Charge Control C Datasheet

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1 Revisions

Revision	Release Date	Changes
8	January 4, 2025	Updated Order Code layout according to PCN-25: EVerest replaces "Truffle" legacy firmware stack.
7		decreased absolute maximum DC supply voltage (Vcc)
6	August 30, 2023	changed introduction, increased minimal recommended DC supply voltage to 12V, corrected max relay switching cycle PLC chip sets changed to QCA7005
5	November 1, 2022	increased mechanical life of relay from 10 * 10^5 to 5 * 10^6 operations, updated order code section and removed differentiation between multi and single port OCPP 1.6, limit the application to only use the controller in EVSE, specified voltage of digital outputs more precisely, changed company logo, corrected dimensions of the mechanical drawing of Charge Control C, updated mechanical drawing with additional information about tolerances and PCB thickness, replaced obsolete safety standard IEC 60950-1 with IEC 61851-1:2017, removed fire protection requirement, clarified RS-485 failsafe biasing for hardware revisions, updated mechanical dimension figure to latest HW revision
4	May 12, 2020	added information about enclosure requirements, added relay CC2 rating conditions, added information about increased isolation voltage for RS485 interface on newer PCB, corrected max ambient temperature rating, added section Hardware Revision Identification
3	April 5, 2019	added information about which EIA-485 supports failsafe biasing, added information about included software licenses, added absolute maximum ratings for digital inputs, corrected error in variant table stating that Charge Control C 100 does not have ”PWM to PEV”
2	January 11, 2019	clarified that size is without case, added symbol declaration Vcc to ,,DC supply voltage”, clarified that no available variant has the CAN interface, removed second (not isolated RS-485) from HW variant 200, corrected typos, decreased max EIA-485 Baudrate, removed invalid order codes, moved information to user guide, extended product variant table to list common interfaces and not just differences
1	October 11, 2018	initial release

2 Introduction

The Charge Control C is an advanced, open-system AC charge controller designed to offer maximum customization and robustness in EV charging solutions. Customers are given the freedom to write their own software, ensuring the highest level of adaptability to their unique requirements.

The charge controller comes standard with the open-source software, EVerest, an efficient platform known for its optimal performance. It operates on an embedded Linux framework with an iMX6ULL processor, 512 MB of RAM, and 4 GB of eMMC storage, ensuring rapid response times and efficient operations.

Equipped with interfaces for IEC 61851 and SAE J1772, the Charge Control C offers comprehensive compatibility with a variety of charging systems. Additionally, it supports Powerline Homeplug GreenPhy in accordance with ISO 15118-3 on CP for increased versatility.

One of the major advantages of the Charge Control C is the inclusion of the RAUC system, which provides signed updates and utilizes an atomic update strategy. It alternates between two partitions post-update, enhancing reliability and robustness by allowing the system to fall back on the previous partition if an error occurs.

The Charge Control C offers multiple connectivity options, including 100 Mbit Ethernet and 10 Mbit Homeplug GreenPhy Powerline on the 230 Volt grid side, ensuring broad and flexible networking capabilities.

Additionally, the controller features a USB A Host, and options for either 2x RS-485 interfaces or a combination of 1x CAN and 1x RS-485 interfaces, providing a variety of communication channels.

The Charge Control C also incorporates 2x motor drivers to control the Type 2 locking mechanism and, for example, a shutter. The unit includes 2x 230 V 6 A relays for AC contactors, allowing for phase-switching. Furthermore, it has 6 digital 12 V inputs and 6 digital 12 V push-pull outputs, making it a highly flexible and adaptable solution.

With a power supply of 12 V and a maximum power capacity of 13 W, the Charge Control C is a comprehensive, adaptable, and reliable solution for smart, efficient EV charging.

Features:

- HomePlug Green PHY™ compatible QCA7005 Chip for control pilot communication
- HomePlug Green PHY™ compatible QCA7005 Chip for mains communication
- Filtered output for an auxiliary power supply to improve PLC performance
- Standards: Supported Standards: ISO 15118, Ethernet (IEEE 802.3), EIA-485 (RS-485), ARP, ICMP, IGMPv2, IPv4, IPv6, DHCPv4, TCP, UDP, HTTP, IEC 61851-1
- Network interface for Backend Connectivity: Fast Ethernet 100 Mbit/s and HomePlug AV GreenPHY 10 Mbit/s
- charging stack for ISO 15118 (AC only) with an optional MQTT interface
- Running a Linux Operating System that allows you to adapt the behaviour of the charging station by writing your own control software around the charging stack.

Parameter	Value
Power supply	12 V
Power consumption	max. 13 W
Temperature range	-20 °C - +70 °C
Ouline dimension	120 mm (±300 µm) x 107.3 mm (±300 µm) x 27.6 mm (w/o case)
Weight	110 g
RoHS	This product is manufactured RoHS compliant.

Table 1 Product overview

3 Applications

- charge controller in electric vehicle supply equipment (EVSE)

4 Technical Data

4.1 Electrical Characteristics

4.1.1 Absolute maximum ratings

Safety parameter

SAFETY PARAMETER	
Insulation coordination according to	IEC 61851-1:2017
Overvoltage category	III
Pollution degree	2
Altitude	max. 2000 m above sea level
external Enclosure[1]	minimum IP54
	Protection against unintentional touching the mains voltage which may be connected to PCB
operation location	outdoor[2]

Table 2 Safety parameter

[1] enclosure not provided in product

[2] as long as it complies with ambient parameters of the PCB

Maximum parameter

MAX PARAMETER	MIN	MAX	UNIT
DC supply voltage (Vcc)	-0.3	+13.5	V
Proximity pilot voltage	-0.3	+3.3	V
EIA-485 common mode input voltage	-10	15	V
1-Wire input voltage	-0.5	6	V
USB Vbus		5	V
USB D+, D-	-0.3	5.5	V
CANH, CANL	-12	12	V
fan tach voltage	0	3.3	V
digital inputs voltage	-0.3	18.5	V

Table 3 Maximum parameter

4.1.2 Recommended operating conditions

Supply parameter

SUPPLY PARAMETER	MIN	TYP	MAX	UNIT
DC supply voltage	12	12	13	V
AC supply voltage	85	110 / 230	250	V
AC supply frequency	-	60 / 50	-	Hz
required AC fuse (installation side)	-	-	6	A
Filtered AC output current (L' / N'')	-	-	0.25	A

Table 4 Supply Parameter

EIA-485 parameter

EIA-485 PARAMETER	MIN	TYP	MAX	UNIT
Common mode input voltage	-7		12	V
Max driver output capability		± 60		mA
Receiver input sensitivity		± 200		mV
Data rate			115.2	Kbps
Short-circuit output current			250	mA
Unit load		1*		

Isolation voltage HW ≤ V0R3	500 **			V
Isolation voltage HW ≥ V0R4	1500 **			V

Table 5 EIA-485 parameter

*: up to 32 devices on the bus

**: only for the isolated EIA-485 (X7)

Control pilot parameter

CP PARAMETER	MIN	TYP	MAX	UNIT
Control pilot voltage	-12.5		+12.5	V

Table 6 Control pilot parameter

Fan parameter

FAN PARAMETER	MIN	TYP	MAX	UNIT
fan supply voltage	Vcc - 0.8	Vcc - 0.55	Vcc	V
fan supply current	-	-	125	mA

Table 7 Fan parameter

1-Wire parameter

1-WIRE PARAMETER	MIN	TYP	MAX	UNIT
Input low			0.6	V
Input high	2			V

Table 8 1-Wire parameter

Ethernet parameter

ETHERNET PARAMETER	MIN	TYP	MAX	UNIT
* compliant with IEEE802.3/802.3u (Fast Ethernet), ISO 802-3/IEEE 802-3/IEEE 802.3 (10BASE-T)				

Table 9 Ethernet parameter

Mains powerline communication parameter

PLC ON MAINS PARAMETER	MIN	TYP	MAX	UNIT
Reach			300	m
Data rate			10	Mbit/s

Table 10 Mains powerline communication parameter

GreenPHY powerline communication parameter

PLC ON CONTROL PILOT PARAMETER	MIN	TYP	MAX	UNIT
Reach			300	m
Data rate			10	Mbit/s

Table 11 GreenPHY powerline communication parameter

USB parameter

USB PARAMETER	MIN	TYP	MAX	UNIT
Input voltage (Product as device)		5		V
Output voltage (Product as host)		5		V
Output current (Product as host)			500	mA

Table 12 USB parameter

CAN bus parameter

CAN Bus PARAMETER	MIN	TYP	MAX	UNIT
Data rate			1	Mb/s
CANH; CANL recessive bus output voltage	2.0	2.5	3.0	V
Reccessive output current	-5	-	5	mA
CANH dominant output voltage	2.75	3.5	4.50	V
CANL dominant output voltage	0.50	1.5	2.25	V
Symmetry of dominant output voltage (5V - VCANH - VCANL)	-400	0	400	mV
Dominant differential output voltage	1.5	2.0	3.0	V

Recessive differential output voltage	-500	0	50	mV
CANH short circuit output current	-100	-85	-	mA
CANL short circuit output current	-	75	100	mA

Table 13 CAN bus parameter

Motor driver parameter

MOTOR DRIVER PARAMETER	MIN	TYP	MAX	UNIT
Output voltage		12		V
Peak output current			3.6	A
Output current	0		3.5	A

Table 14 Motor driver parameter

Digital input parameter

DIGITAL INPUT PARAMETER	MIN	TYP	MAX	UNIT
Input voltage	0		12	V

Table 15 Digital input parameter

Digital output parameter

DIGITAL OUT PARAMETER	MIN	TYP	MAX	UNIT
Output current			100	mA
Output voltage	Vcc - 1	Vcc	Vcc + 1	V

Table 16 Digital output parameter

Relay parameter

RELAY PARAMETER	MIN	TYP	MAX	UNIT
Max switching voltage AC			250	VAC
Max switching voltage DC			24	VDC
Max carrying current			6[1]	A
Mechanical life	$5 * 10^6$			operations
Electrical life	$50 * 10^3$			operations
Sense input voltage	AC supply voltage			
Contact load category	CC2			
Power factor cosϕ	0.3	0.4	0.5	
Switching duty cycle			6	cycles / min

Table 17 Relay parameter

[1] CC2 rating is ensured up to 100 mA

Environment parameter

ENVIRONMENT PARAMETER		Min.	Typ.	Max.	UNIT
TAMB	Operating temperature	-20	-	70	°C
TSTORE	Storage temperature	-40	-	85	°C
RAH	Relative air humidity (non condensing)	0	-	85	%

Table 18 Environment parameter

5 Handling

This electronic component is sensitive to electrostatic discharge (ESD).

6 Mechanical Dimensions

The mechanical dimensions and mounting holes of this product are dimensioned in Figure 1. Every mounting hole has a copper restrict area to support mounting via enclosure domes and screws. Screws and domes shouldn't exceed a 7.8 mm diameter.

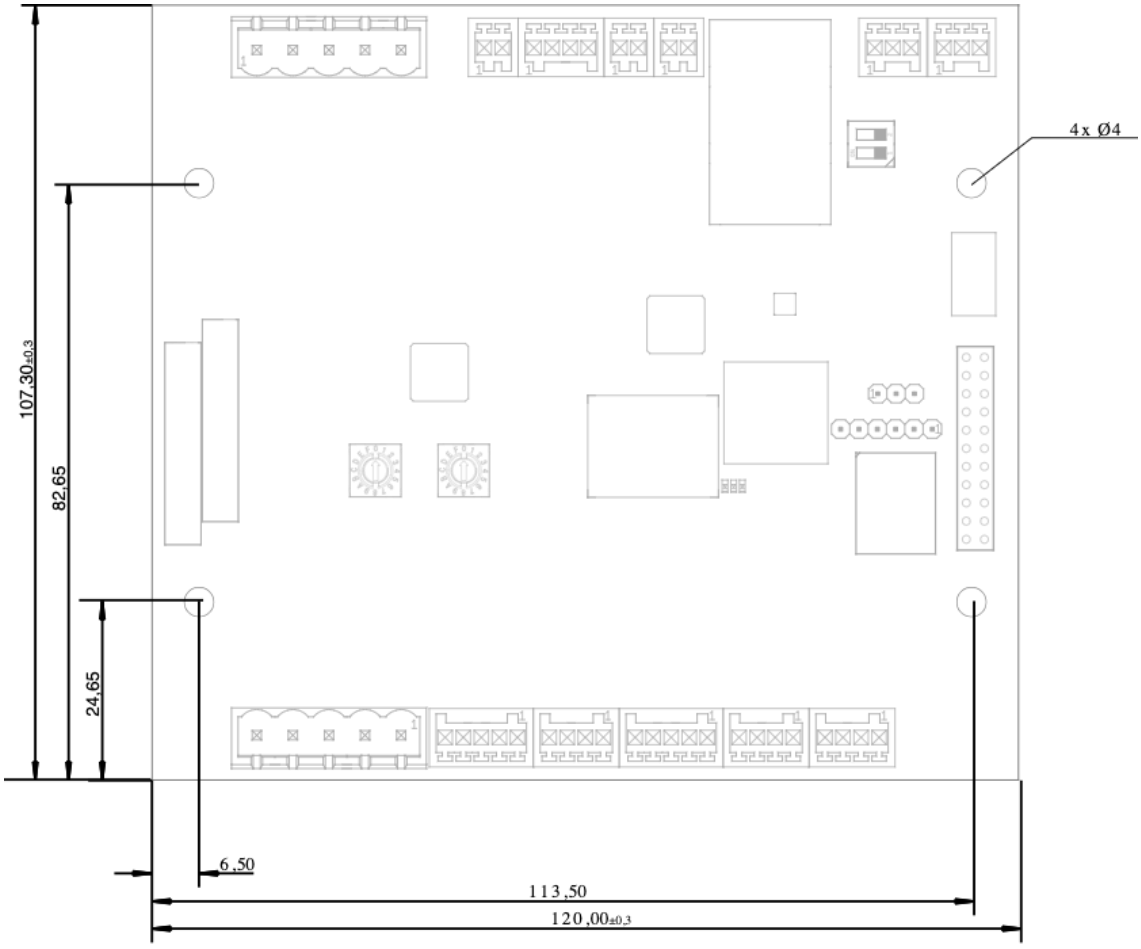


Figure 1 Mechanical drawing of Charge Control C, dimensions in mm

7 Hardware Revision Identification

The hardware revision can be identified by reading the revision marking on top of the PCB next to the relays. Figure 2 shows a hardware with revision V0R4.

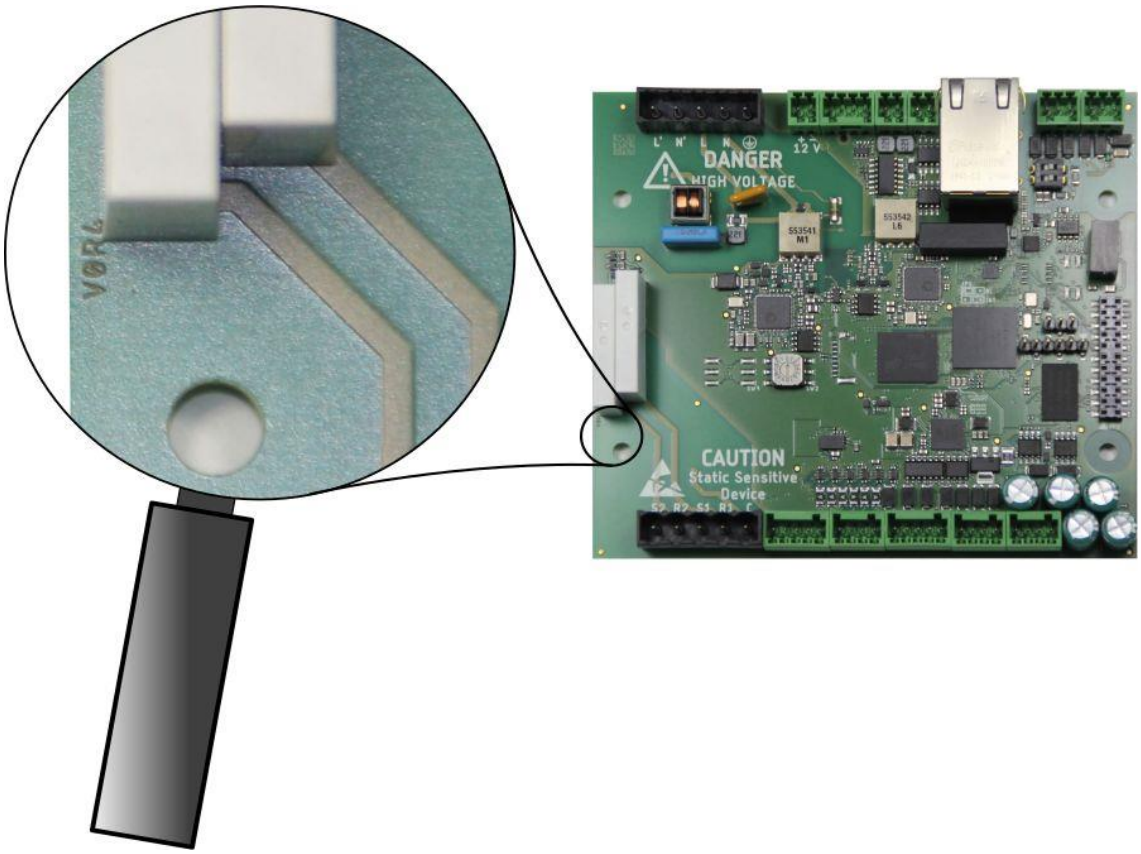


Figure 2 Board Revision Marking

8 Product Variants

Interface	Charge Control C		
	100	200	300
i.MX6ULL Controller, eMMC, DDR3	1	1	1
Ethernet	-	1	1
PLC over mains	-	-	1
PLC to PEV	-	1	1
PWM to PEV	1	1	1
Relay outputs (250 VAC / 6 A) with sense feedback	1	2	2
EIA-485 (not galvanically isolated, with failsafe biasing)	-	-	1
EIA-485 (galvanically isolated, with failsafe biasing[1])	1	1	1
USB 2.0 Host Interface	1	1	1
Digital input	4	4	6
Digital output	4	4	6
1-Wire Temperature Interface	-	1	1
Locking Motor Interface	-	2	2
Rotary coding switch	1	1	1
Fan output	-	-	1
Option Connector	1	1	1
Mounting holes	4	4	4
CAN[2]	-	-	-

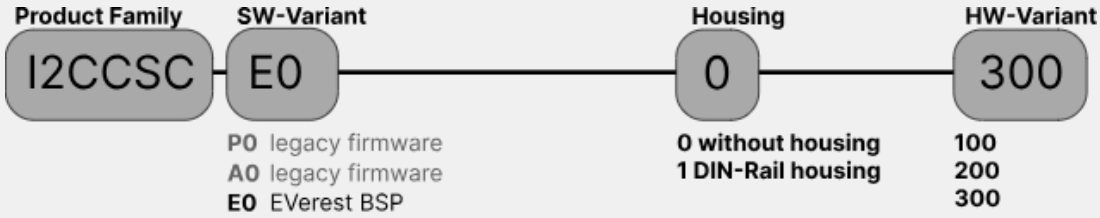
Table 19 Product Variants

[1] without failsafe biasing up to hardware revision V0R3

[2] Please note that there is currently no standard product that includes a CAN interface.

9 Order Code

Product Code



Order Code

Available order codes	SW-Variant	Housing	HW-Variant
I2CCSC-P00-105	legacy stack	no housing	100
I2CCSC-A00-204	legacy stack	no housing	200
I2CCSC-A00-303	legacy stack	no housing	300
I2CCSC-E00-204	EVerest BSP	no housing	200
I2CCSC-E00-303	EVerest BSP	no housing	300

A Connector Kit with all mating connectors can be retrieved using the order code I2CCSC-CK-1.

10 Contact

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