NXP
EdgeLock® SE05x

Use Case: *Smart, Secure EV Charging*

As more Electric Vehicles (EVs) hit the road, there's a growing need to support charging in more places. To help extend the network of Electric Vehicle Source Supply Equipment (EVSE), NXP offers a turnkey solution for secure EVSEs that enables quick deployment and rapid scaling of compliant chargers in residential and commercial use cases.

APPLICATIONS

Public EV Charging Stations / EVSE

Residential EV Charging Stations / EVSE

CHALLENGE

EVSEs are an essential part of the transition to eMobility because having convenient access to charging services makes it easier to own and operate an EV. With government decisions, such as the EU only allowing new cars with zero CO_2 emissions from 2035 onwards, and more people choosing EVs over traditional vehicles with internal combustion engines, government agencies and private enterprises are moving quickly to deploy EV chargers in residences, parking lots, along roadways, or wherever they're needed.

Several internationally recognized standards and protocols, designed to enable interoperability and accelerate adoption, are helping to expand the infrastructure. The Combined Charging System (CCS), for example, defines the "plug" or "nozzle" that delivers power to the EV, and ISO 15118 defines the digital communication between the EV and the charger.

PLUG&TRUST

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Securing tomorrow's eMobility. *Today.*

The Open Charging Point Protocol (OCPP) is an open source protocol promoted by the Open Charge Alliance (OCA) that can be used to connect EVSEs to a compatible Charging Station Monitoring System (CSMS) allowing users to handle operations (e.g. starting/stopping charging sessions), manage chargers, initiate firmware upgrades, and more.

From a security standpoint, EV chargers are connected edge devices that integrate functions also found in smart meters and POS terminals and require similar protection. EVSEs are often unmanned and located in remote or isolated areas. As they are an entry point to the energy grid, attackers might try to get unauthorized access. Therefore, interactions with the charger or between the charger and the cloud need to be authenticated and kept safe, to prevent unauthorized access or manipulation of data transmissions. Any notifications sent to the end user, to provide status during charging or as part of the billing process, must be kept private. Also, before delivering power, the EVSE and the vehicle must first perform mutual authentication, to ensure safe charging.

Developing an EVSE system that meets all the requirements for interoperability and, at the same time, supports all the necessary security mechanisms – and keeps those mechanisms up to date once the charger is deployed in the field – involves building a multi-layered security architecture that provides end-to-end protection. Creating this kind of comprehensive, built-for-purpose security architecture is time-consuming, and typically relies on specialized techniques that are often unfamiliar to many hardware and software engineers.

SOLUTION

NXP supports all the key design elements of secure EVSE systems. Drawing on our proven talent for secure connections and infrastructure, as well as our position as a steering-committee member of CharIN, the global association promoting CCS-based EV charging, we've developed a turnkey solution for EV charging.

The NXP EasyEVSE Development Platform, designed for quick deployment in commercial and residential applications, combines advanced, standards-compliant EV charging with a fit-for-purpose, multi-layered security architecture that safeguards operation. Equipped with an NXP EdgeLock SE05x secure element, the solution implements all the security requirements for ISO 15118-2, simplifies key management for OEMs and service providers, and offers certified, future-proof security that is easily updateable in the field.

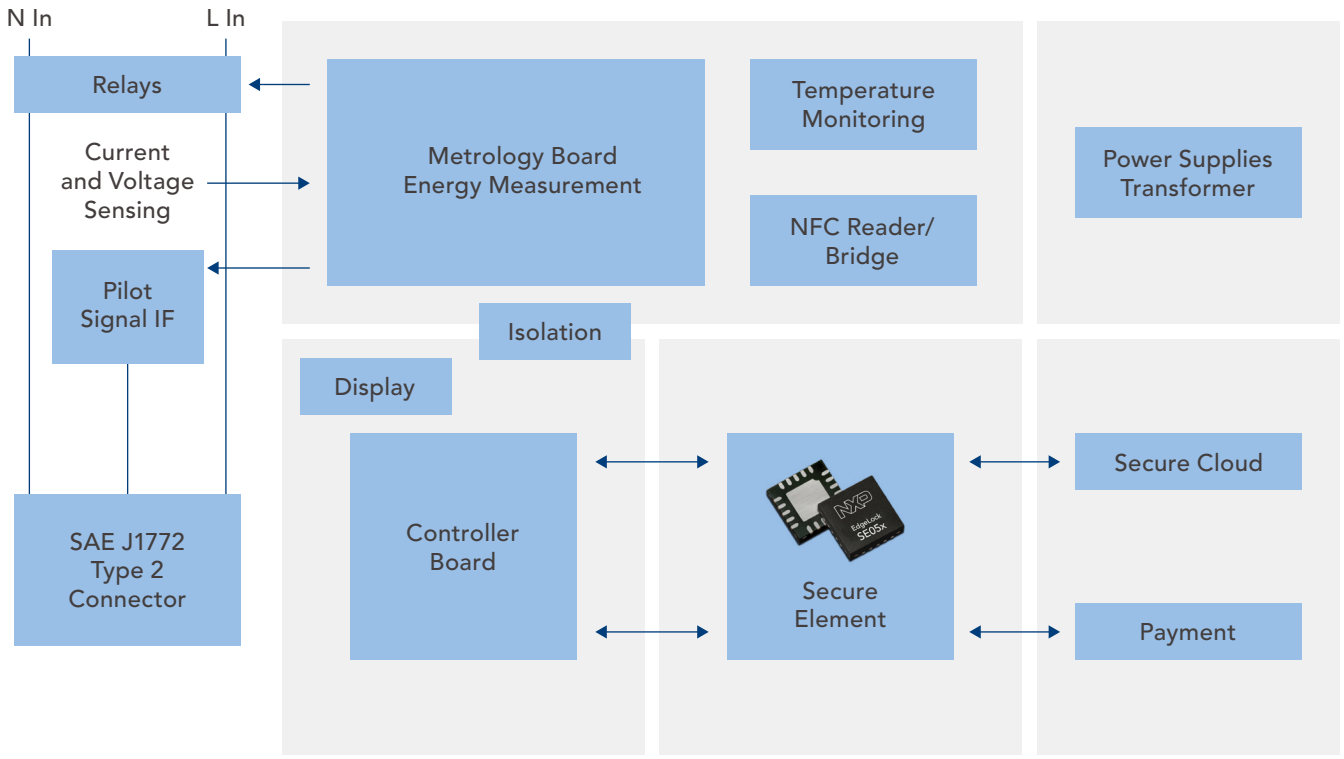
The EdgeLock SE05x delivers high-level security in an easy-to-use format and provides secure storage for credentials, including the leaf certificate and the private key. It supports hardware-based pre-implementation of the crypto protocols (such as ECDH and ECDSA) specified in the network and application protocol requirements ISO 15118-2. In addition, it supports ECDSA based on NIST curve P521 for even higher security as required in the 2nd generation network and application protocol requirements (ISO 15118-20). The addition of a host software stack for TLS enables seamless, secure onboarding to backend servers and cloud services, for fast deployment and easy remote management.

The EdgeLock SE05x secure element also authenticates energy-usage and billing data, enables secure transactions and billing operations with various service providers, and protects transmissions with cryptographic keys. Over-the-air update capabilities ensure up-to-date configurations for software and firmware, and there's support for remote attestation of software updates on ad-hoc networks.

Support for EdgeLock 2GO, NXP's secure, flexible IoT service platform, enables key rotation and credential updates in the field, so the EVSE remains secure after deployment and keeps current with government-specified requirements.

With EdgeLock 2GO, there's no need to establish a costly and complex PKI infrastructure, and charger production can take place in third-party facilities without adding security risk. Also, flexible customization and dynamic key storage supports the use of multiple Certificate Authorities (CAs), for EV charger authentication with multiple entities.

BLOCK DIAGRAM

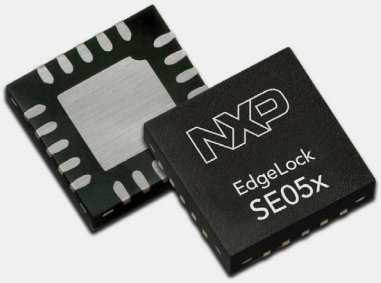


System-level view of an EVSE (Electronic Vehicle Sourcing Equipment)

LEARN MORE

The NXP Design Community site offers helpful hints, easy-to-follow how to's, and detailed application notes for use with the EdgeLock SE050, while our product pages link to detailed specs, designs tools & software, training & support, and more.

- NXP Design Community
- EdgeLock SE050 Secure Element Product Page
- EasyEVSE EV Charging Station Development Platform



Find more information on **www.nxp.com/SE050**

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