DB2605-AC EV Charging Controller

Datasheet

Rev 1.0.12, May 2026

Contents

1 Overview

The DB2605-AC EV Charging Controller is the core unit of a Supply Equipment Communication Controller (SECC) that manages EV Combined Charging System (CCS) AC high-level charging and basic charging.

The DB2605-AC EV Charging Controller is equipped with a Qualcomm QCA700X and a powerful MCU that runs RTOS with a complete ISO 15118-2/20 software stack and an optional IEC 61851 stack.

1.1 HomePlug Green PHY

The DB2605-AC fully supports HomePlug Green PHY Spec 1.1 (IEEE 1901). HPGP features:

- Spectrum: 2 – 30 MHz
- Max PHY rate: 10Mbps
- Modulation: OFDM
- Subcarriers: 917
- Subcarrier space: 24.414kHz
- ROBO: 4Mpbs (5x repeat code), 5Mbps (4x repeat code), 10Mpbs (2x repeat code)

1.2 Charge Software Stack

The DB2605-AC complies with

- ISO 15118-3
- ISO 15118-2/20 AC EIM and PnC
- ISO 15118-20 Bidirectional charging with security

1.3 Hardware Security Module

- Security certification: CC EAL4+ (HW + JCOP), FIPS 140-2 L3
- ECC crypto curves: ECC NIST (192 to 521 bit)/ed448
- Secure key storage: up to 50k bytes

1.4 Diagram

Figure 1 shows controller components as well as necessary connections and external components.

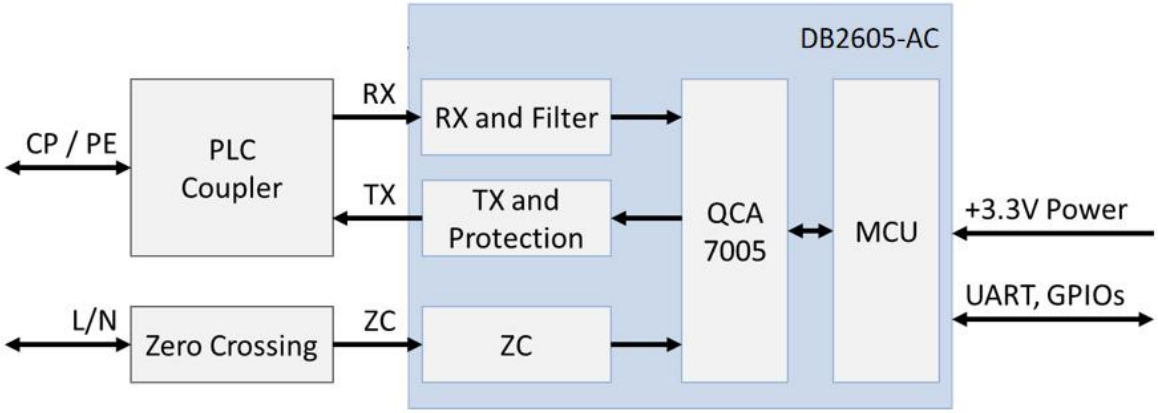


Figure 1 – DB2605-AC Block Diagram

All DB2605-AC components are protected by a metal shield. Information about the controller is printed on a high-temperature label on this shield.

1.5 Host Interface

The DB2605-AC connects to a host module via a UART interface, a reset pin, and a boot pin.

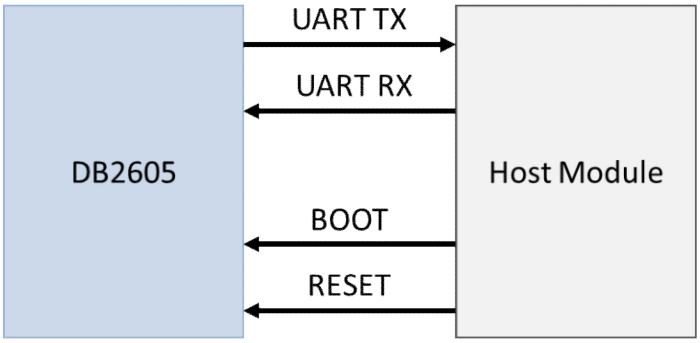


Figure 2 – Block Diagram of UART Pins

UART serial port setting: 115200bps; 8-N-1

2 Information

2.1 General

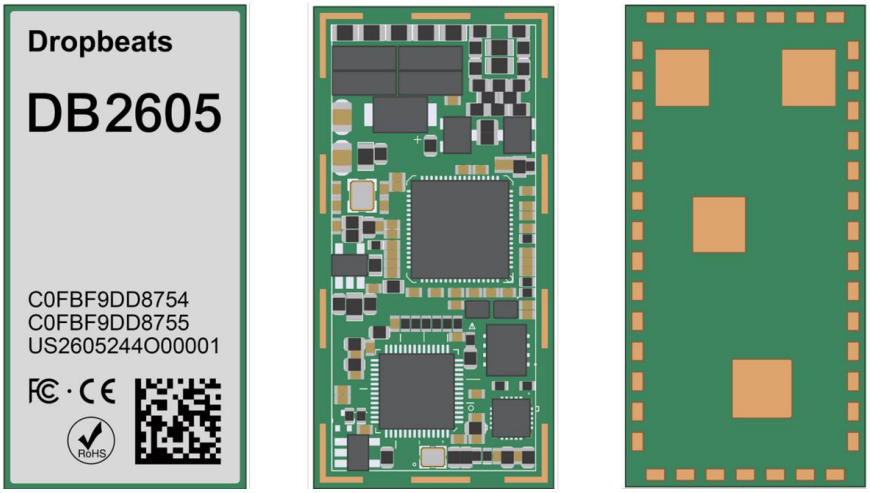


Figure 3 – Images of DB2605-AC EV Charging Controller

2.2 Pin Definitions

Pin	Name	Type	Usage
1	GND	P	Ground
2	RX-	IA	Power line coupling transformer Rx-
3	RX+	IA	Power line coupling transformer Rx+
4	TX-	OA	Power line coupling transformer Tx-
5	TX+	OA	Power line coupling transformer Tx+
6	GND	P	Ground
7	ZC_IN	IA	Power line zero crossing in. If not used, connect to ground.
8	GND	P	Ground
9	PWM	O	Reserved
10	GND	P	Ground
11	ADC_CP	IA	Reserved
12	ADC_PP	IA	Reserved
13	GND	P	Ground
14	UART0_TX	O	UART0 Tx
15	UART0_RX	I	UART0 Rx
16	USB_DP	I/O	Reserved
17	USB_DM	I/O	Reserved
18	GP25	I/O	Reserved
19	GP26	I/O	Reserved
20	GP27	I/O	Reserved
21	GP28	I/O	Reserved

Pin	Name	Type	Usage
22	PSGD	I	Reserved Pull-down to ground in AC EVSE Application.
23	GP30	I/O	Reserved
24	GP31	I/O	Reserved
25	GP32	I/O	Reserved
26	GP34	I/O	Reserved
27	GP33	I/O	Reserved
28	GND	P	Ground
29	Vdd	P	Power supply, 3.3V
30	GND	P	Ground
31	I2C0_SDA	I/O	Reserved, leave floating
32	I2C0_SCL	I/O	Reserved, leave floating
33	CAN_TX	I/O	Reserved
34	CAN_RX	I/O	Reserved
35	UART1_TX	O	UART1 Tx
36	UART1_RX	I	UART1 Rx
37	GND	P	Ground
38	/Reset	I	Power-on reset. Active low power-on-reset input.
39	BOOT	I	Boot mode setting
40	GND	P	Ground
41	GND	P	Ground
42	GND	P	Ground
TPAD1	GND	P	Ground
TPAD2	GND	P	Ground
TPAD3	GND	P	Ground
TPAD4	GND	P	Ground

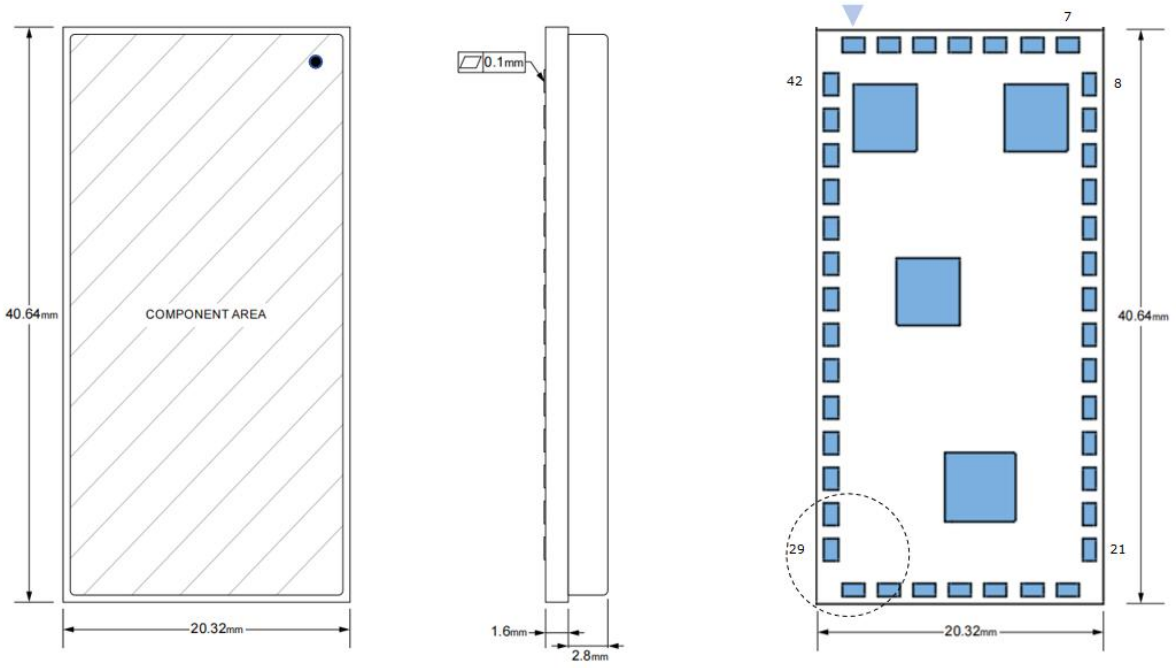
2.3 Power-on Configuration

One pin of the DB2605-AC is sampled at boot (bootstrap) to obtain the desired configuration.

Pin	Function	Description
BOOT	Boot mode	High: Boot from UART0 (pins 14/15). This mode is mainly used for firmware upgrade. Low: Launch application image from flash

2.4 Form Factor

Width * Length * Height: 20.32 * 40.64 * 4.4 mm



Top View Bottom View

Figure 4 – DB2605-AC Form Factor

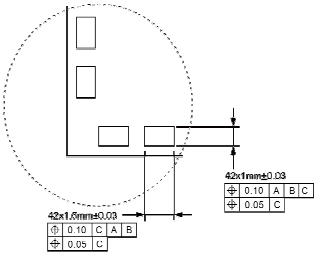
Tolerance：

1 Width Tolerance：±0.13mm

2 Length Tolerance：±0.13mm

3 Height Tolerance：±0.14mm

4 Pin Pad Tolerance：±0.03mm



2.5 Recommended Solder Footprint

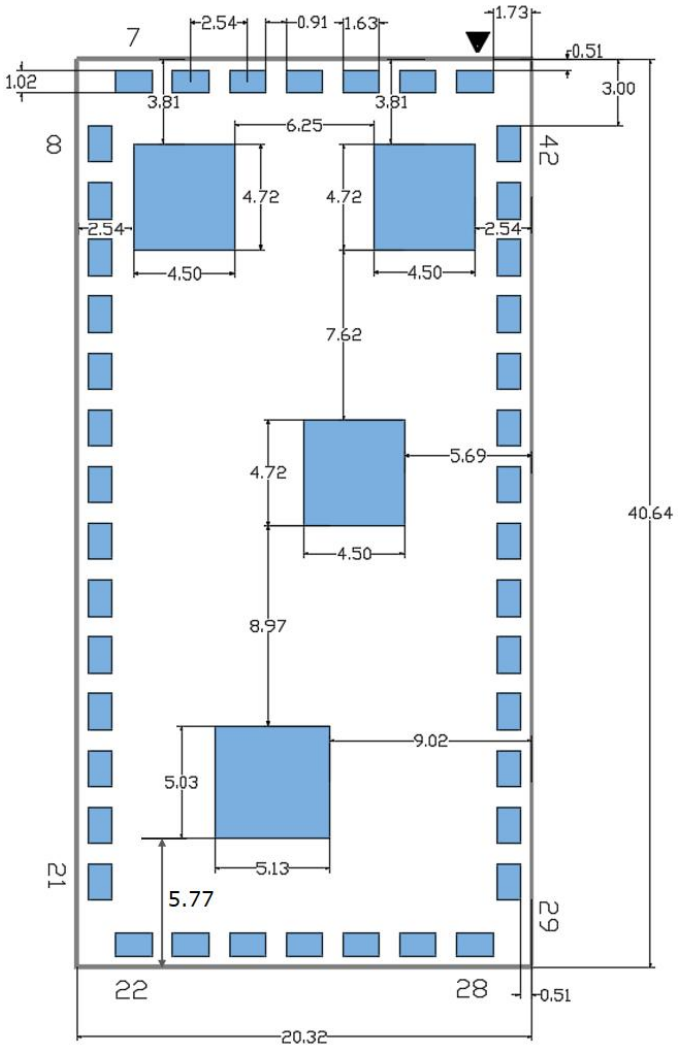


Figure 5 – Recommended Solder Footprint

Notes:

1. Top view, as seen through the DB2605-AC from the Top.
2. DB2605-AC outline shows nominal dimensions; tolerance is not included
3. All dimensions in mm
4. Pads are all the same size
5. Distances between pads are equal
6. The solder footprint pads are recommended to be fully consistent with the pin pads.

2.6 Recommended Paste Footprint

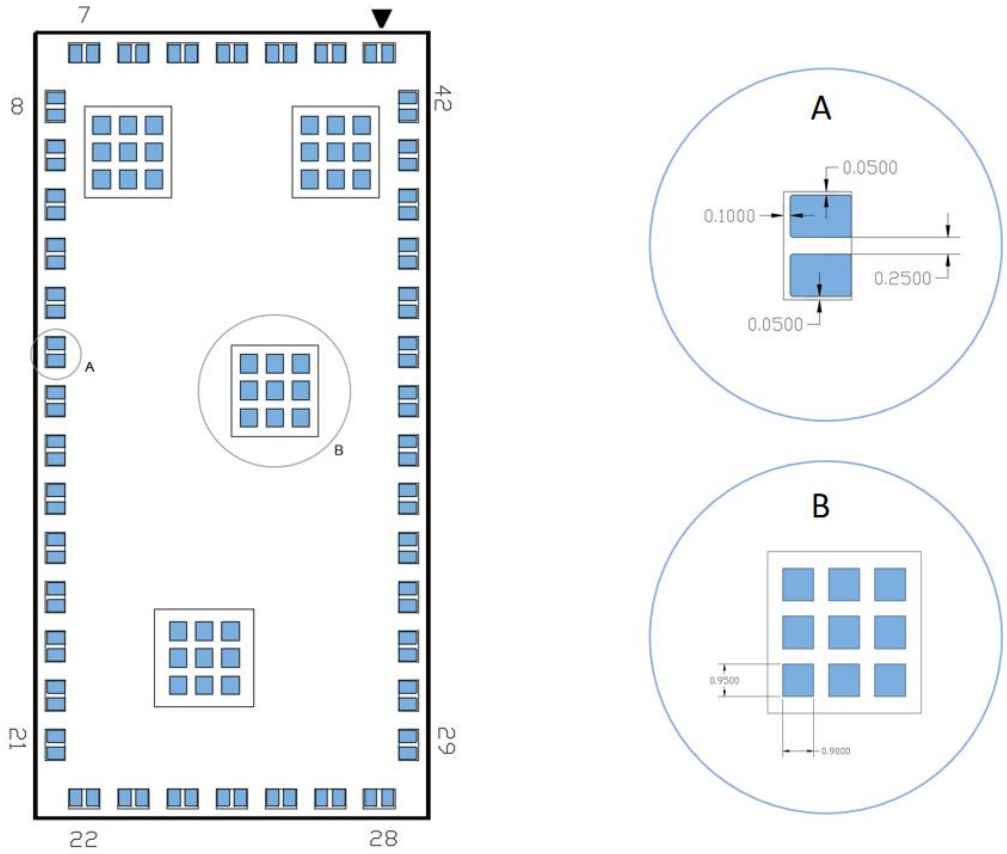


Figure 6 – Recommended Paste Footprint

2.7 Recommended Reflow Information

	Low Limit	High Limit	Units
Max Rising Slope (Target=2.5)	1	5	Degrees/Second
Slope1 (Target=2.3)	0.5	4	Degrees/Second
Between 180.0 and 220.0			
Max Falling Slope	-3	-1	Degrees/Second
Soak Time 150-180C	60	100	Seconds
Time Above Reflow - 220C	30	90	Seconds
Peak Temperature	235	250	Degrees Celsius

Reflow Profile Setting Example:

Degree Celsius										
Zone	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
	150	**160**	**180**	**180**	**180**	**180**	**200**	**220**	**235**	**260**
Conveyor Speed (cm/min):						**90**				

Reflow Profile Example:

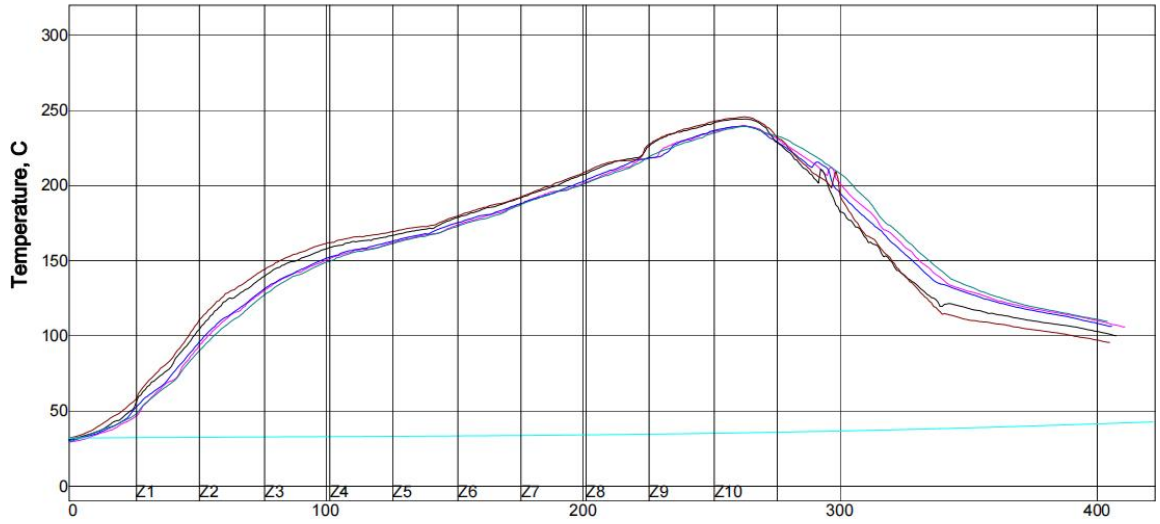


Figure 7 – Reflow Profile Example

3 Electrical Characteristics

3.1 Recommended Operating Rating

Symbol	Parameter	Min	Typ	Max	Units
Vdd	Power Supply	3.13	3.3	3.46	V

3.2 Environment

Environmental Condition	
Operating Temperature	-40 – 85 °C
Storage Temperature	-40 – 105 °C

3.3 DC Switching Thresholds

Symbol	Parameter	Test Conditions	Min	Max	Units
VIL	Low-level input voltage		—	0.3*Vdd	V
VIH	High-level input voltage		0.7*Vdd	—	V
VOL	Low-level output voltage	IOL= 4 mA, 12mA[1]	—	0.4	V
VOH	High-level output voltage	IOH = -4 mA, -12 mA[2]	2.4	—	V
IOZ	High-impedance output current	Gnd ≤ VI ≥ Vdd	-1	+1	µA

[1] IOL = 12 mA for all GPIOs

IOL = 4 mA for all other interfaces

[2] IOH = -12 mA for all GPIOs

IOH = -4 mA for all other interfaces

3.4 Current Consumption

Parameter	Value
Max power dissipation	300mA
Typical power dissipation	200mA

4 Applications

4.1 Pilot Signal managed by Host Module

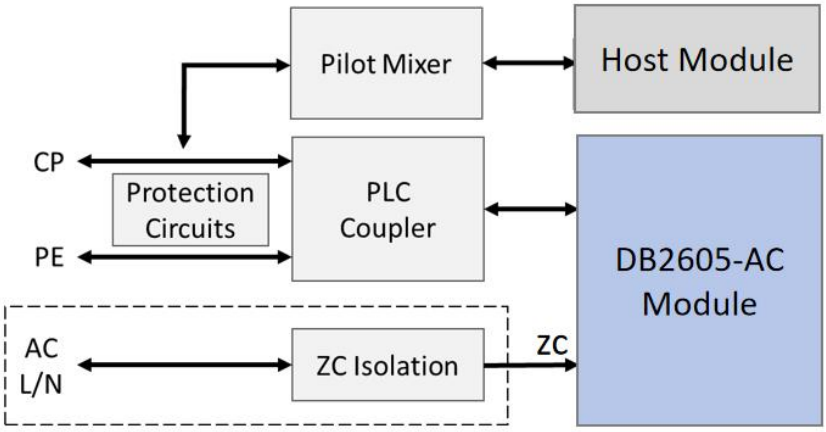


Figure 8 – Control Pilot Signal Managed by Host Module

Note:

AC power line zero-crossing detection requires an external opto-coupler and filter circuits;If zero-crossing detection is not required, connect the ZC pin to ground.

5 Reference Designs

5.1 Zero Crossing Circuit

A zero crossing function may be used to synchronize other PLC devices for bandwidth management.

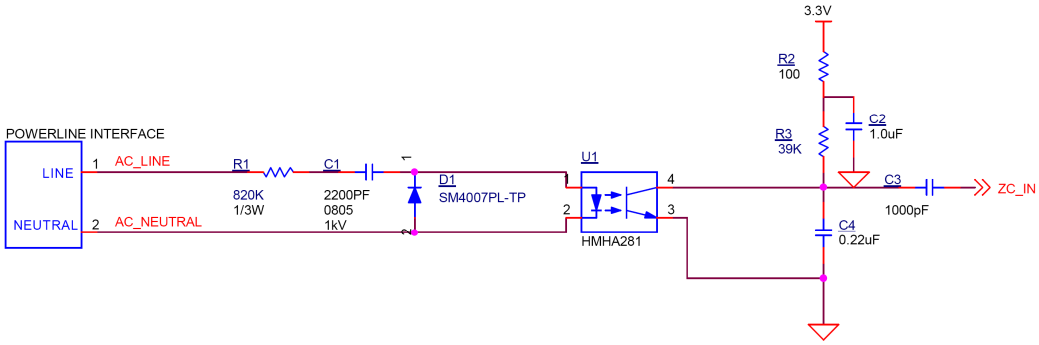


Figure 10 – HPGP Zero Crossing Circuit

Note:

An optocoupler is used for isolation between the high-voltage and low-voltage sides, resulting in a relatively large circuit footprint. If space constraints do not allow this, connect ZC_IN to GND to reduce the circuit area.

5.2 HPGP Coupler

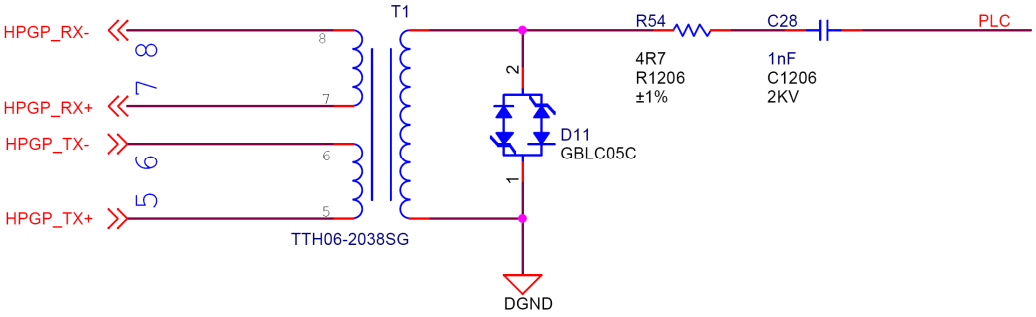


Figure 11 – HPGP Coupler Circuit

Note:

A coupling capacitor blocks the DC voltage present on the pilot wire. The component values may change after component optimization.

A 1:1:1 turn ratio transformer and a 4.7 Ω series resistor limit transient current and set the output impedance to about 6Ω. This current-limiting resistor value may be adjusted slightly to trim the transmitter output voltage amplitude.

A TVS diode is placed across the PLC coupling transformer to isolate the second stage circuitry and clamp surge voltage to a more acceptable level for the DB2605-AC.

Recommended Coupler Transformer

Part No.	Vendor	Features	Description
TTH06-2038SG	Dropbeats	Industrial	AC EVSE Application

6 Packaging Information

The polystyrene carrier tape package contains 200 DB2605-AC per reel.

7 Marking

Each Controller is marked with the following data:

- Dropbeats brand
- Controller identifier DB2605
- Product Name
- Product Hardware Version and Manufacture Date(MFD)
- HPGP Modem MAC address
- HOST MCU MAC address
- Serial Number
- Certification logos
- QR code with HPGP Modem MAC address

8 Ordering

Order Code	Chipset	Temperature Range	Interface	Applications
DB2605-AC-UN-U-V130	QCA7005-AL33	-40 – 85°C	UART	AC EVSE
Notes: DB2605-AC is intended for AC EVSE applications.				

9 Design and Development

Product	Description
DB2605-AC EV Charging HAT	DB2605-AC with jumpers and connector. A platform that allows evaluation, software development, and integration of the DB2605-AC, the ISO 15118-2/20 AC charging solution.
DB2605-AC EV Charging Raspberry Pi Kit	DB2605-AC EV Charging HAT plus Raspberry Pi
DB2605-AC EV Charging Evaluation Kit	DB2605-AC EV Charging Raspberry Pi Kit extended to include EV coupler and EV simulator, which allow quick evaluation of EV charging designs

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Revision History

Revision	Date	Descriptions
1.0.0	2024.4.24	Initial
1.0.1	2024.5.31	Changed document name to Datasheet.
1.0.2	2024.6.4	Changed document name “module” to “controller”
1.0.3	2024.7.6	Updated form factor
1.0.4	2024.7.18	Updated form factor
1.0.5	2024.11.8	Added bottom pads for soldering; added soldering paste footprint; added reflow profile setting.
1.0.6	2025.9.3	Updated marking and Pin 26/27 name.
1.0.7	2025.10.15	Revised Note 1 in Section 2.5 from “Top View” to “Bottom View”.
1.0.8	2025.12.18	Added dimension for the upper edge of the thermal pad in Section 2.5.
1.0.9	2025.12.22	Added dimension for the upper pins in Section 2.5. Changed the names of Section 2.5 and 2.6.
1.0.10	2026.1.9	Renamed DB2605 to DB2605-AC.
1.0.11	2026.5.10	Recommended: The IEC 61851 (Control and Proximity Pilot) function is not handled by DB2605-AC, and the related circuits and descriptions have been removed.
1.0.12	2026.5.11	Added form factor tolerances.