DC CHARGING SOLUTION INTRODUCTION

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1. About us

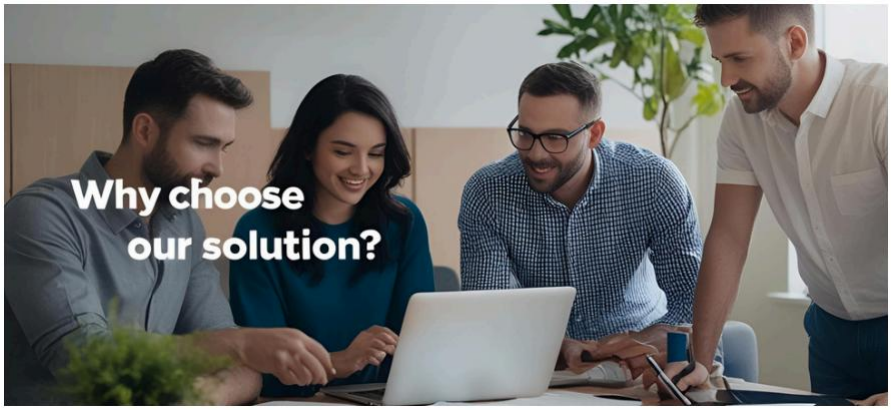
1.1 Company Profile

AUPINS Technology Co., Ltd. began providing One-Stop solutions for major new energy charging system in 2019. The company mainly develops smart EV charging solutions compliant with mainstream China, European, American, and Japanese standards.
Additionally, the company supplies vehicle-end communication protocol software and hardware systems for automakers, delivering advanced, stable, and reliable products and solutions to clients.

1.2 Core Strengths

Focused on R&D of Advanced Global (China, European and American) Standard Charging solution: With years of in-depth research on global EV charging standards, we fully grasp the demands and pain points of China and overseas charging facilities and electric vehicles. We deliver high-quality, cost-effective smart charging systems and products.
Charging Pile Products Available Worldwide: We possess multiple core technologies covering global charging standard protocols. All products are independently developed, supporting OCPP, SECC, ECC, and EVSE.
Global Compatibility: Our solutions are fully compatible with global charging standards, including Chinese GB/T27930, European & American ISO15118/DIN70121, and Japanese CHAdeMO. We remain a leading provider of advanced EU and US standard solutions.

1.3 Team & Technical Advantages



We are no startup team, but a regroup of seasoned industry experts.

Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

Proven Project Experience: Team members have led benchmark projects including Star Charge EU-standard piles, Ampsafe liquid-cooled supercharging piles, and Teld US-standard piles.
Full Protocol Compatibility: We master full protocol compatibility of GBT/CCS1/CCS2/CHAdeMO for global market adaptation. Modular hardware design and dynamic power distribution boost charging efficiency.
EU & US Standard Experts: Proficient in international standards such as CE, UL, and IEC 61851-23 to guarantee product compliance. We provide pre-test and certification guidance to shorten time-to-market.
Robust Verification Data: The team has participated in Huawei's European road test projects, possessing abundant field test data and verification experience to offer solid data support for solution design.

2. What is the CN/EU/US Standard DC Charging Solution?

The CN/EU/US standard DC charging solution integrated solution refers to a set of DC fast charging systems designed in compliance with China, European and American charging specifications such as **DIN70121** and **ISO15118-2**.
It covers the whole process including system architecture, hardware, software, component selection, structure design, production documents, product certification, and after-sales services. The solution enables charging manufacturers to launch mass production efficiently.

2.1 Solution Matrix & Content Elements

The following table outlines the exact technical assets, documents, and options included in the full turnkey solution:

Category Item	Description	Remarks
System Architecture	System Architecture Diagram	Ensures coordinated operation
	Main Control Logic Flow Chart	
Electrical Engineering Design Library	Electrical Drawings	Assures electrical compliance
	Power Module Selection Calculation Sheet	
	EMC Design Specification	
	Safety Clearance Design Guideline	
	Interface Definition of Each Module	
Complete Machine BOM & Production Documents	Complete Full Set of Machine BOM	Guidance from sample to SOP
	Wiring Harness Process Documents	
	Wiring Diagrams	
Production System	Production Process Flow, , , , , , , ,	Full quality control pipeline
	Key Process Control Points	
	Test Tooling List	
	Prototype Verification Documents	
	Prototype Test Outline	

Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
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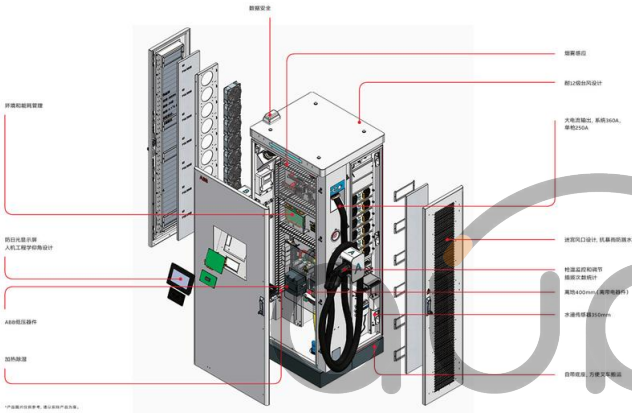
E-mail:felixxu@aupins.com

Category Item	Description	Remarks
	Type Test Items	
	Issue Tracking Matrix	
	Factory Test Specification (Including Test Steps, Limits & Judgment Criteria)	
	Traceable Test Record Template	
	Testing Equipment List	
Structural Design	SOLIDWORKS 2022	
Prototype	Complete Prototype Assembly per Design BOM	
Certification	Customized as Customer Requirements	

2.2 What we can do for your benefit



Complete machine BOM and production documents
Provide guidance files for processing, production, testing and acceptance from sample production to SOP stage

System Architecture Design
It includes the overall framework of charging piles, functional module division, as well as interface definitions and interaction logic between modules, ensuring coordinated operation of all parts and delivering stable and reliable charging services

Prototype Delivery
Delivery of full-functional prototype, available for actual charging test and performance verification

Hardware Circuit Design Documents (Optional)
Detailed circuit schematic diagrams, PCB layout design and connection schemes between main controller and peripherals, helping clients understand hardware structure and facilitating production and subsequent maintenance

Shorten your R&D cycle

Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

Leverage mature electrical system framework and material selection to realize rapid prototyping. Our standardized module design cuts product development cycle from traditional 20 months to 1-3 months, enabling quick market launch and sales.

Deliver reliable and stable product design for you
Designed in compliance with CE and UL full charger certification standards for speedy certification approval. Rigorously tested and verified, the design ensures stable operation under extreme conditions and meets access requirements of major global markets.

Greatly reduce your R&D costs
No need to develop European and American charging protocols from scratch. Open configurable interfaces enable fast adaptation to overseas vehicle models. Compared with independent R&D, it saves about 60% investment and 80% time cost.

High Equipment Compatibility
Supports DIN70121/ISO 15118 charging protocols. It has passed Keysight conformance and interoperability tests, and completed road tests in more than 27 overseas countries.

High-performance Mature Product
Adopts load balancing algorithm and supports dual-gun dynamic power distribution, greatly improving charging efficiency.

All-round Charging Solution Compatible with Global Standards
Built based on DIN 70121/ISO 15118 standards, realizing intelligent vehicle-pile communication and Plug and Charge (PNC) function.
Fully compliant with OCPP 1.6J/OCPP 2.0 open charging protocols, ensuring seamless connection with global charging networks.
Reserved design for the complete charging pile solution and OTA support, easily adapting to future standard updates

3. Introduction to Complete Charging Solution
3.1 International Standard Implementation Comparison

The mainstream international DC fast charging standards are formulated by regional standardization bodies and industry alliances, reflecting technical routes and the competition landscape across major global markets.
3.1.1 Core Standards and Certification Description

Project	European Standard (CCS2)	US Standard (CCS1 / Tesla NACS)
DC Interface Standard	IEC 62196-3 (CCS2, Combo2)	SAE J1772 CCS1 or Tesla NACS
Communication Protocol	ISO 15118 (PLC), IEC 61851-23	ISO 15118 (PLC), SAE J1772
Grid Voltage & Safety Certification	3-phase AC 400V (50Hz) **Certification: CE, TUV,**	Single-phase / 3-phase AC 480V (60Hz)

Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

Project	European Standard (CCS2)	US Standard (CCS1 / Tesla NACS)
	RoHS	**Certification: UL 2202, UL 2594, FCC (EMC)**
Metrology Regulations	MID Certification (Class B Accuracy)	ANSI C12.20 (US Metrology Standard)

3.1.2 Hardware Design Differences

Project	European Standard (CCS2)	US Standard (CCS1 / Tesla NACS)
Electrical Architecture & Topology	Input: 3-phase 400V AC, rectified output 200-1000V DC (compatible with 800V high-voltage platform) Topology: Rectifier + LLC resonant DC/DC (efficiency > 94%)	Input: 3-phase 480V AC or single-phase 240V AC (home fast charging) Topology: PFC rectifier + Dual Active Bridge (DAB), supporting wide voltage range of 150-500V
Charging Gun & Interface	CCS2	CCS1 / NACS
Harmonic Suppression	EN 61000-3-12 ($THDi < 5\%$)	IEEE 519-2014 ($THD < 5\%$)
Solar & Storage Integration	DC-coupled PV (saves inverter)	AC-coupled (NEC 705 specification)
V2G Support	Common (ISO 15118-20)	Pilot programs (a few states like California)

3.1.3 Software and Communication Protocols

Project	European Standard (CCS2)	US Standard (CCS1 / Tesla NACS)
Charging Control	PLC Communication: ISO 15118-20 supports V2G and Plug & Charge	NACS adopts CAN bus and proprietary protocol (non-ISO 15118)
Communication Layer	Mandatory support for OCPP 1.6/2.0 (commonly used by European operators)	CCS1 shall comply with SAE J3400 for NACS standardization transition

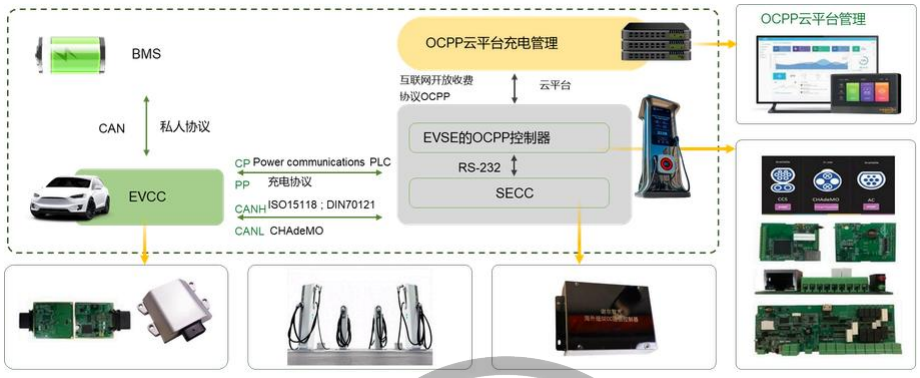
3.1.4 Power Grid and Energy Integration

Project	European Standard (CCS2)	US Standard (CCS1 / Tesla NACS)

Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

Project	European Standard (CCS2)	US Standard (CCS1 / Tesla NACS)
Harmonic Suppression	EN 61000-3-12 (THDi < 5%)	IEEE 519-2014 (THDi < 5%)
Solar-Storage-Charging	DC-Coupled PV (Eliminates the need for an inverter / Inverter-free)	AC-Coupled (Compliant with NEC 705 regulations)
V2G Support	Widespread / Common (ISO 15118-20)	Pilot Projects (Limited to a few states, e.g., California)

3.2 Technical Framework of DC Charging Solution



System Architecture Composition

Our charging system architecture consists of several key modules. The OCPP cloud platform implements the open charging protocol over the internet. The main control board handles core computing and control functions. The safety protection module ensures safe and reliable charging processes. The UI module provides user interface interaction.

Technical Connection

The system communicates with electric vehicles via CP/PP signals. The metering and monitoring module tracks charging parameters in real time, while the power supply system delivers stable electricity. The power module connects to the vehicle battery system through DC+/DC- to achieve efficient energy transmission. Designed based on modular principles, the system features relatively independent yet closely coordinated functional units, guaranteeing safe, stable and efficient charging. This layered architecture facilitates fault isolation and system upgrades, greatly enhancing maintainability and scalability.

Global Standard Compatible Design

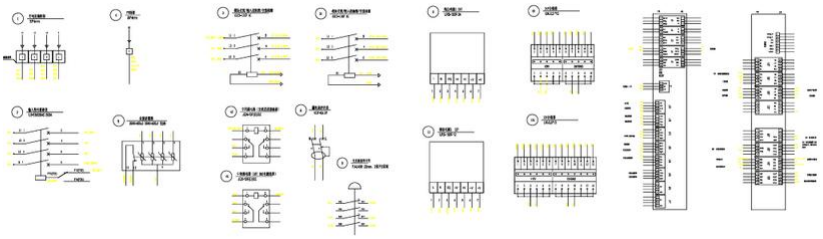
Developed in accordance with DIN 70121 and ISO 15118 standards, it realizes intelligent vehicle-pile communication and Plug&Charge function. Fully compliant with OCPP 1.6J and OCPP 2.0 open charging protocols, enabling seamless connection with global charging networks. Reserved design and OTA upgrade support allow easy adaptation to future standard updates

Intelligent Power Allocation System

Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

The intelligent module scheduling algorithm maximizes charging resource utilization, delivering a single pile output power up to 1.6MW.
Dual-port design enables dynamic power distribution with automatic adjustment per vehicle charging demands
Smart power allocation for simultaneous multi-vehicle charging eliminates power waste
Full power output available for single vehicle charging to shorten charging time
Automatic load balancing in peak periods ensures steady power supply

3.3 ELECTRICAL DESIGN



Our electrical design centers on safety, intelligence and reliability. It integrates comprehensive protection functions to secure charging operations. Advanced algorithms and control technologies enable smart charging management and elevate user experience. All designs comply strictly with international standards to guarantee product quality and dependability.

3.4 SOFTWARE DESIGN

Whole Charger Control
Drive and control peripheral modules in compliance with DIN 70121 and ISO 15118 timing sequences. Emergency stop, lightning protection, overcurrent and overvoltage monitoring and protection are implemented for safety assurance.

Protocol Development
Developed in accordance with DIN 70121, ISO 15118-2 and ISO 15118-20 standards, and passed conformance and interoperability tests. The protocol software has been adapted for charging services in over 27 overseas countries with an adaptation rate of 99%

Diagnosis and Upgrade
Based on ISO 14229, faults arising from abnormal shutdown and self-check errors of chargers can be quickly stored for problem recording. OTA upgrade is supported to adapt to future protocol releases

3.5 FULL MODULAR DESIGN

Our CCS DC charging pile adopts full modular design. Each functional unit can be upgraded and maintained independently, greatly enhancing product flexibility and maintainability

High-efficiency Power
Conversion Unit Conversion efficiency exceeds 96.5%, effectively cutting energy loss and boosting charging efficiency.

Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

Fully compliant with OCPP communication standards
Supports OCPP 1.6J/2.0, ensuring compatibility with various charging management platforms

Modular Manufacturing Process
Significantly shorten delivery cycles and enhance production efficiency and quality control

Cutting-edge Digital Control System
Precisely adjust output power to realize intelligent charging

3.6 SELECTION AND DESIGN

High-Quality Supply Chain Assurance
We use components from leading domestic suppliers (A, B, and C) to ensure reliable procurement channels and competitive pricing for our customers. We carefully select our suppliers to guarantee component quality and supply stability, effectively mitigating supply chain risks.

Compatible with international standards
We use CE-compliant components to ensure timely certification and safety for the entire pile system. All critical components have obtained internationally recognized certifications, ensuring that our products can successfully pass market access Inspection s in various countries.

Design-for-tolerance Strategy
The design incorporates redundancy (while mainstream electronic locks typically require a 2A drive current, this design uses a 3A drive chip), allowing for the use of off the-shelf components and giving customers flexibility in independent development and component selection. This design philosophy enhances the product's adaptability and scalability.

3.7 SCALABLE DESIGN

The solution supports various power expansion options and standardized production.

Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

Low Power – 20–60 kW
Ideal for small charging stations and commercial facilities, offering excellent value for money.
• Maximum output of 60 kW per charging point
• Dynamic power allocation for dual charging points
• Compact footprint and easy installation

Standard Series - 60–300 kW
The top choice for mainstream charging stations, offering a balance of performance and cost.
• Maximum output of 120 kW per charging point
• Supports dynamic load balancing between dual charging points
• Modular design for easy maintenance

High-End Class - 300–600 kW
Ideal for highways and large scale charging hubs, offering ultra-fast charging speeds.
• Maximum output of 240 kW per charging gun
• Intelligent power allocation for dual charging guns
• Superior air-cooling technology ensures stability

OCPP Cloud Platform Management: Implements the open charging protocol over the internet (supporting OCPP 1.6J and OCPP 2.0). This ensures a seamless, direct connection with global charging networks and operators.
Core Controller (SECC & EVSE): The system communicates with electric vehicles via CP/PP signals. It features smart vehicle-pile communication developed based on DIN 70121 and ISO 15118 standards to achieve Plug and Charge (PNC) functionality.
Intelligent Power Allocation System:
High Power Capability: Powered by an intelligent module scheduling algorithm that maximizes charging resource utilization, delivering a single pile output power up to **1.6MW**.
Dual-Port Dynamic Distribution: Automatically adjusts per vehicle charging demands. Full power output is available for single vehicle charging to shorten charging time, while automatic smart allocation eliminates power waste when multiple vehicles charge simultaneously.
Load Balancing: Automatic load balancing in peak periods ensures a steady power supply.

3.8 IN-HOUSE DESIGN AND CUSTOMIZATION OPTIONS
Shorten R&D cycles, expedite full-scale prototyping, mitigate process risks, reduce overseas after-sales service, and meet customer needs

Leading in-house protocol stack
Features an industry-leading, in house developed protocol stack and rapid iteration capabilities: IEC 61851/DIN 70121/ISO 15118, passed KEYSIGHT and comemso conformance testing, and ensures high compatibility

In-house developed core technologies
The core electrical components, software, and hardware are all developed in-house and can be customized to meet specific customer requirements

Comprehensive testing system

Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

With the availability of EVCC and related simulator products, you can quickly set up product testing and validation workflows as well as in-line charging test processes, significantly shortening the testing cycle.

End-to-end certification support
We possess CE/UL design capabilities and can provide comprehensive guidance and support from design through certification, ensuring that products successfully pass all certification tests.

Hardware Customization
We have successfully developed 20– 120 kW all-in-one charging stations and have extensive experience in obtaining UL RL certification for the entire unit. Based on your requirements, our solutions can provide customized products with different power ratings, meeting the needs of various application scenarios, from small scale commercial charging to large scale charging stations

Software Customization
We offer customized software and hardware services that can be tailored to specific peripheral models and display languages specified by our clients. This includes the integration of various peripherals, such as payment terminals, displays, and communication modules, as well as the development of multilingual user interfaces to meet the needs of users worldwide.

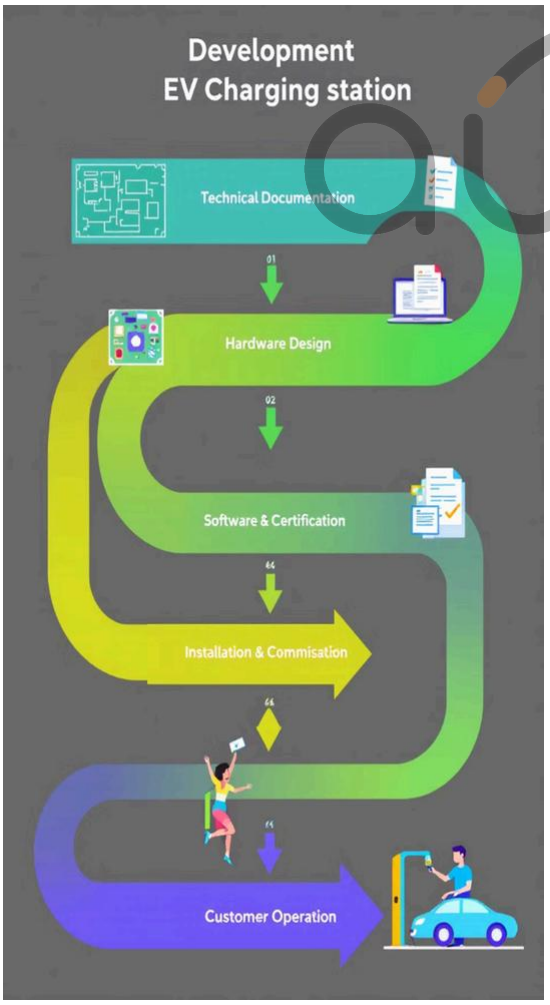
4. DELIVERABLES

Project		Remark
System Architecture	System Architecture Diagram	
	Main Control Logic Flowchart	
Electrical Engineering Design Library	Electrical Diagrams	
	Power Module Selection Calculation Table	
	EMC Design Specifications	
	Safety Clearance Design Guidelines	
	Interface Definitions for Each Module	
Assembly BOM + Production Materials	Detailed Complete BOM for the Entire Unit	
	Wiring Harness Process Documentation	
	Wiring Diagram	
Production System	Production Process Flow	
	Key Process Control Points	
	Test Fixture List	
	Prototype Validation Documentation	
	Prototype Testing Outline	

Tel:86-025-52353393
Wechat/Whatsapp/Mobile:
+86-18512525557
E-mail:felixxu@aupins.com

Project		Remark
	Contents of Type Testing	
	Issue Tracking Matrix	
	Factory Test Specifications (including test procedures, limits, and acceptance criteria) Test Record Template (Traceable for Each Unit)	
	List of Test Equipment	
Structural Design	SOLIDWORKS 2022 3D Design	Optional
prototype	Assemble a complete prototype according to the design BOM	Optional
Certification	According to customer requirements	Optional

4.1 DELIVERABLES RELATIONSHIPS AND VERSION CONTROL



Technical Documentation

Serves as the foundation for all subsequent development and production activities

Hardware Manufacturing

Manufacturing based on documentation to ensure that the hardware meets design Specifications

Software Deployment

Developed in tandem with hardware to ensure seamless integration between software and hardware

Final Pile Inspection

Delivered to the customer upon completion of certification to ensure product quality and safety

Actual deliverables will be adjusted based on the customer's contract (for example, ODM customers may only require hardware and basic documentation, while turnkey projects require a full-service solution). We recommend using a Git or SVN version control system to ensure the consistency and traceability of all deliverables.

5. SUPPORT SERVICES—24/7 FULL-CYCLE SERVICE

Live Support

Our team of professional engineers provides online technical support, responds quickly to customer needs, and resolves urgent issues.

Troubleshooting

Quickly identify and resolve technical issues, minimize downtime, and ensure the continuous and stable operation of charging equipment

Continuous Optimization

We provide regular system updates and performance enhancement solutions to ensure that our charging equipment remains state of-the-art and competitive.

Documentation Support

We provide comprehensive and detailed technical documentation to help our customers' technical teams understand and master the system.

We provide professional services covering the entire production cycle of charging stations, from analyzing product technical requirements to R&D and design, and on to manufacturing, ensuring the efficient development and rapid deployment of charging infrastructure.

6. Commercial Value of the Overall Solution

Drastically Shortened R&D Cycle (1 to 3 Months): By leveraging our mature electrical system framework, material selection, and standardized module design, the traditional 20-month development cycle is cut down to just **1-3 months**, enabling rapid prototyping and fast market launch.

Greatly Reduced Investment Costs (Save ~60%): Clients avoid having to develop European and American charging protocols from scratch. Open configurable interfaces enable fast adaptation to overseas vehicle models. Compared with independent R&D, it **saves about 60% investment and 80% time cost**.

High Equipment Compatibility & Field-Proven Stability: The solution has passed Keysight conformance and interoperability tests, and completed road tests in more than **27 overseas countries**. It delivers a reliable, stable product design compliant with CE and UL full charger certification standards for speedy approval.

China Supply Chain Advantages with Global Standards: Backed by a sophisticated domestic supply chain with prominent cost advantages, we optimize localized product adaptation based on rich overseas project experience. Furthermore, reserved design and **OTA upgrade support** allow the system to easily adapt to future standard updates without hardware re-engineering.

Tel:86-025-52353393
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