Test the sealing performance of the connecting parts
- **Safety Test:** Test the insulation and voltage withstand
- **EOL test:** Comprehensive test before packing



Supply Chain



Major Components Supplier

	Import	China
Transistor	INFINEON, ON, ST, ROHM	Oriental Demi, Sanrise, CR Micro, AOS, Pan JIT
Analog IC	ON, TI, ADI, NXP	Novosns, SGMICRO, Meraki-IC
Digital IC	TI, NXP	Huda Semi, Giga device, CR Micro
Magnetic devices	TDK, MURATA	TDG Core, KDM, DMEGC
Resistor		Yageo, FHcomp, Yezhan, TALEC
Capacitor	TDK, MURATA	Yageo, FHcomp, Jianghai, AiShi, Faratronic
Fuses	LITTEFUSE	Conquer
Relay	Ormon	Hongfa, Jonhon
Connector	TE, Amphenol	Jonhon, Chilye, Yonggui



Material delivery cycle

Item	Period (Weeks)
Imported electronic materials	52-99
China electronic materials	12-26
Imported Connectors	12-16
Other materials	4-5

Long lead time mterial management:

- Material safety stock : 4 months
- Setup dual source
- New generation improvement
- Verification and application of domestic alternative materials

Quality Certificate



IATF 16949



ISO 14001:2015

Embrace the future with green technology

Strive to be the first leader about on-board power supply solutions in the world



Sales and R&D Center: 5F, A, No. 108, Xiangyuan Rd, Gongshu District, Hangzhou, 310015 China

Plant: No. 1368, Haimao Rd, Binhai Industry, Jiaojiang Distric, Taizhou, 318014 China

Tel: +86-571-88368635 Fax: +86-571-88235199 Mailbox: charger@tccharger.com