

#### 带有GB/T27930 CAN接口的ISO/IEC15118 电动汽车充电通讯解决方案

ISO/IEC15118 EV Charging Communication Solutions

with GB/T27930 CAN Interface



### RNL 是一家电动汽车充电通信解决方案的领军供应商。RNL的通信通信调制解调器与ISO/IEC15118, SAE2847-2及 DIN70121

都兼容。

RNL is a leading provider of EV Charging communication solution.

RNL’s EV Charging Communication Modems are compliant to ISO/IEC15118, SAE2847-2 and DIN70121.

2

### 被全球电动汽车制造商验证过的解决方案



Solutions are verified by Global EV makers

RNL的电动汽车通信解决方案被全球的电动汽车制造商和电动汽车充电桩供应商测试过。

RNL EV Charging Communication Solution was tested with Global Car Makers and EV Charger Solution providers.

##### HYUNDAI

} GM

##### } VOLKSWAGEN

} BMW

##### } FORD

} HONDA

} NISSAN

##### } Sumitomo, Denso, TUDortmunt, AUDI, TMG, LGInnotek, …

3

### ISO/IEC15118 电动车充电软件结构

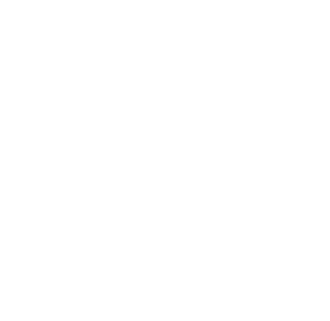
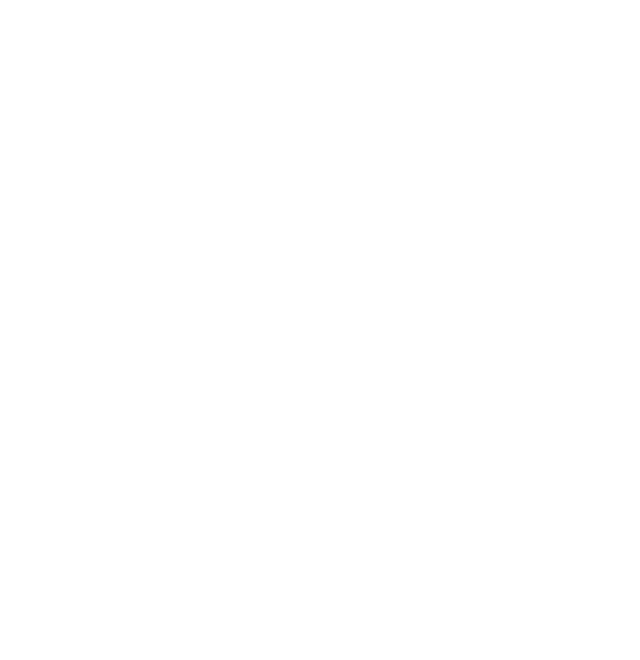
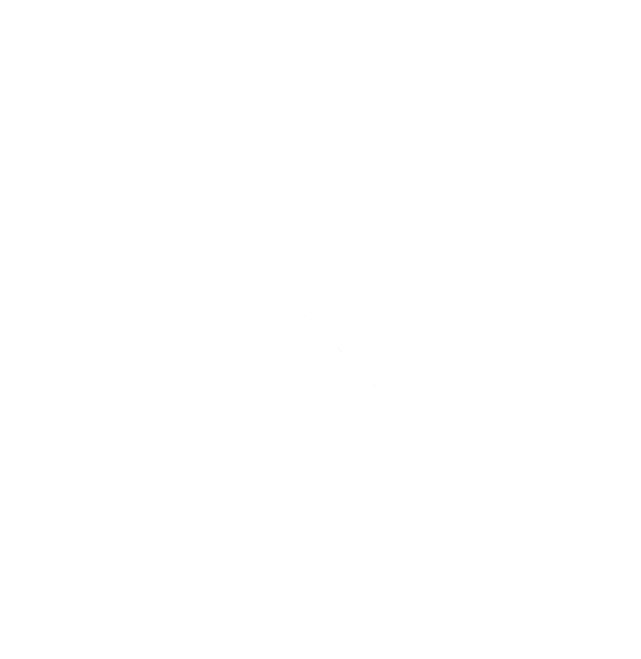
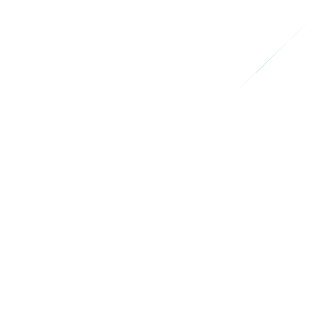
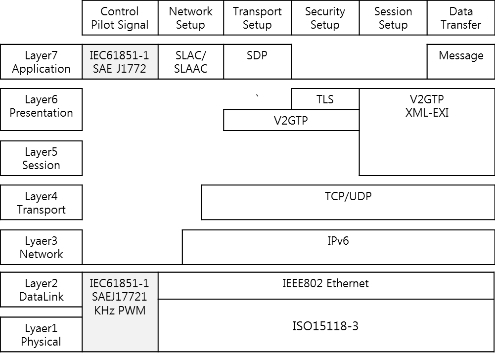


Multi-V2GTP

Multi-SLAC

Multi-SDP

4



### ISO/IEC15118 电动汽车充电序列



CP Status

Cp 状态

Power ON Initialization PLC module

Description of Charging sequences

充电序列描述

*\* red character: can be loop for sometimes because EVSE or EV may take a time to finish that special event.*

State A1 State B1 State B2

Coupler connection Coupler connection

Initialization

* Proximity Detection by EV
* CP Status Change Detection by PLC
* Digital Comm. check - Duty ratio 5%
* V2GTP Start
* SLAC
* SDP
* Support Application Protocol & result
* Session Set up & result
* Service Discovery & result
* Service Payment selection & result

***connector locked by EV***

State C2

Cable Check

* + **Contract Authorization & result**
  + **Charge Parameter Discovery & result**
  + **Cable Check & result**

***EVSE shall execute isolation check max. within 30 seconds.***

Pre-charge

Delivery Energy

* Pre-charge & result
* Power Delivery & result (Request Energy)
* Current Demand & result

State B2 State B1

Finish

* + Power Delivery & result
  + Welding Detection & result
  + Session Stop & result

5

## GQ EVSE & EVCC 板

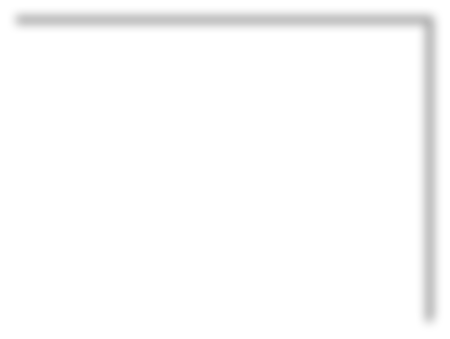
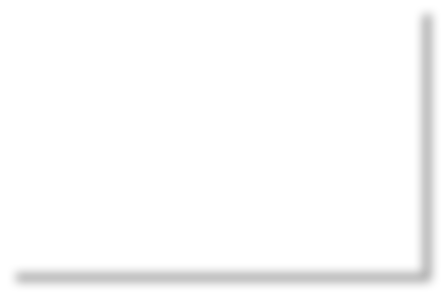
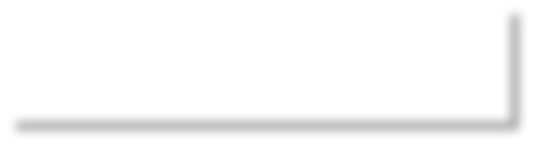
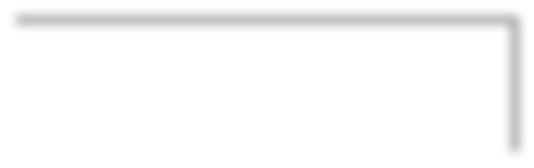
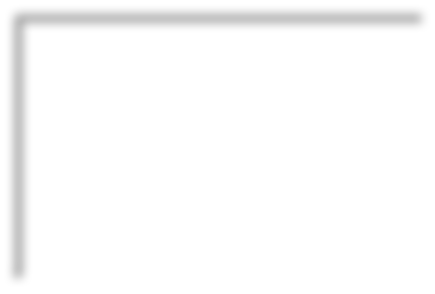
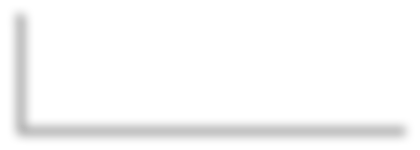
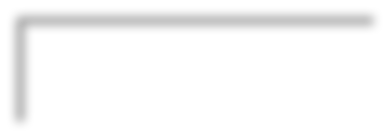
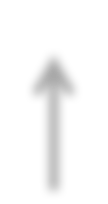


带有HomePlug Green PHY PLC的ISO/IEC15118软件整体解决方案

Turnkey solution of ISO/IEC15118 Software with HomePlug Green PHY PLC

**GQ-EVCC-xxV-用于电动汽车**

**GQ-EVSE-xxV –用于电动汽车充电桩**



Power

PD

CAN Low

CP

1

10

11

20

CAN High PE

Gnd



CAN

Power

CP/PE

Console (RS232)

RNL解决方案选型指南



|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Target Application 目标应用** | | **EV Charger 电动汽车桩** | | **EV & E-BUS 电动车&巴士** | |
| **Product Name 产品名称** | | **GQ-EVSE\_1** | **GQ-EVSE\_2** | **GQ-EVCC\_1** | **GQ-EVCC\_2** |
| **Part Number料号** | | **GQEVSE32PLC-12V** | **GQEVSE32PLC-24V** | **GQEVPLC-36V** | **GQEVPLC-24V** |
| **Dimension**  **尺寸** |  | **120 x 88 mm** | **120 x 88 mm** | **97 x 90 mm** | **TBD** |
| **Main**  **features 主要特征** | **Charging Protocol** | **GB/T27930** ßà**CCS**  **Conversion** | **GB/T27930** ßà**CCS**  **Conversion** | **GB/T27930** ßà**CCS**  **Conversion** | **GB/T27930** ßà**CCS**  **Conversion** |
| **PLC** | **√** | **√** | **√** | **√** |
| **RS232 or RS485** | **√** | **√** | **-** | **-** |
| **PWM 1KHz** | **√** | **√** | **-** | **-** |
| **CP\_Level** | **√** | **√** | **-** | **-** |
| **CAN\_ISO** | **√** | **√** | **√** | **√** |
| **CAN2** | **√** | **√** | **-** | **√** |
| **CHAdeMO** | **-** | **√** | **-** | **-** |
| **PD, Duty, 9V**à**6V** | **-** | **-** | **√** | **√** |
| **Connector Lock** | **-** | **-** | **-** | **√** |
| **K3/K4 Control** | **-** | **-** | **-** | **√** |
| **Input**  **Voltage 输入电压** | **Min.** | **6V** | **13V** | **6V** | **13V** |
| **Typ.** | **12V** | **24V** | **24V** | **24V** |
| **Max** | **36V** | **36V** | **36V** | **36V** |
| **Availability**  **可供性** |  | **Available now 可供** | **Available now可供** | **Available now 可供** | **TBD待定** |

电动汽车充电通信软件



EV Charging Communication Software

RNL-SEStack

§ ISO/IEC15118, SAE2847-2, DIN70121 support.

* Support multi-EV in parallel. 并行支持多车
* Error handling for all exceptions. 对所有异常的错误处理
* Easy Control & Monitoring using RS232/RS485/CAN . 用

RS232/RS485/CAN易于监控

* Verified by Compliant test with global Electric Vehicle companies通过全球电动汽车公司的验证测试

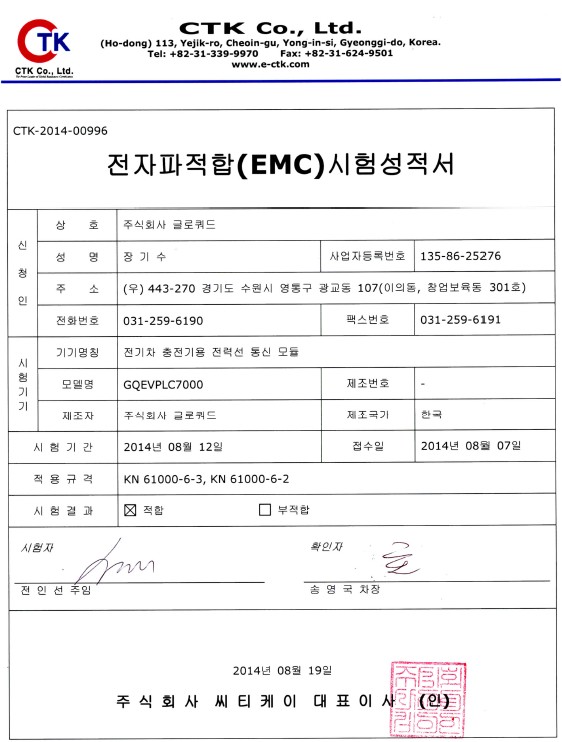
RNL-EVStack

§ ISO/IEC15118, SAE2847-2, DIN70121 support.

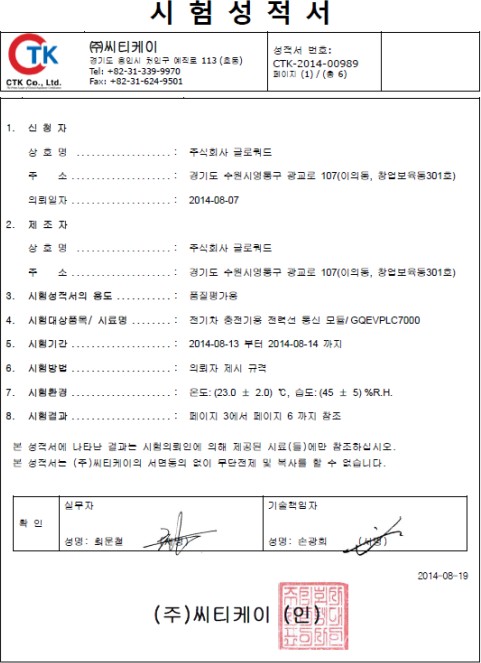
* + Error handling for all exceptions.对所有异常的错误处理
  + Easy Control & Monitoring using CAN 用CAN易于监控

8

# 产品测试报告



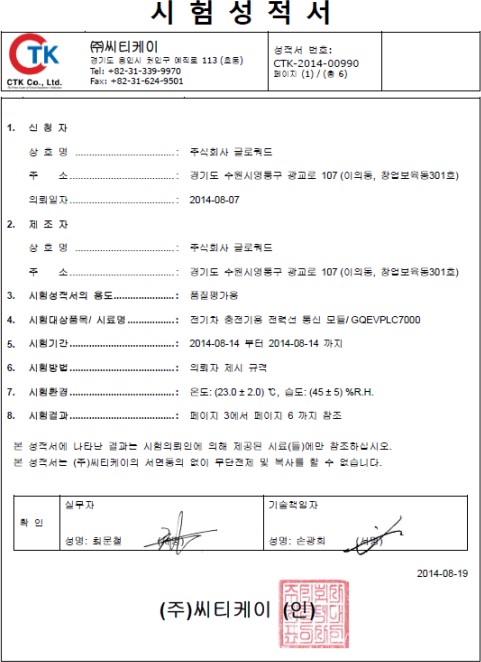
EMC Test Report



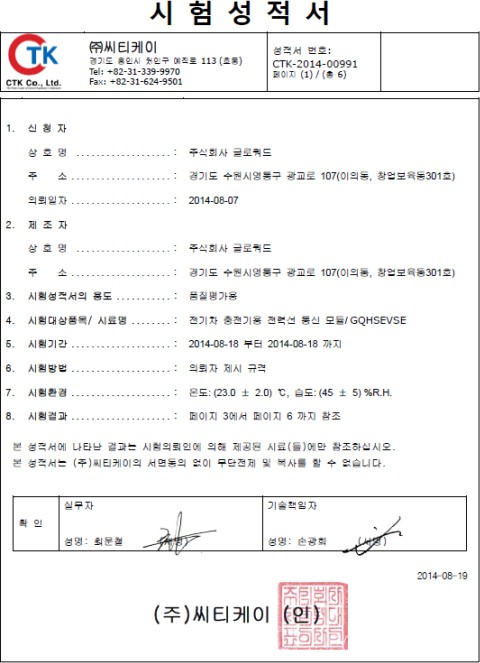
Reliability Test Report (-40 ~ +85 Temp.)



9



PLC Throughput Test



Vibration Test Report (10-100Hz, 0.5 Oct/Min)



# 如何用ISO/IEC15118和GB/T 27930

开发CSS电动汽车联合充电解决方案

### How to develop CCS EV Charging Solution wit

h ISO/IEC15118 and GB/T 27930

GB/T27930 VS ISO/IEC15118



\*CCS: Combined Charging System

|  |  |  |
| --- | --- | --- |
|  | GB/T27930 | CCS (ISO/IEC15118) |
| PHY/MAC | CAN | PLC(HomePlug Green PHY) |
| AC/DC Charging | DC | AC/DC |
| Connector Lock | By Charger | By EV |
| When Insulation |  |  |
| test start | Just after exchange handshake | After exchange Charge parameters |
|  | Plugin à Lock à CHM/BMH à  **insulation test by charger** à CRM à | Plugin à CHM/BHM à CRM/BRM à  BCP/CML à BRO à CRO=0 à  **Insulation test by EV** à CRO=AA à |
| Charging Decision by | EVSE (Charger) Charger (EVSE) checks EV’s parameters for Charging | EVCC (EV)  EV checks Charger(EVSE)’s charge  parameters for Charging |
| When EVSE DC Relay ON | CRO=0 à **DC relay ON** à  CRO=AA à …  (charger ready to transfer energy) | CRO=0 à Insulation test à CRO=AA à  **DC relay ON** à … |

11

# CHAdeMO vs. ISO/IEC15118



|  |  |  |
| --- | --- | --- |
|  | **CHAdeMO** | **ISO/IEC15118 CCS**  **(Combined Charging System)** |
| Communication Interface | CAN (Serial) | PLC (Internet Protocol version 6) |
| AC/DC | DC only | AC/DC Combined |
| Pin Assignment | CAN+ CAN-  Charge sequence signal 1 (d1) *Charge sequence signal 2 (d2)* Vehicle charge permission (k) *Connector proximity detection* Ground  DC+  DC- | Control Pilot(CP)  Proximity detection Ground  DC+  DC-  AC Power (L1) AC Power (L2,N) |

12

## GB/T27930 CAN Signal for ISO/IEC15118



RNL需要实现新的GB/T27930 CAN信号以使国标GB/T27930的电动汽车充电桩 支持ISO/IEC1511

8电动汽车充电桩标准。客户需要在他们的SECC(电动汽 车充电桩控制板)上加上新的GB/T279

30 CAN 信号。RNL提供快速面向市场 的符合ISO/IEC15118的充电桩解决方案。

用于ISO/IEC15118接口的新GB/T27930 CAN信号

New GB/T27930 CAN Signal for ISO/IEC15118 Interface

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| MSG  Code | ID | Start bit | Length (b it) | Signal Name | | description | | Factor | offset | Range | unit | SPN |
| BHM | 182756F4 | 16 | 8 | CR\_Plc\_Aagvalue | | Average Attenuation Gain, at start: 00, at end of SLAC:≠ 0 | | 1 | 0 | 0 ~ 255 | - | New\_1 |
| 24 | 2 | CR\_Plc\_CpStatus | | See reference | | 1 | 0 | 0 ~ 7 | - | New\_2 |
| BCP | 1C0656F4  (with TP, PGN=0x000600) | 104 | 4 | CR\_Plc\_EvTransferType | | Supported Energy Type (default 3, see appendix) | | 1 | 0 | 0 ~ 15 | - | New\_3 |
|  |  |  | |  | |  |  |  |  |  |
| BST | 101956F4 | 30 | 1 | CF\_Plc\_FullChgComplete | | 0: not Full 1: full charging complete | | 1 | 0 | 0 ~ 1 | - | New\_4 |
| 31 | 1 | CF\_Plc\_ChgFinished\_ | | 0: charging, 1: charging stop request | | 1 | 0 | 0 ~ 1 | - | New\_5 |
| `BSD | 181C56F4 | 56 | 1 | CF\_Plc\_WeldDetectionReq | | 0: no welding detection 1: welding detection request | | 1 | 0 | 0 ~ 1 | - | New\_6 |
|  |  |  | |  | |  |  |  |  |  |
| BEM | 181EF456 | 48 | 8 | CR\_Plc\_ErrorCode | | PLC Error Code | | 1 | 0 | 0 ~ 255 |  | New\_7 |
| 56 | 3 | CR\_PLC\_EvErrCode | | EV error Code, see appendix | | 1 | 0 | 0 ~ 15 | - |
| CHM | 1826F456 | 24 | 4 | CR\_Secc\_EvseTransferType | | Supported Energy Type (default 3, see appendix) | | 1 | 0 | 0 ~ 15 | - | New\_8 |
| 28 | 1 | CF\_Secc\_StartPlc | | 0: PLC wait to start 1: PLC start chargeing seq. | | 1 | 0 | 0 ~ 1 | - | New\_81 |
| CSD | 181DF456 | ~~16~~ | ~~16~~ | ~~CR\_Secc\_OutEnergy~~ | | ~~0 (no value with CCS) , Output Energy~~ | | ~~0.1~~ | ~~0~~ | ~~0~1000~~ | ~~KWh~~ | ~~3612~~ |
| 16 | 16 | CR\_Secc\_EvseOutVolt | | Voltage output value | | 0.1 | 0 | 0~6553.5 | V | New\_9 |
|  |  |  |  |
|  |  |  | |  | |  |  |  |  |  |

13

ISO/IEC 15118 和GB/T 27930配置概述



EV Charger

Charger Board (SECC)

(GB/T27930)

DC+

DC- CP

GND

GB/T27930 CAN

Inlet

(J1772)

DC+

DC- CP

GND PD

EV Car

BMS

(GB/T27930)

GB/T27930 CAN

DC12V CAN- CAN+

DC24V

CAN- CAN+

GB/T27930 CAN to

CCS Protocol Converter

GQ EVSE

GB/T27930 CAN to

CCS Protocol Converter

PLC Board

GQ EVCC

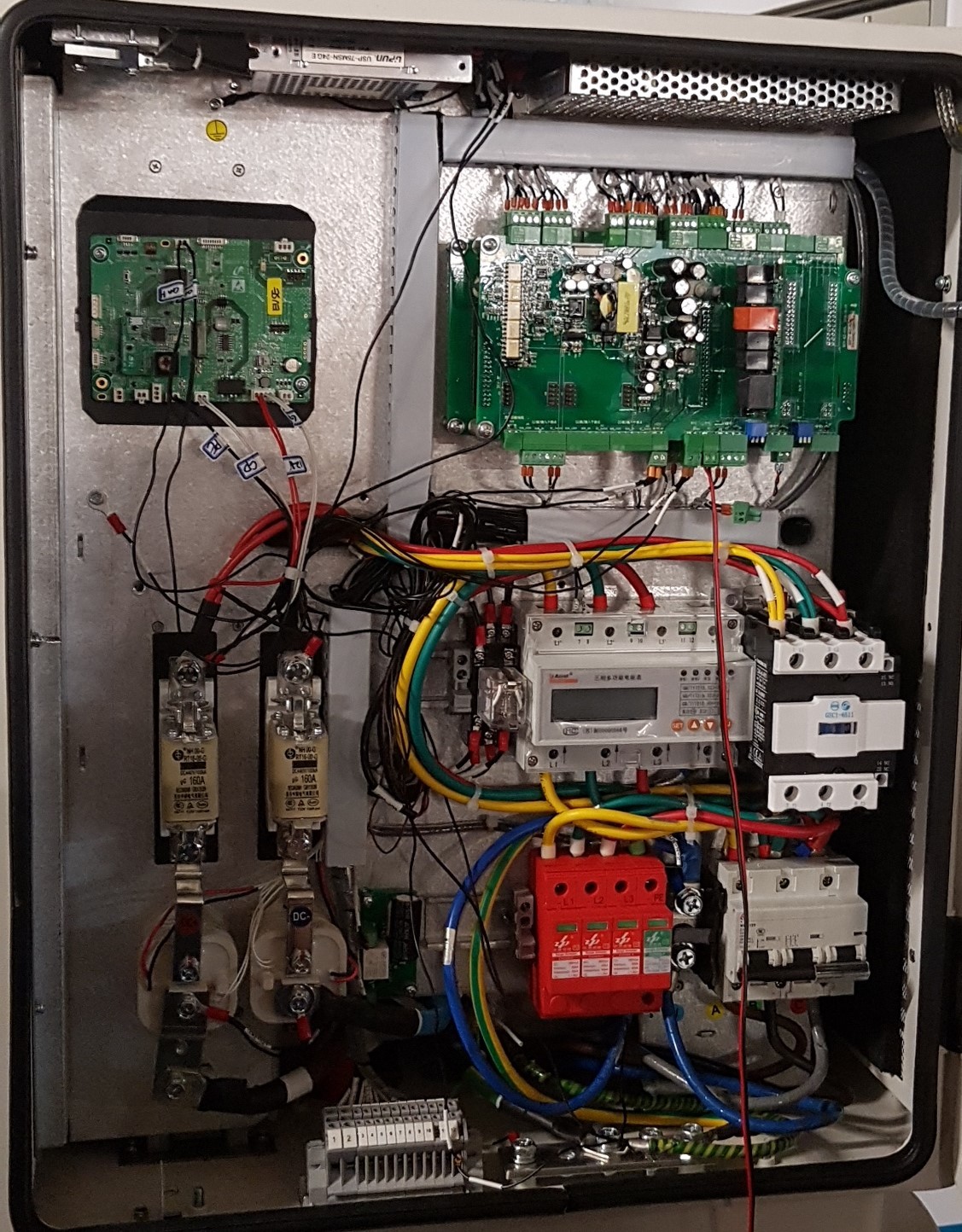
PLC Board

RNL 提供给客户简单方便，快速面向市场的ISO/IEC15118充电通讯软硬件解决方案。

# EV充电桩配置参考



**GQ’s EVSE board Customer’s GB/T27930**

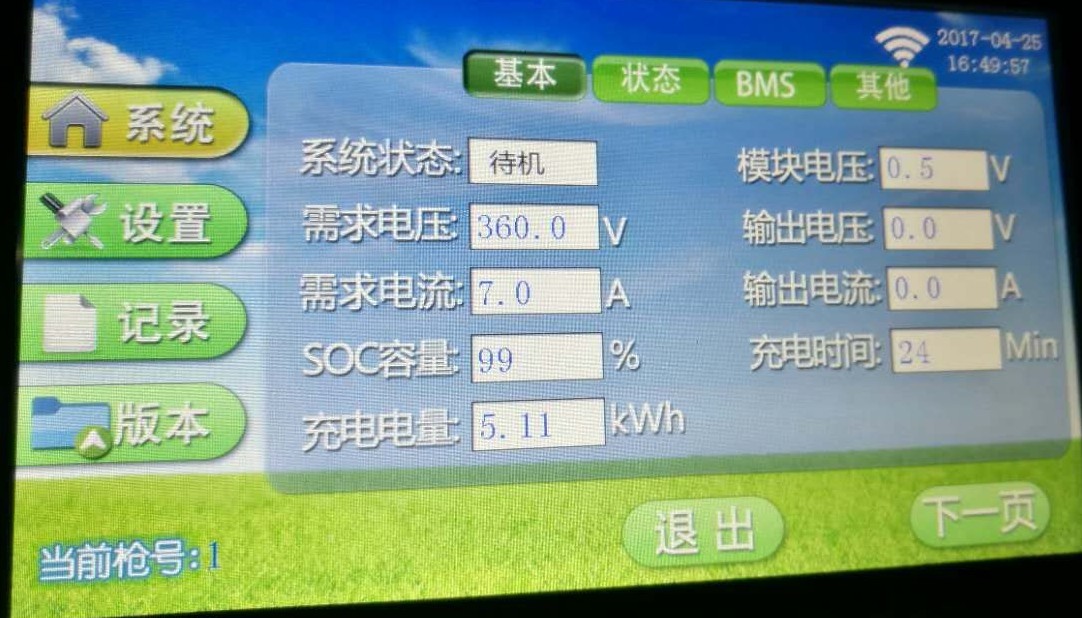


**Charger Controller Board (SECC)**

**CAN:** GB/T27930-2015

# 用户界面





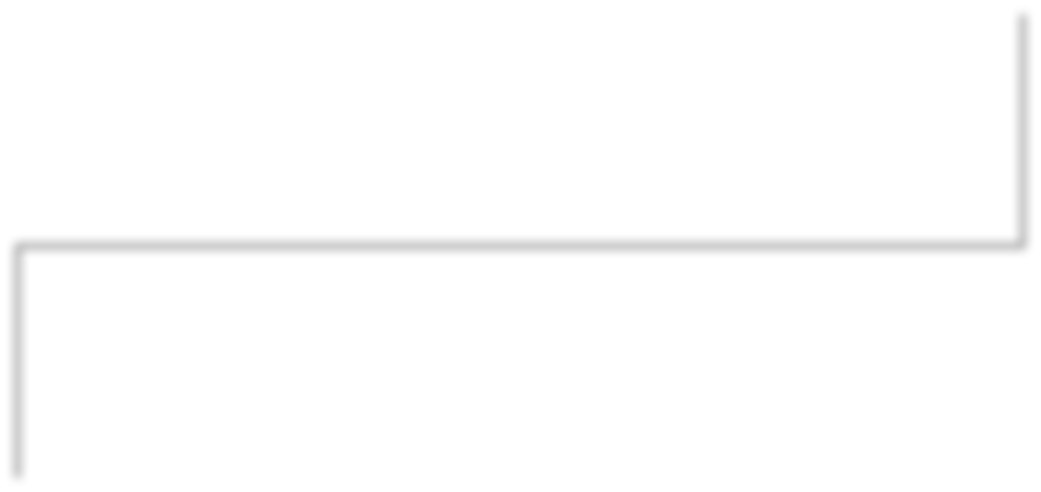
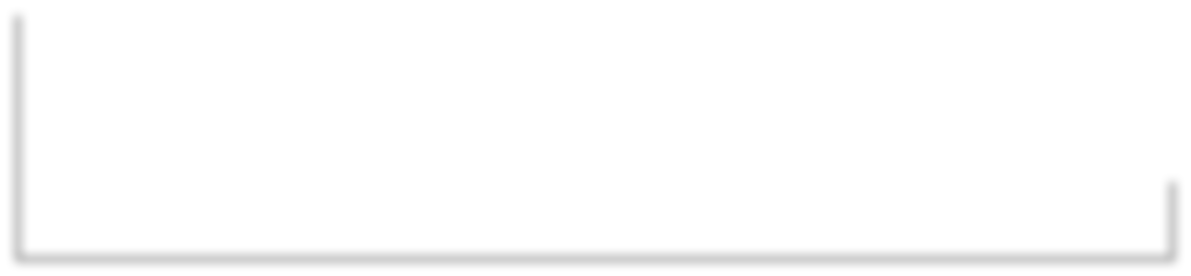
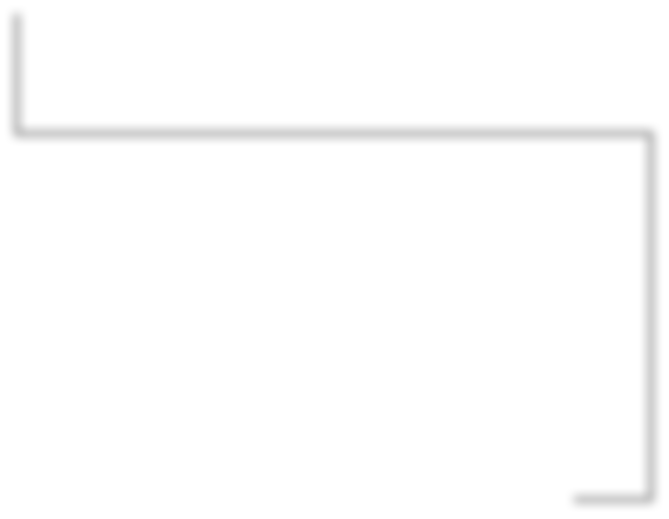
16

# 开发工具组配置



**SECC: GB/T27930 Simulator**

**EVCC: GQ EV Simulator**



**GQJ1772CHA-JIG**

**CAN**(GBT ßà CCS)

**EVSE: GQEVSE32PLC-12V, 24V**

**Voltage level change**

CP/PE

# 开发工具组配置



J1772 Simulator board

CP

PE

Control Pilot

PE(GND)

**EVCC/PLC**

GB/T 27930

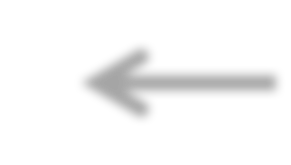
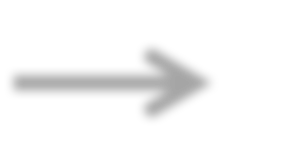
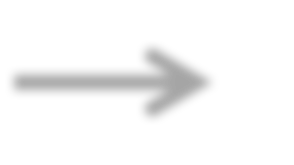
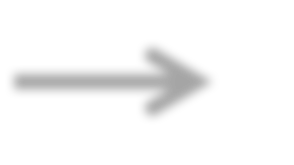
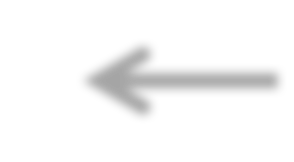
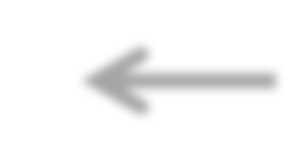
CAN Signal

**GB/T27930**

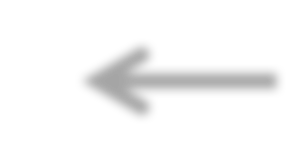
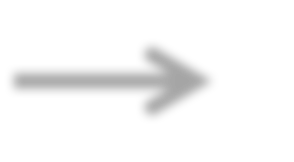
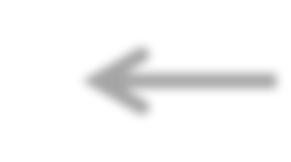
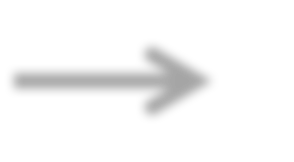
**Simulator (SECC)**

**EVSE / PLC**

**EV Charger**



# GQJ1772CHA-JIG 板模式选择



|  |  |
| --- | --- |
|  | Plug-in |
|  | Un-plug |
|  | Switch pressed |

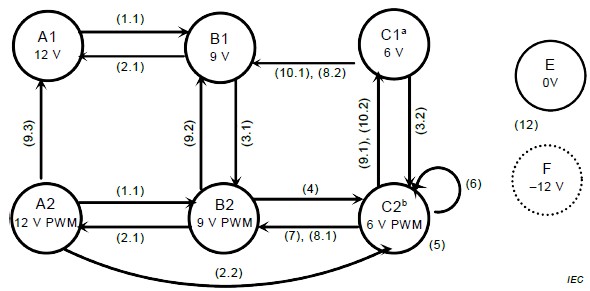
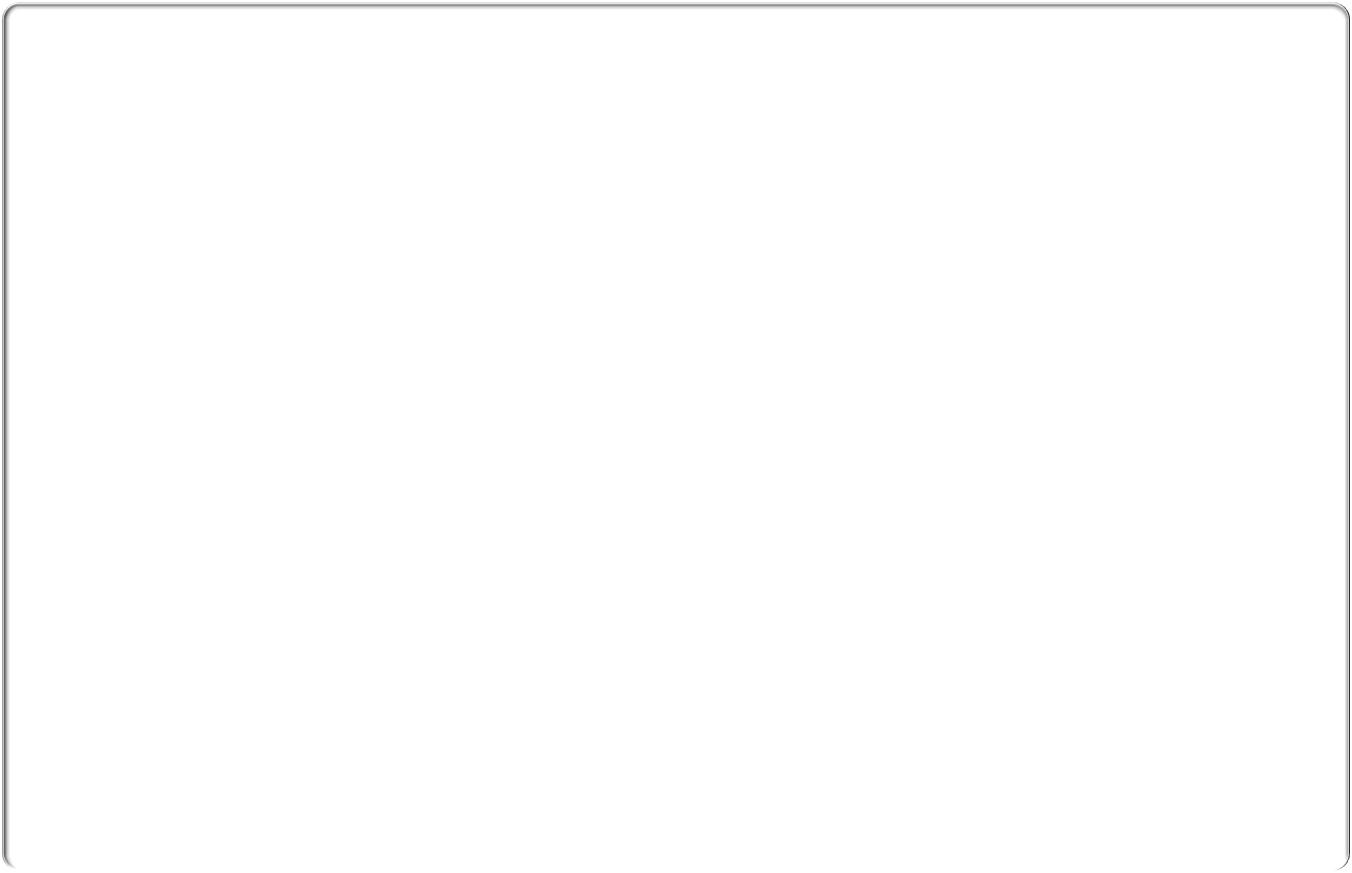


附录

**充电状态图 Charging State Diagram**



State A1: Un-plugged 未插入



State B1: Plugg-In & EVSE not ready 插入&EVSE未准备

State C1: B-C-B toggle function started by EV 由Ev启动B-C-B 切换功能

State B2: EVSE ready to transfer energy EVSE准备传输能量State C2: Charging充电

Un-plugged Plugin

Charging

* 1.1 : Plug-in 插入
* 2.1 : Unplug at state Bx (x == 1 or 2, Bx == B1 or B2 )在状态Bx

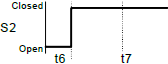
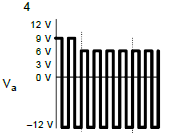
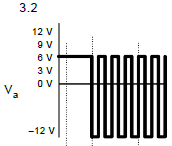
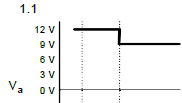
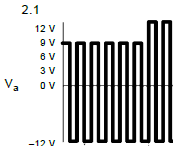
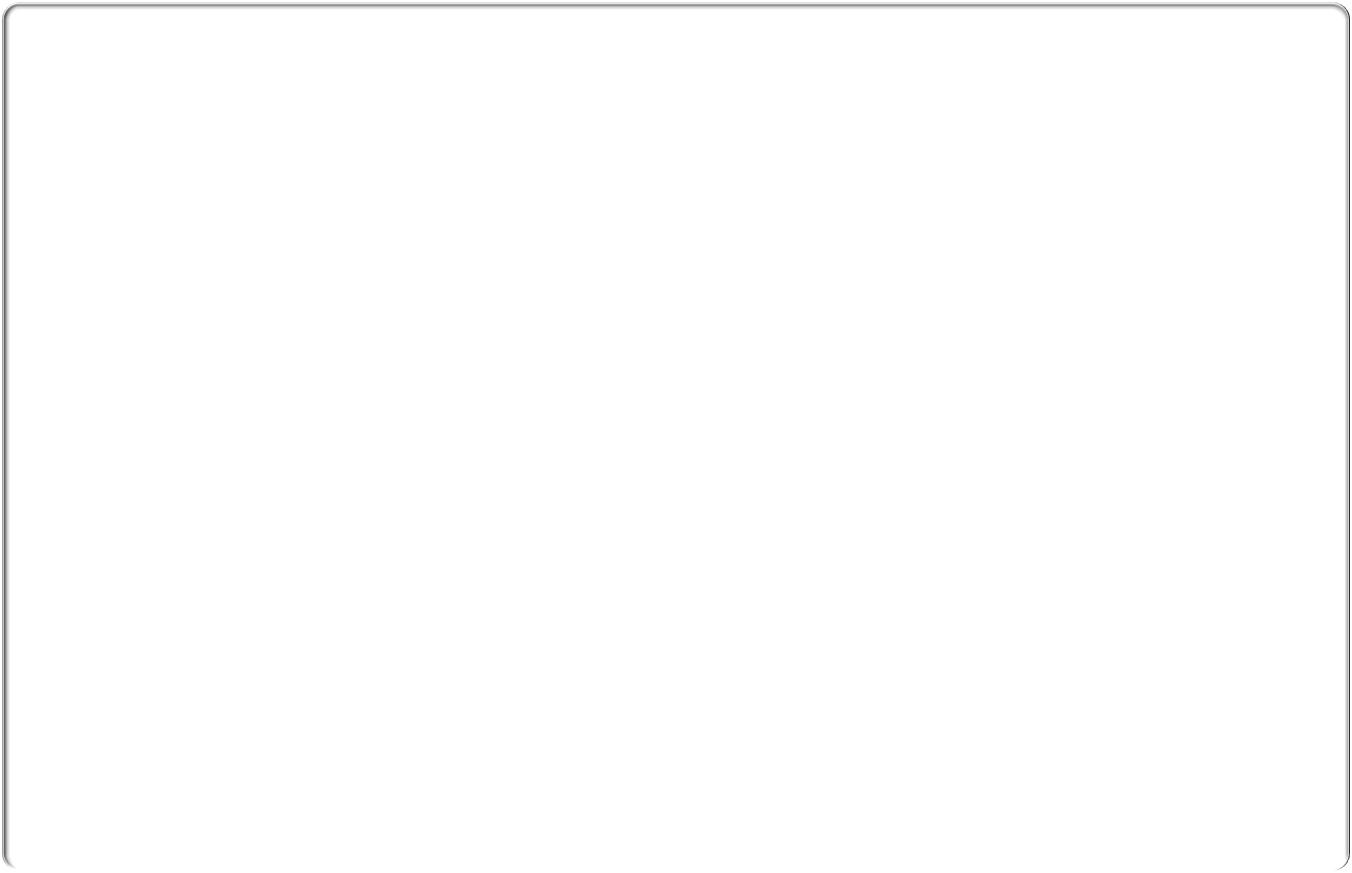
时未插入

* 3.1: EVSE power available (state B) EVSE电源可用（状态B）
* 3.2 : EVSE power available (state C) EVSE电源可用（状态C）
* 4 : EV ready to charge Ev准备充电
* 7 : EV stops charging Ev停止充电
* 8.1 : EVSE responds to EV opens S2 (with PWM)
* 6 : current charging
* 9.1 : EVSE requests to stop charging EVSE请求停止充电
* 10.2: EV does not respond to a stop charging request
* EV未响应停止充电请求

**充电序列中的CP状态(I) Charging Sequence Control Pilot Status**



**1.1 插入Plug-In**



**2.1 : Bx状态下未插入 Unplug at state Bx**

**3.2 : C状态下的EVSE电源可用. EVSE power available (state C)**

1. **: EV 准备充电 EV ready to charge**

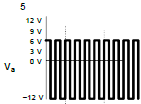
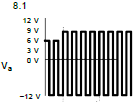
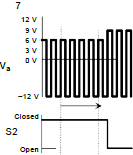
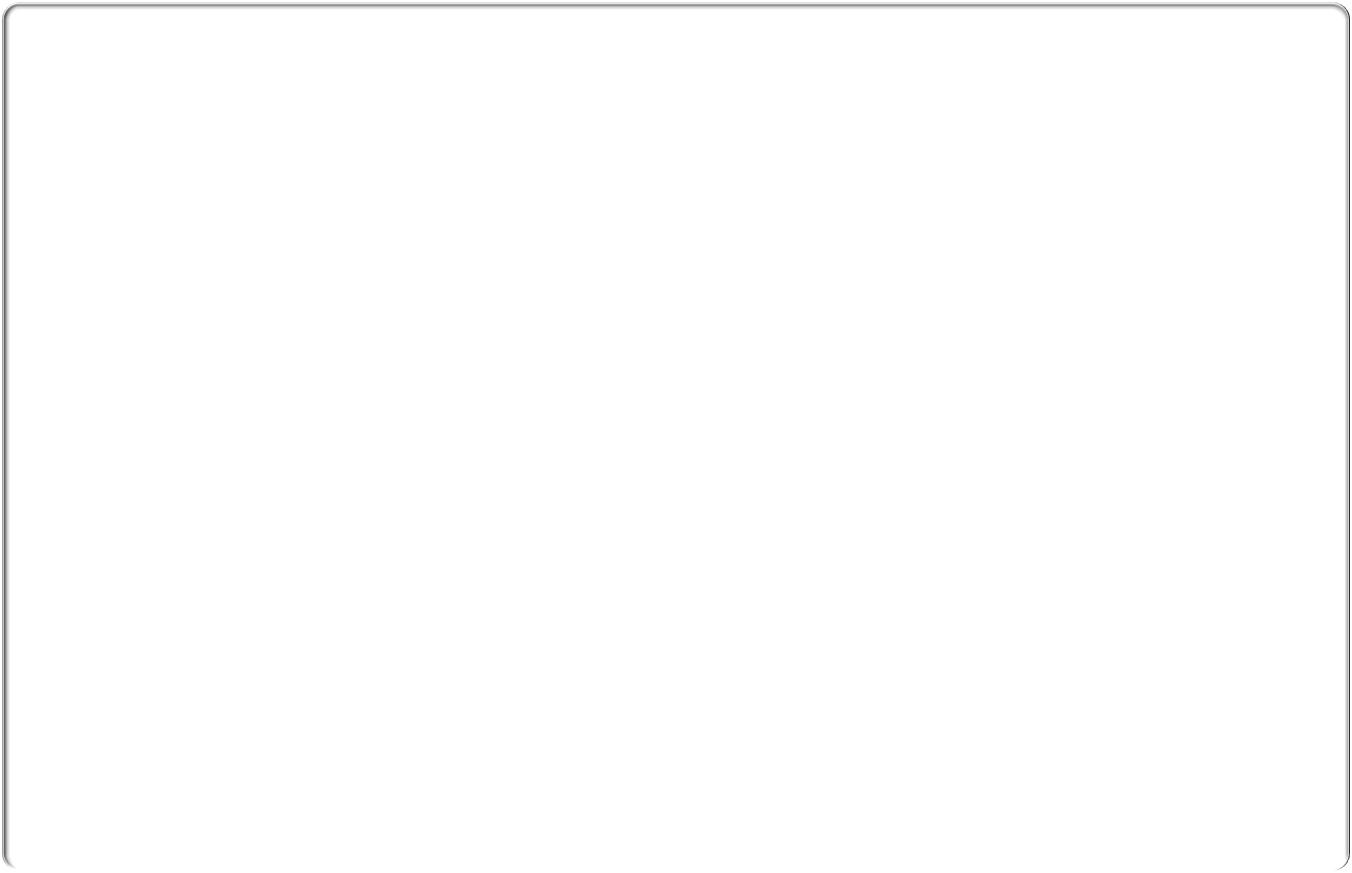
**充电序列中的CP状态(II) Charging Sequence Control Pilot Status (II)**



1. **: Charging充电**

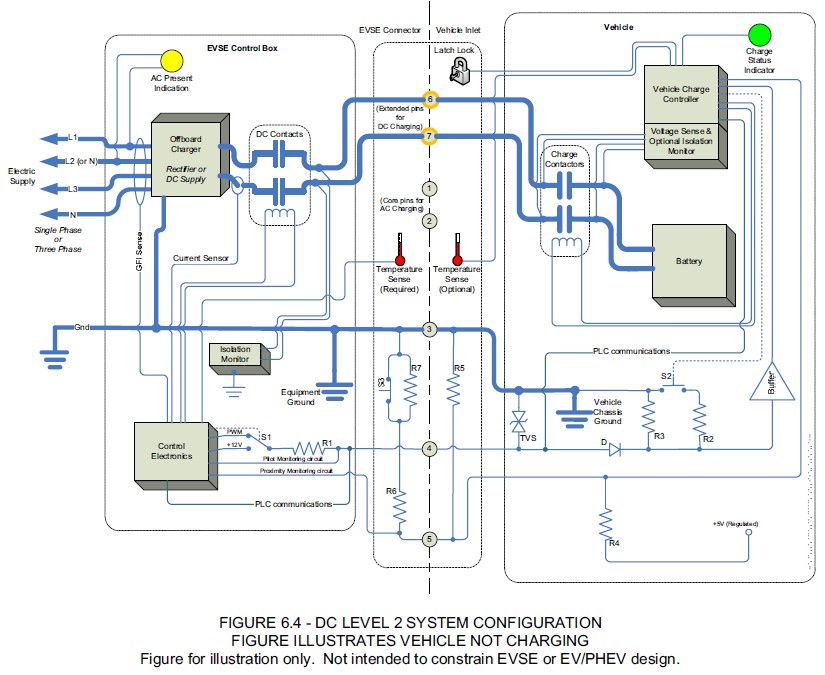
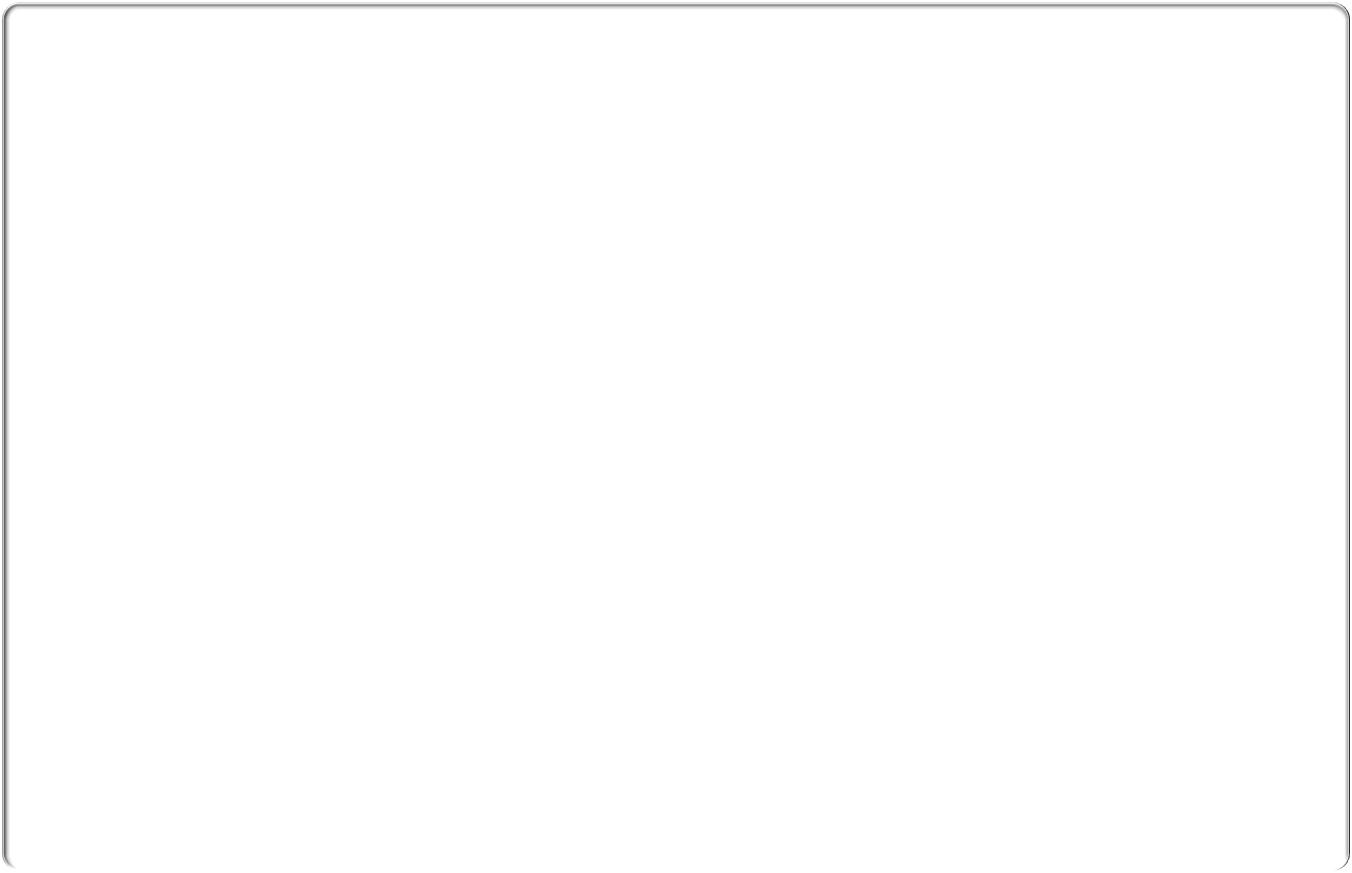
**8.1 : EVSE responds to EV opens S2 (with PWM)**

**EVSE回应Ev（通过PWM）打开S2**



**7 : EV stops charging Ev停止充电**

**DC Level2系统示例 System Example**



### 任何疑问或需求，请联系：

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25