



PLC Stamp micro 2 Datasheet

in-tech smart charging GmbH

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1 Revisions

Revision	Release Date	Changes
11	January 27, 2021	format/ layout changes
10	May 5, 2020	added versions -003 and -004 to order code table
		added "Motorola" to SPI mode description
		updated example module label
		added table with QCA firmware versions
9	September 5, 2017	added section "processing"
8	June 13, 2017	updated section "GPIO", corrected error in meaning of GPIO levels
7	March 9, 2017	added hints for use in PEVs in section "Getting Started"
6	February 1, 2017	added Package Materials Information and order options, adding info about difference in QCA7000 and QCA7005
5	March 21, 2016	added GPIO output current limit, all GPIO3 functions and timings
4	February 24, 2016	fixed GPIO function assignment
3	February 9, 2016	clarified UART settings
2	January 25, 2016	added default UART settings
1	November 16, 2015	initial release

2 Abstract

The PLC (PowerLine Communication) module gives your application access to powerline communication based on the HomePlug® Green PHY™ Chip QCA7000 / QCA7005. You can realize point-to-point and multi-point connections depending on your application. The data will be transmitted as Ethernet packets over the power line. This gives you the opportunity to use TCP/IP or whatever network protocols you wish to use.

You can freely select the galvanic isolation from the powerline and the power supply so that it perfectly meets the requirements for your application.

The QCA7000 / QCA7005 by Qualcomm Atheros ensures compatibility with many other commercial powerline devices.

The main difference between the QCA7000 and QCA7005 is the chip package. The QCA7000 has a traditional QFN package, whilst the QCA7005 has a modified QFN for better optical inspection that is intended for use in automotive applications with highest quality requirements. The default option for these modules is the QCA7000.

Parameter	Value
Power supply	3.3 V
Power consumption	0.5 W
Data rate	max. 10 MBit/s
Reach	max. 300 m via Powerline
Temperature range	-40 °C - 85 °C (industrial) / 0 °C - 70 °C (commercial)
Outline dimension	22 mm x 22 mm x 4.5 mm
Weight	3.3 g
RoHS	PLC Stamp micro 2 is manufactured in compliance with RoHS

3 Applications

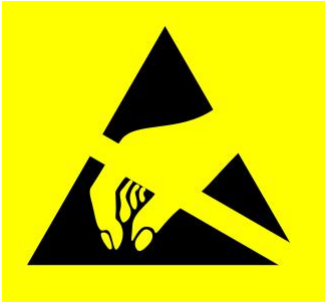
- interconnecting household appliances to the Smart Grid
- connecting smart meters to Smart Meter Gateways and/or LAN/WAN/WiFi
- connecting sensors and photovoltaic equipment
- connecting heating and air conditioning system
- coupling machines and measurement devices
- forwarding digital signals (remote I/O)
- coupling of RF cells for home automation

4 Interfaces

Powerline: 230 V AC, 110 V AC, DC, dead-wire 2-wire-connections

Serial interfaces: UART or SPI (order option)

5 Handling



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

The module contains components with **moisture sensitivity level (MSL) 3**. Please handle them accordingly.

6 Module Overview

The block diagram in [figure 1](#) shows the module components in the gray box as well as the connections and external components that you need additionally.

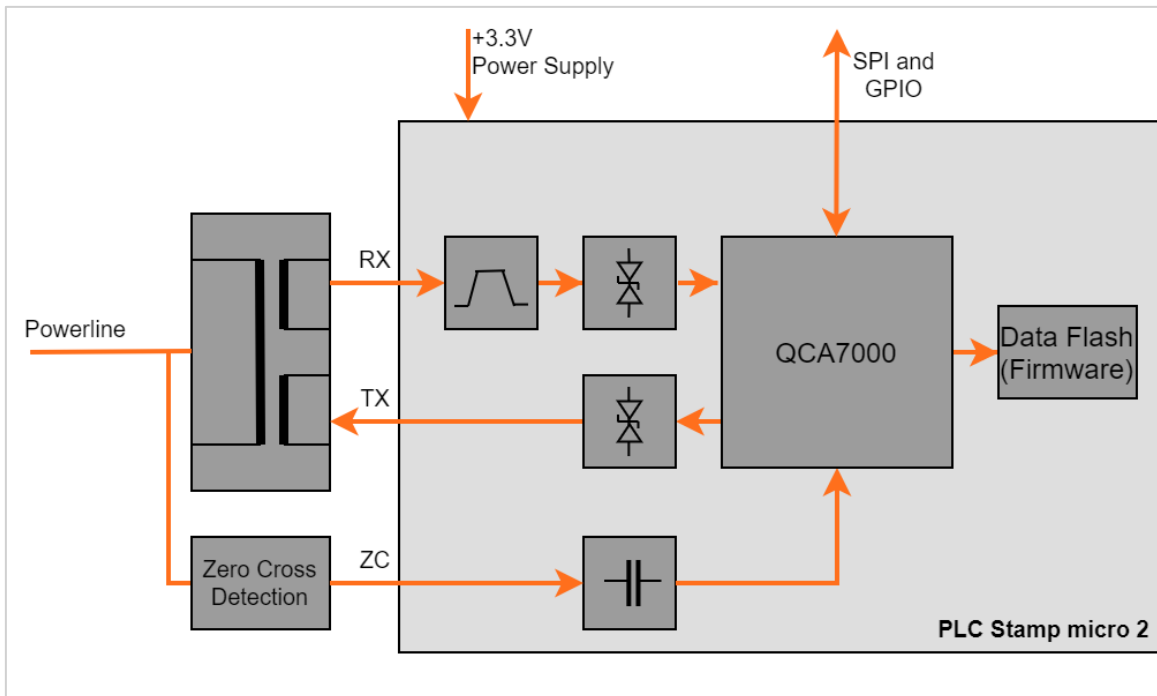


Figure 1 Block Diagram of PLC Stamp micro 2

Electronic components of the module are covered by a metal shield, on which a thermal label containing information about the module exists.



Figure 2 Image of the Module

7 Technical Data

7.1 Absolute Maximum Ratings

SYMBOL	PARAMETER	Min.	Max.	UNIT
VDD	Digital supply voltage	-0.3	3.46	V
VDIO	Digital input voltage	-0.3	3.63	V
TSTORE	Storage temperature	-40	150	°C
RAH	Relative air humidity (not condensing)	10	90	%

7.2 Operating Conditions

SYMBOL	PARAMETER	Min.	Typ.	Max.	UNIT
VDD	Digital supply voltage	3.13	3.3	3.46	V
IDD	Current for VDD	-	150 (average)	300	mA
TCASE	Max. ambient temperature (industrial)	-40	-	85	°C
	Max. ambient temperature (commercial)	0	-	70	°C
I_GPIO	GPIO current	-	-	12	mA

8 Firmware and MAC Addresses

These modules are pre-programmed with firmware and parameter information block (PIB). The PIB contains the MAC addresses of the module, prescaler values defining the output power as well as settings for automotive use of the QCA7000 / QCA7005 (SLAC). The MAC address uses a prefix (organizationally unique identifier) that is assigned to in-tech smart charging. The prescaler values that are set in the production process were defined by Qualcomm for the intended application / market (see order option Parameter Optimization). Automotive variants include settings to enable SLAC for either the EVSE or the PEV side.

9 Module Pinout

PIN	Direction	Name	Description
1	SUPPLY	VDD	Supply Voltage for the Module
2	IN	RX_N	Powerline receiver input negative
3	IN	RX_P	Powerline receiver input positive
4	OUT	TX_N	Powerline transmitter output negative
5	OUT	TX_P	Powerline transmitter output positive
6	IN	ZC_IN	Zerocross detection input
7	SUPPLY	GND	Ground connection
8	SUPPLY	GND	Ground connection
9	SUPPLY	GND	Ground connection
10	-	-	not available (mechanical coding)
11	SUPPLY	GND	Ground connection
12	SUPPLY	GND	Ground connection
13	SUPPLY	GND	Ground connection
14	SUPPLY	GND	Ground connection
15	SUPPLY	GND	Ground connection
16	SUPPLY	GND	Ground connection
17	SUPPLY	GND	Ground connection
18	IN/OUT	GPIO_0	QCA7000 / QCA7005 GPIO 0
19	IN/OUT	GPIO_1	QCA7000 / QCA7005 GPIO 1
20	IN/OUT	GPIO_2	QCA7000 / QCA7005 GPIO 2
21	IN/OUT	GPIO_3	QCA7000 / QCA7005 GPIO 3
22	IN	RESET_L	Reset (low active)
23	IN/OUT	SERIAL_4	Serial_4 of QCA7000 / QCA7005
24	IN/OUT	SERIAL_3	Serial_3 of QCA7000 / QCA7005
25	IN/OUT	SERIAL_2	Serial_2 of QCA7000 / QCA7005
26	IN/OUT	SERIAL_1	Serial_1 of QCA7000 / QCA7005
27	IN/OUT	SERIAL_0	Serial_0 of QCA7000 / QCA7005
28	SUPPLY	GND	Ground connection

9.1 GPIO

9.1.1 Power-on Configuration

The QCA7000 / QCA7005 comprises four GPIO pins which are read while booting to get the desired configuration. [Table 1](#) shows the configuration of the QCA7000 / QCA7005 at boot time.

GPIO #	Function	Pull Up	Pull Down	Preload on Module
0	Boot Source	Flash	Host	-
1	Host Interface	-	SPI Slave	10 kOhm Pull Down
2	SPI Slave Mode	Burst	Legacy	-
3	None	-	-	-

Table 1 QCA7000 / QCA7005 Boot Strap Options

9.1.2 GPIO Functions

The GPIOs of the QCA7000 / QCA7005 have different functions after booting. They can either be used as input or output to display various states or to trigger some actions. It is not possible to use these pins from your own application - only the QCA7000 / QCA7005 firmware can control these GPIOs.

The GPIOs are set up as specified in [table 2](#).

GPIO #	Direction	Function
0	Output	PLC connection (1=connection established, 0=no connection)
1	Output	Pushbutton Simple Connect (toggling 1/0 with 1Hz: simple connect mode active, 0: not in simple connect mode)
2	Output	unused in default configuration
3	Input	Pushbutton Simple Connect (hold time: 0.5 to 3s), NMK randomize (hold time: 5 to 8s), Factory defaults (hold time: 10 to 15s)

Table 2 QCA7000 / QCA7005 GPIO Settings

Since the GPIOs are also used as bootstrap pins, special attention should be paid to the LED ([figure 3](#)) and switch ([figure 4](#)) connection according to the strap direction. Behaviour in [table 2](#) states a '1' for a pressed button or a lit LED, the electrical state (high/low) depends on the direction of the bootstrap resistor.

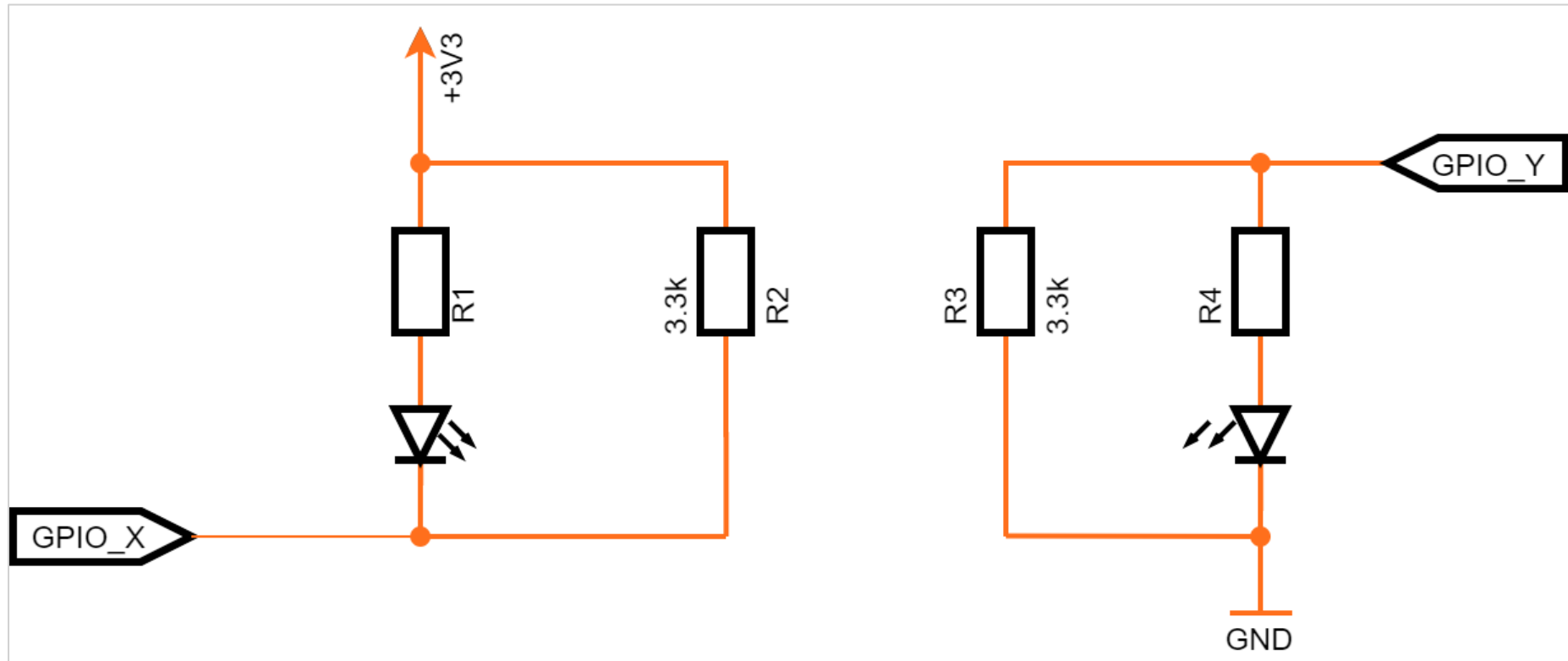


Figure 3 GPIO LED Bootstrap

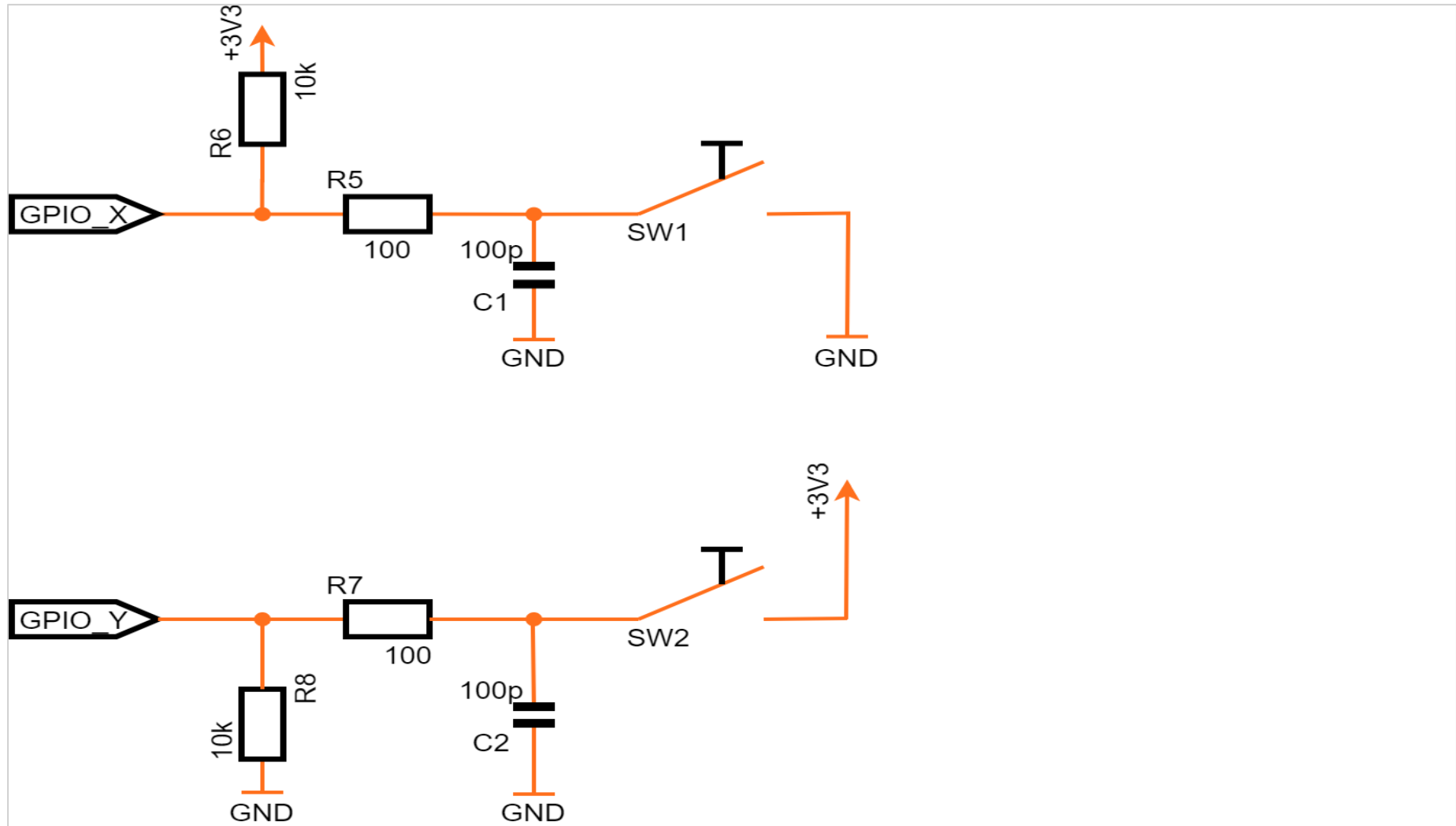


Figure 4 GPIO Switch Bootstrap

9.2 Serial Signals

The signals SERIAL_0 to SERIAL_4 represent SPI or UART signals. [Table 3](#) contains the UART and SPI function for each signal.

Signal Name	SPI function	UART function
SERIAL_0	Interrupt	
SERIAL_1	CLK	RTS
SERIAL_2	CS	CTS
SERIAL_3	MISO	TXD
SERIAL_4	MOSI	RXD

Table 3 QCA7000 / QCA7005 UART/SPI Signals

Note: The selection between SPI and UART mode is effected via different QCA7000 / QCA7005 firmware and is therefore an order option.

9.2.1 UART

All module variants in UART mode use the settings in [table 4](#). Pins RTS and CTS are not used.

Setting	Value
Baud Rate	115200
Data Bits	8
Parity	None
Stop Bits	1
Flow Control	None

Table 4 UART Settings

9.2.2 SPI

The QCA7000 / QCA7005 uses Motorola SPI mode 3: CPOL=1, CPHA=1.

SPI should be used in burst mode, meaning that the Chip Select signal is kept low during a complete SPI message.

The SPI CLK period should not be less than 83.3 ns resulting in a maximum clock frequency of 12 MHz.

9.3 Recommended Footprint

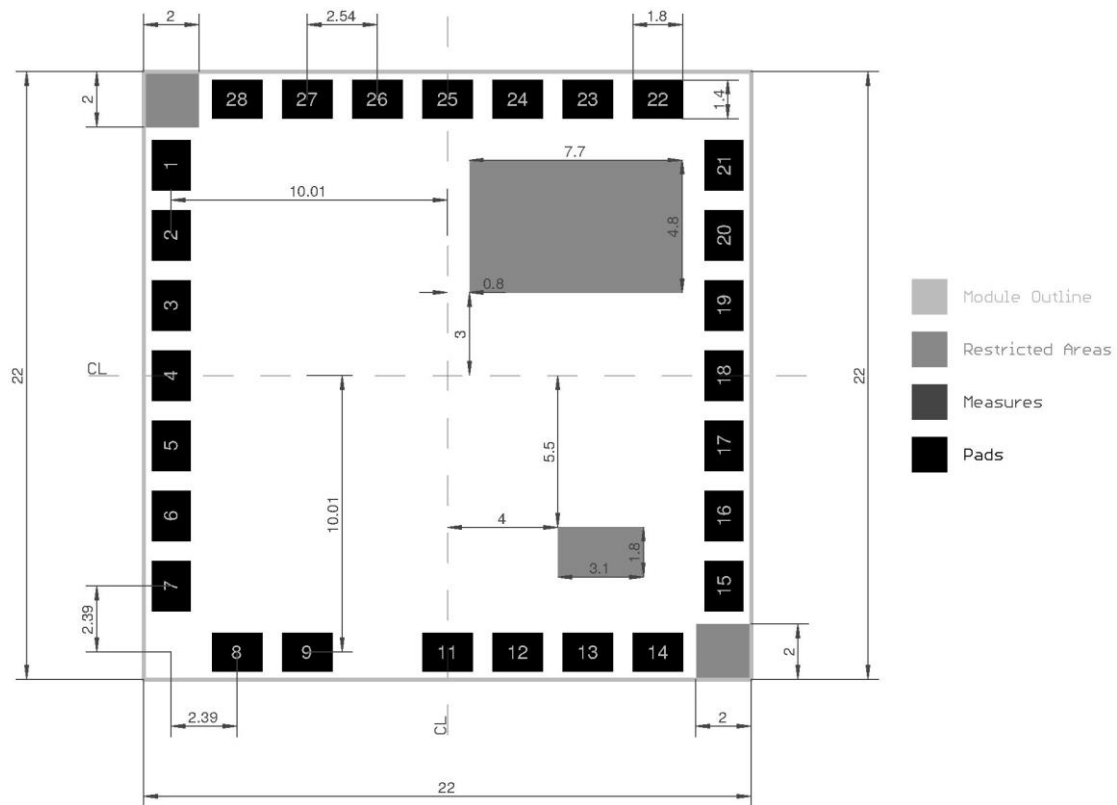


Figure 5 PLC Stamp micro 2 Footprint

Notes:

1. All dimensions are in mm.
2. Pads are all of the same size.
3. Distances between pads are equal, unless otherwise specified.
4. The drawing in [figure 5](#) shows the top view on the footprint (as if you look through the module).
5. Restricted areas should be kept free of copper on the base of PCB.
6. The module outline shows the ideal measures - tolerance is not included.

10 Getting Started

You will have to make some choices for the use of the PLC Stamp micro 2 before you start developing your hardware.

1. Which serial interface do you want to use?
 - UART is much easier to use, but less robust and slower (maximum baud rate). SPI is more robust due to its synchronous nature, which, however, makes it harder to use. SPI can be used for a faster transfer of data to the QCA7000 / QCA7005 (maximum serial clock frequency). In general, the use of SPI is the best choice, which is why it is used in the default order variant.
2. To which medium do you want to couple the HomePlug GreenPHY signal?
 - Depending on your choice, there might be different insulation and transient protection requirements. The signal can be coupled to a clean transmission line for which there are no heavy insulation requirements and no transients to be suppressed. On the other side, there may be a CAT IV / 3 Phase / 230 V for communication. The latter medium requires more thought regarding insulation and transient protection.
3. Are there any sources of noise or capacitive sinks in your transmission line?
 - Both can have an impact on the signal quality. Sources of noise in the region between 2 and 30 MHz should be avoided. Power supplies or equipment like solar inverters might have capacitors between L and N, which will effectively lead to a short circuit in the PLC frequencies.

A possible implementation of the coupling circuit is shown in [figure 6](#) for coupling to mains and in [figure 7](#) for automotive applications. These schematics are both freely based on the QCA7000 / QCA7005 Add-In reference schematic by Qualcomm Atheros.

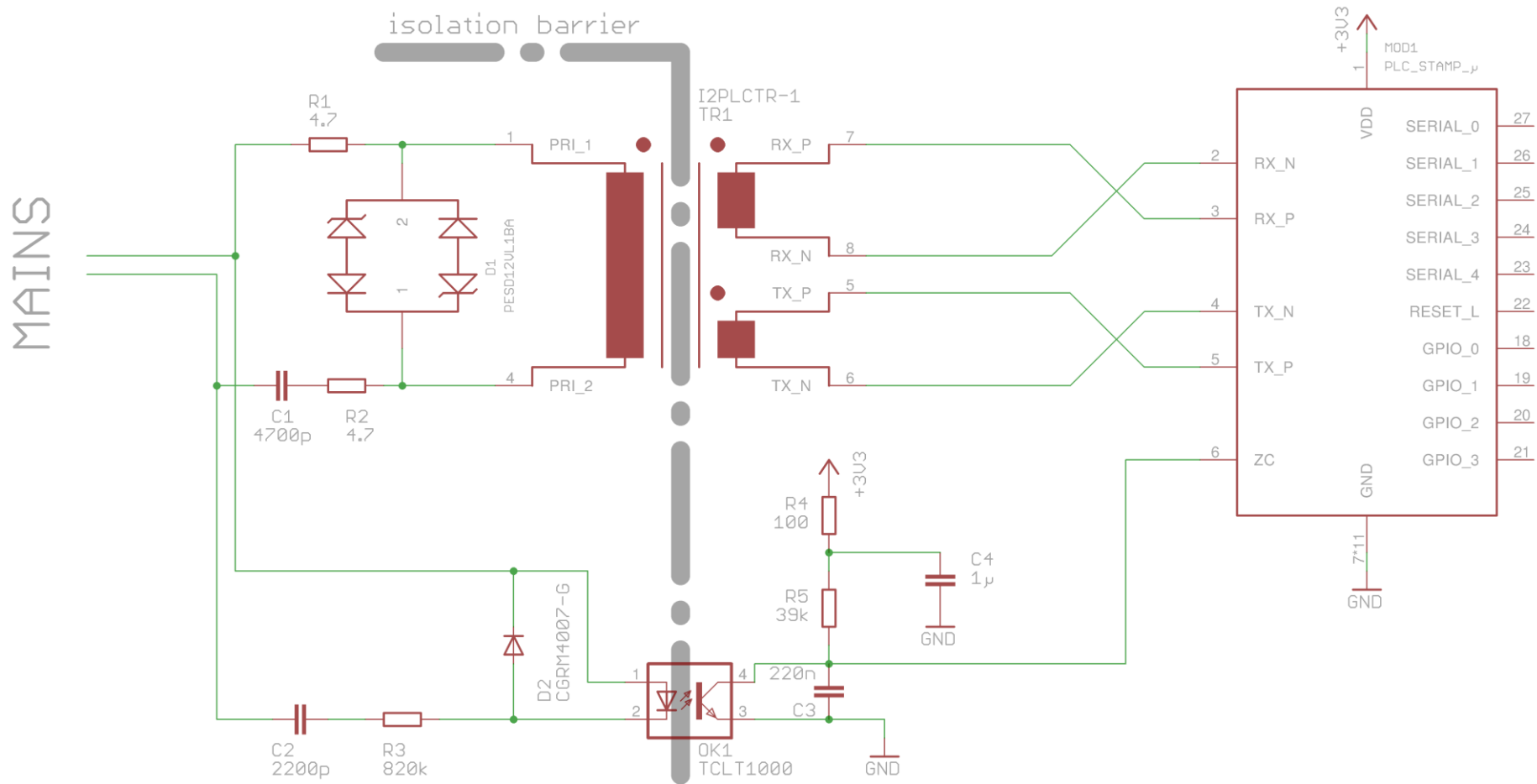


Figure 6 Reference Schematic for PLC Coupling to Mains

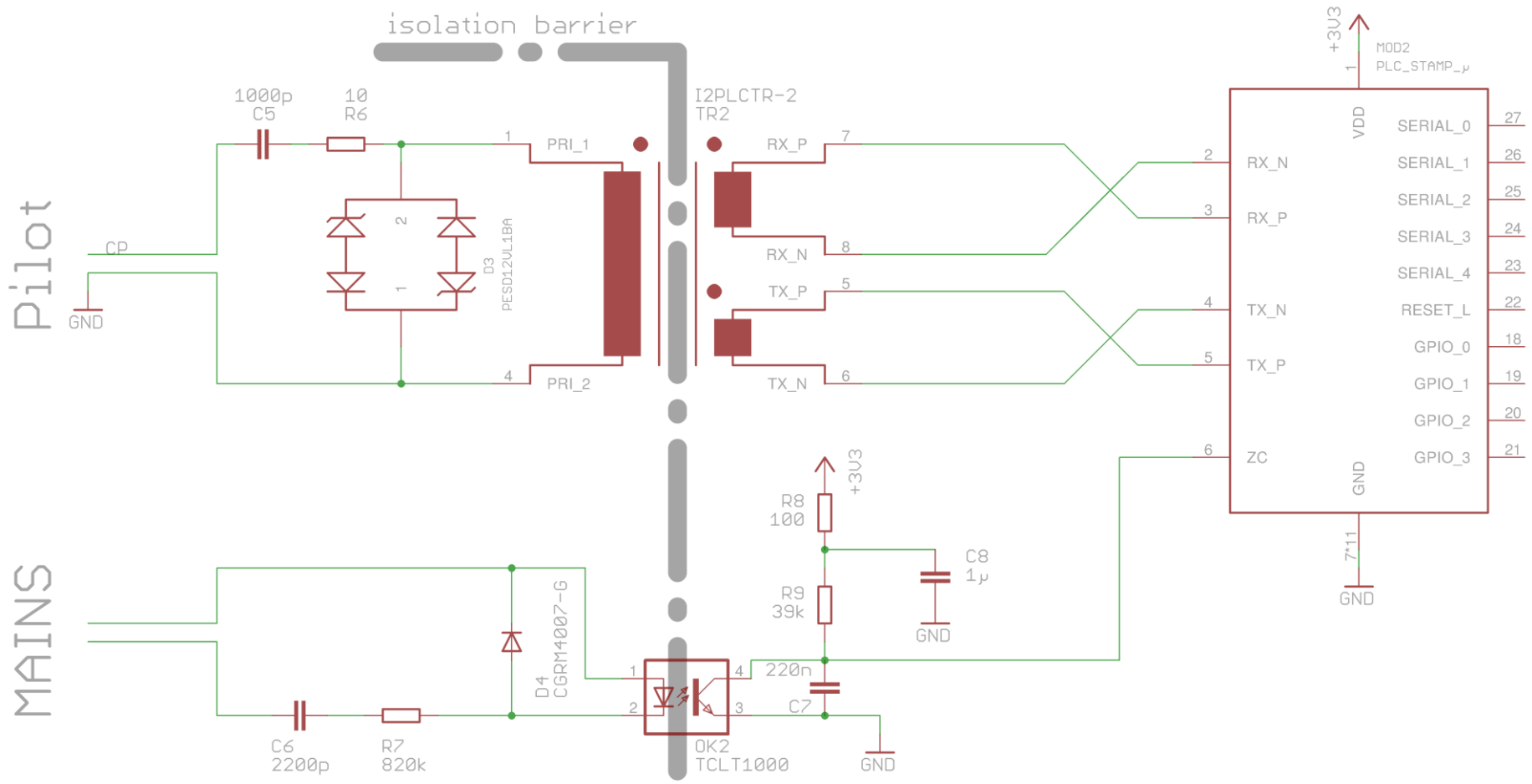


Figure 7 Reference Schematics for PLC Coupling to the Pilot Signal

Capacitors C1, C2, C5, C6 need to be selected according to your environment. They are presented with almost full voltage from your communication lines. If connected to mains, X types need to be used. Please also remember to take all other product safety related topics into consideration.

When using a dead wire connection (or pilot wire in automotive applications), you can use the circuit in [figure 7](#). If you are not sure if the signals will couple to other lines where PLC communication is used, you should connect the zero cross detector in the lower part of the schematic to your mains port. For use in electric vehicles (PEV) the signal ZC_IN needs to be connected to GND and the optocoupler circuit can be omitted.

in-tech smart charging provides you with all non-standard parts you will need to implement this design into your own application. Section “Available Accessories” contains further references to these parts.

An easy way to put PLC Stamp micro 2 into operation is to use it with the evaluation kit offered by in-tech smart charging. Please contact your distributor for further information.

11 Processing

- Process the modules according to IPC/JEDEC J–STD-020 and J-STD-033 guidelines.
- Limit repeated reflow processes to maximum 2.

12 Module Marking

Each module is marked with a label containing the following data:

1. Order Code
2. QCA7000 / QCA7005 MAC Address (printed with a separating colon every two digits, the DataMatrix code contains the digits without separator)
3. Serial Number
4. Production Date Code: WWYY
5. Device Security Key
6. 2D DataMatrix code containing the above information as a list of space separated values.

Additionally, each label contains:

1. in-tech Banner
2. Pin 1 Marking

An example is shown in [figure 8](#).

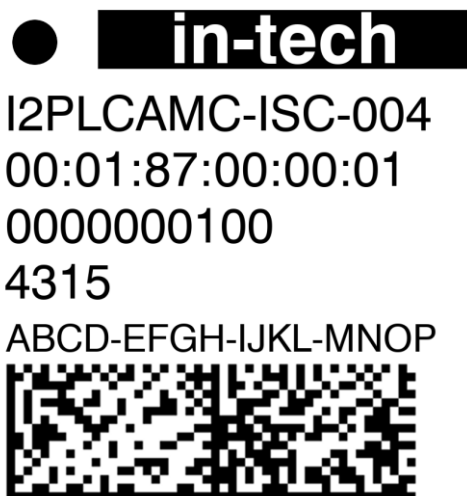


Figure 8 Example Label for PLC Stamp micro 2

13 Order Information

The following table provides an overview of the available PLC Stamp micro 2 variants.

Order Code	Chip	Temperature Range/ °C	Serial Interface	Parameter Optimization	Packaging	Availability
Version 004						
I2PLCAMC-ISC-004-T	QCA7000	-40 - 85	SPI	CE Class B	Tray, 40pcs	standard
I2PLCAMC-ISC-004-R	QCA7000	-40 - 85	SPI	CE Class B	Tape and Reel, 370pcs	standard
I2PLCAMC-ISN-004-T	QCA7000	-40 - 85	SPI	North America	Tray, 40pcs	standard
I2PLCAMC-ISN-004-R	QCA7000	-40 - 85	SPI	North America	Tape and Reel, 370pcs	standard
I2PLCAMC-ISE-004-T	QCA7000	-40 - 85	SPI	Automotive EVSE	Tray, 40pcs	standard
I2PLCAMC-ISE-004-R	QCA7000	-40 - 85	SPI	Automotive EVSE	Tape and Reel, 370pcs	standard
I2PLCAMC-ISP-004-T	QCA7000	-40 - 85	SPI	Automotive PEV	Tray, 40pcs	standard
I2PLCAMC-ISP-004-R	QCA7000	-40 - 85	SPI	Automotive PEV	Tape and Reel, 370pcs	standard
I2PLCAMC-IUC-004-T	QCA7000	-40 - 85	UART	CE Class B	Tray, 40pcs	standard
I2PLCAMC-IUC-004-R	QCA7000	-40 - 85	UART	CE Class B	Tape and Reel, 370pcs	standard
I2PLCAMC-IUN-004-T	QCA7000	-40 - 85	UART	North America	Tray, 40pcs	standard
I2PLCAMC-IUN-004-R	QCA7000	-40 - 85	UART	North America	Tape and Reel, 370pcs	standard
I2PLCAMC-IUE-004-T	QCA7000	-40 - 85	UART	Automotive EVSE	Tray, 40pcs	standard
I2PLCAMC-IUE-004-R	QCA7000	-40 - 85	UART	Automotive EVSE	Tape and Reel, 370pcs	standard
I2PLCAMC-IUP-004-T	QCA7000	-40 - 85	UART	Automotive PEV	Tray, 40pcs	standard
I2PLCAMC-IUP-004-R	QCA7000	-40 - 85	UART	Automotive PEV	Tape and Reel, 370pcs	standard
I2PLCAMC-CSC-004-T	QCA7000	0 - 70	SPI	CE Class B	Tray, 40pcs	on request

Order Code	Chip	Temperature Range/ °C	Serial Interface	Parameter Optimization	Packaging	Availability
I2PLCAMC-CSC-004-R	QCA7000	0 - 70	SPI	CE Class B	Tape and Reel, 370pcs	on request
I2PLCAMC-CSN-004-T	QCA7000	0 - 70	SPI	North America	Tray, 40pcs	on request
I2PLCAMC-CSN-004-R	QCA7000	0 - 70	SPI	North America	Tape and Reel, 370pcs	on request
I2PLCAMC-CSE-004-T	QCA7000	0 - 70	SPI	Automotive EVSE	Tray, 40pcs	on request
I2PLCAMC-CSE-004-R	QCA7000	0 - 70	SPI	Automotive EVSE	Tape and Reel, 370pcs	on request
I2PLCAMC-CSP-004-T	QCA7000	0 - 70	SPI	Automotive PEV	Tray, 40pcs	on request
I2PLCAMC-CSP-004-R	QCA7000	0 - 70	SPI	Automotive PEV	Tape and Reel, 370pcs	on request
I2PLCAMC-CUC-004-T	QCA7000	0 - 70	UART	CE Class B	Tray, 40pcs	on request
I2PLCAMC-CUC-004-R	QCA7000	0 - 70	UART	CE Class B	Tape and Reel, 370pcs	on request
I2PLCAMC-CUN-004-T	QCA7000	0 - 70	UART	North America	Tray, 40pcs	on request
I2PLCAMC-CUN-004-R	QCA7000	0 - 70	UART	North America	Tape and Reel, 370pcs	on request
I2PLCAMC-CUE-004-T	QCA7000	0 - 70	UART	Automotive EVSE	Tray, 40pcs	on request
I2PLCAMC-CUE-004-R	QCA7000	0 - 70	UART	Automotive EVSE	Tape and Reel, 370pcs	on request
I2PLCAMC-CUP-004-T	QCA7000	0 - 70	UART	Automotive PEV	Tray, 40pcs	on request
I2PLCAMC-CUP-004-R	QCA7000	0 - 70	UART	Automotive PEV	Tape and Reel, 370pcs	on request
I2PLCBMC-ISC-004-T	QCA7005	-40 - 85	SPI	CE Class B	Tray, 40pcs	on request
I2PLCBMC-ISC-004-R	QCA7005	-40 - 85	SPI	CE Class B	Tape and Reel, 370pcs	on request
I2PLCBMC-ISN-004-T	QCA7005	-40 - 85	SPI	North America	Tray, 40pcs	on request
I2PLCBMC-ISN-004-R	QCA7005	-40 - 85	SPI	North America	Tape and Reel, 370pcs	on request
I2PLCBMC-ISE-004-T	QCA7005	-40 - 85	SPI	Automotive EVSE	Tray, 40pcs	on request

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I2PLCBMC-ISE-004-R	QCA7005	-40 - 85	SPI	Automotive EVSE	Tape and Reel, 370pcs	on request
I2PLCBMC-ISP-004-T	QCA7005	-40 - 85	SPI	Automotive PEV	Tray, 40pcs	on request
I2PLCBMC-ISP-004-R	QCA7005	-40 - 85	SPI	Automotive PEV	Tape and Reel, 370pcs	on request
I2PLCBMC-IUC-004-T	QCA7005	-40 - 85	UART	CE Class B	Tray, 40pcs	on request
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I2PLCBMC-IUN-004-T	QCA7005	-40 - 85	UART	North America	Tray, 40pcs	on request
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I2PLCBMC-IUE-004-R	QCA7005	-40 - 85	UART	Automotive EVSE	Tape and Reel, 370pcs	on request
I2PLCBMC-IUP-004-T	QCA7005	-40 - 85	UART	Automotive PEV	Tray, 40pcs	on request
I2PLCBMC-IUP-004-R	QCA7005	-40 - 85	UART	Automotive PEV	Tape and Reel, 370pcs	on request
Version 003*						
I2PLCAMC-ISC-003-T*	QCA7000	-40 - 85	SPI	CE Class B	Tray, 40pcs	on request
I2PLCAMC-ISC-003-R*	QCA7000	-40 - 85	SPI	CE Class B	Tape and Reel, 370pcs	on request
I2PLCAMC-ISN-003-T*	QCA7000	-40 - 85	SPI	North America	Tray, 40pcs	on request
I2PLCAMC-ISN-003-R*	QCA7000	-40 - 85	SPI	North America	Tape and Reel, 370pcs	on request
I2PLCAMC-ISE-003-T*	QCA7000	-40 - 85	SPI	Automotive EVSE	Tray, 40pcs	on request
I2PLCAMC-ISE-003-R*	QCA7000	-40 - 85	SPI	Automotive EVSE	Tape and Reel, 370pcs	on request
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I2PLCAMC-CSC-003-T*	QCA7000	0 - 70	SPI	CE Class B	Tray, 40pcs	on request
I2PLCAMC-CSC-003-R*	QCA7000	0 - 70	SPI	CE Class B	Tape and Reel, 370pcs	on request
I2PLCAMC-CSN-003-T*	QCA7000	0 - 70	SPI	North America	Tray, 40pcs	on request
I2PLCAMC-CSN-003-R*	QCA7000	0 - 70	SPI	North America	Tape and Reel, 370pcs	on request
I2PLCAMC-CSE-003-T*	QCA7000	0 - 70	SPI	Automotive EVSE	Tray, 40pcs	on request
I2PLCAMC-CSE-003-R*	QCA7000	0 - 70	SPI	Automotive EVSE	Tape and Reel, 370pcs	on request
I2PLCAMC-CSP-003-T*	QCA7000	0 - 70	SPI	Automotive PEV	Tray, 40pcs	on request
I2PLCAMC-CSP-003-R*	QCA7000	0 - 70	SPI	Automotive PEV	Tape and Reel, 370pcs	on request
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I2PLCBMC-ISN-003-T*	QCA7005	-40 - 85	SPI	North America	Tray, 40pcs	on request
I2PLCBMC-ISN-003-R*	QCA7005	-40 - 85	SPI	North America	Tape and Reel, 370pcs	on request
I2PLCBMC-ISE-003-T*	QCA7005	-40 - 85	SPI	Automotive EVSE	Tray, 40pcs	on request
I2PLCBMC-ISE-003-R*	QCA7005	-40 - 85	SPI	Automotive EVSE	Tape and Reel, 370pcs	on request
I2PLCBMC-ISP-003-T*	QCA7005	-40 - 85	SPI	Automotive PEV	Tray, 40pcs	on request
I2PLCBMC-ISP-003-R*	QCA7005	-40 - 85	SPI	Automotive PEV	Tape and Reel, 370pcs	on request
I2PLCBMC-IUC-003-T*	QCA7005	-40 - 85	UART	CE Class B	Tray, 40pcs	on request
I2PLCBMC-IUC-003-R*	QCA7005	-40 - 85	UART	CE Class B	Tape and Reel, 370pcs	on request
I2PLCBMC-IUN-003-T*	QCA7005	-40 - 85	UART	North America	Tray, 40pcs	on request
I2PLCBMC-IUN-003-R*	QCA7005	-40 - 85	UART	North America	Tape and Reel, 370pcs	on request
I2PLCBMC-IUE-003-T*	QCA7005	-40 - 85	UART	Automotive EVSE	Tray, 40pcs	on request
I2PLCBMC-IUE-003-R*	QCA7005	-40 - 85	UART	Automotive EVSE	Tape and Reel, 370pcs	on request
I2PLCBMC-IUP-003-T*	QCA7005	-40 - 85	UART	Automotive PEV	Tray, 40pcs	on request
I2PLCBMC-IUP-003-R*	QCA7005	-40 - 85	UART	Automotive PEV	Tape and Reel, 370pcs	on request

Order Code	Chip	Temperature Range/ °C	Serial Interface	Parameter Optimization	Packaging	Availability
Version 002*						
I2PLCAMC-ISC-002-T*	QCA7000	-40 - 85	SPI	CE Class B	Tray, 40pcs	standard
I2PLCAMC-ISC-002-R*	QCA7000	-40 - 85	SPI	CE Class B	Tape and Reel, 370pcs	standard
I2PLCAMC-ISN-002-T*	QCA7000	-40 - 85	SPI	North America	Tray, 40pcs	standard
I2PLCAMC-ISN-002-R*	QCA7000	-40 - 85	SPI	North America	Tape and Reel, 370pcs	standard
I2PLCAMC-ISE-002-T*	QCA7000	-40 - 85	SPI	Automotive EVSE	Tray, 40pcs	standard
I2PLCAMC-ISE-002-R*	QCA7000	-40 - 85	SPI	Automotive EVSE	Tape and Reel, 370pcs	standard
I2PLCAMC-ISP-002-T*	QCA7000	-40 - 85	SPI	Automotive PEV	Tray, 40pcs	standard
I2PLCAMC-ISP-002-R*	QCA7000	-40 - 85	SPI	Automotive PEV	Tape and Reel, 370pcs	standard
I2PLCAMC-IUC-002-T*	QCA7000	-40 - 85	UART	CE Class B	Tray, 40pcs	standard
I2PLCAMC-IUC-002-R*	QCA7000	-40 - 85	UART	CE Class B	Tape and Reel, 370pcs	standard
I2PLCAMC-IUN-002-T*	QCA7000	-40 - 85	UART	North America	Tray, 40pcs	standard
I2PLCAMC-IUN-002-R*	QCA7000	-40 - 85	UART	North America	Tape and Reel, 370pcs	standard
I2PLCAMC-IUE-002-T*	QCA7000	-40 - 85	UART	Automotive EVSE	Tray, 40pcs	standard
I2PLCAMC-IUE-002-R*	QCA7000	-40 - 85	UART	Automotive EVSE	Tape and Reel, 370pcs	standard
I2PLCAMC-IUP-002-T*	QCA7000	-40 - 85	UART	Automotive PEV	Tray, 40pcs	standard
I2PLCAMC-IUP-002-R*	QCA7000	-40 - 85	UART	Automotive PEV	Tape and Reel, 370pcs	standard
I2PLCAMC-CSC-002-T*	QCA7000	0 - 70	SPI	CE Class B	Tray, 40pcs	on request
I2PLCAMC-CSC-002-R*	QCA7000	0 - 70	SPI	CE Class B	Tape and Reel, 370pcs	on request
I2PLCAMC-CSN-002-T*	QCA7000	0 - 70	SPI	North America	Tray, 40pcs	on request

Order Code	Chip	Temperature Range/ °C	Serial Interface	Parameter Optimization	Packaging	Availability
I2PLCAMC-CSN-002-R*	QCA7000	0 - 70	SPI	North America	Tape and Reel, 370pcs	on request
I2PLCAMC-CSE-002-T*	QCA7000	0 - 70	SPI	Automotive EVSE	Tray, 40pcs	on request
I2PLCAMC-CSE-002-R*	QCA7000	0 - 70	SPI	Automotive EVSE	Tape and Reel, 370pcs	on request
I2PLCAMC-CSP-002-T*	QCA7000	0 - 70	SPI	Automotive PEV	Tray, 40pcs	on request
I2PLCAMC-CSP-002-R*	QCA7000	0 - 70	SPI	Automotive PEV	Tape and Reel, 370pcs	on request
I2PLCAMC-CUC-002-T*	QCA7000	0 - 70	UART	CE Class B	Tray, 40pcs	on request
I2PLCAMC-CUC-002-R*	QCA7000	0 - 70	UART	CE Class B	Tape and Reel, 370pcs	on request
I2PLCAMC-CUN-002-T*	QCA7000	0 - 70	UART	North America	Tray, 40pcs	on request
I2PLCAMC-CUN-002-R*	QCA7000	0 - 70	UART	North America	Tape and Reel, 370pcs	on request
I2PLCAMC-CUE-002-T*	QCA7000	0 - 70	UART	Automotive EVSE	Tray, 40pcs	on request
I2PLCAMC-CUE-002-R*	QCA7000	0 - 70	UART	Automotive EVSE	Tape and Reel, 370pcs	on request
I2PLCAMC-CUP-002-T*	QCA7000	0 - 70	UART	Automotive PEV	Tray, 40pcs	on request
I2PLCAMC-CUP-002-R*	QCA7000	0 - 70	UART	Automotive PEV	Tape and Reel, 370pcs	on request
I2PLCBMC-ISC-002-T*	QCA7005	-40 - 85	SPI	CE Class B	Tray, 40pcs	on request
I2PLCBMC-ISC-002-R*	QCA7005	-40 - 85	SPI	CE Class B	Tape and Reel, 370pcs	on request
I2PLCBMC-ISN-002-T*	QCA7005	-40 - 85	SPI	North America	Tray, 40pcs	on request
I2PLCBMC-ISN-002-R*	QCA7005	-40 - 85	SPI	North America	Tape and Reel, 370pcs	on request
I2PLCBMC-ISE-002-T*	QCA7005	-40 - 85	SPI	Automotive EVSE	Tray, 40pcs	on request
I2PLCBMC-ISE-002-R*	QCA7005	-40 - 85	SPI	Automotive EVSE	Tape and Reel, 370pcs	on request
I2PLCBMC-ISP-002-T*	QCA7005	-40 - 85	SPI	Automotive PEV	Tray, 40pcs	on request

Order Code	Chip	Temperature Range/ °C	Serial Interface	Parameter Optimization	Packaging	Availability
I2PLCBMC-ISP-002-R*	QCA7005	-40 - 85	SPI	Automotive PEV	Tape and Reel, 370pcs	on request
I2PLCBMC-IUC-002-T*	QCA7005	-40 - 85	UART	CE Class B	Tray, 40pcs	on request
I2PLCBMC-IUC-002-R*	QCA7005	-40 - 85	UART	CE Class B	Tape and Reel, 370pcs	on request
I2PLCBMC-IUN-002-T*	QCA7005	-40 - 85	UART	North America	Tray, 40pcs	on request
I2PLCBMC-IUN-002-R*	QCA7005	-40 - 85	UART	North America	Tape and Reel, 370pcs	on request
I2PLCBMC-IUE-002-T*	QCA7005	-40 - 85	UART	Automotive EVSE	Tray, 40pcs	on request
I2PLCBMC-IUE-002-R*	QCA7005	-40 - 85	UART	Automotive EVSE	Tape and Reel, 370pcs	on request
I2PLCBMC-IUP-002-T*	QCA7005	-40 - 85	UART	Automotive PEV	Tray, 40pcs	on request
I2PLCBMC-IUP-002-R*	QCA7005	-40 - 85	UART	Automotive PEV	Tape and Reel, 370pcs	on request

Table 5 PLC Stamp micro 2 Order Codes

Product Family Code	Chip	Variant	Temperature Range	Serial Interface	Parameter Optimization	Version	Packaging
I2PLC	A: QCA7000	MC-	I: Industrial (-40 - 85 °C)	S: SPI	C: CE Class B	-002*	-T: Tray, 40pcs
	B: QCA7005		C: Commercial (0 - 70 °C) - only for QCA7000	U: UART	N: North America	-003*	-R: Tape and Reel, 370pcs
					E: Automotive EVSE	-004	
					P: Automotive PEV		

Table 6 PLC Stamp micro 2 Order Code Compilation

Order Code Version	QCA Firmware Version
002*	1.1.3
003*	1.2.3
004	1.2.5

Table 7 PLC Stamp micro 2 Order Code Version to QCA Firmware Version Mapping

*: not recommended for new designs

13.1 Available Accessories

in-tech smart charging provides you with tested powerline transformers, which are part of the reference designs. Please refer to further documentation for a full specification of these transformers.

Version	Order Code
1:4:5 for mains power line coupling	I2PLCTR-1
1:1:1 for Electric Vehicle (PEV) and Electric Vehicle Supply Equipment (EVSE)	I2PLCTR-2

14 Packaging Information

14.1 Tape and Reel

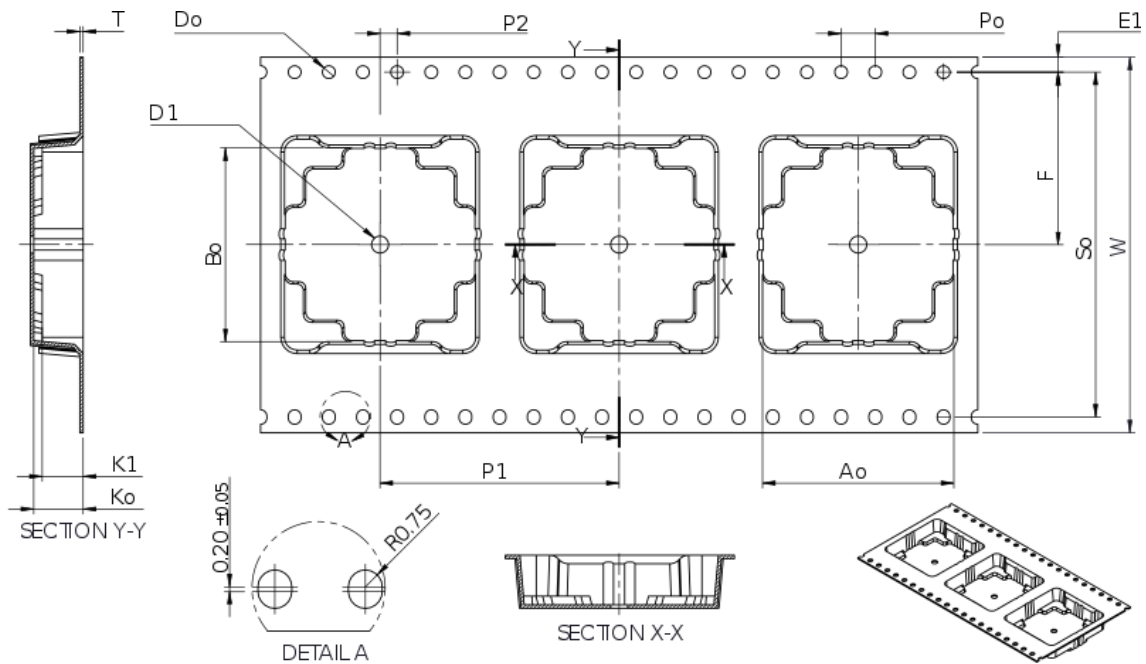


Figure 9 Tape and Reel according to EIA-481

Ao	22.6 ± 0.15
Bo	22.7 ± 0.15
Do	$\varnothing 1.5 + 0.1$
D1	$\varnothing 2.0 \text{ MIN}$
E1	1.75 ± 0.10
F (III)	20.20 ± 0.15
Ko	5.80 ± 0.15
K1	4.80 ± 0.15
Po (II)	4.00 ± 0.15
P1	28.00 ± 0.15
P2 (I)	2.00 ± 0.15

So	40.40 ± 0.15
T	0.40 ± 0.04
W	44.0 ± 0.3

All dimensions in millimeters unless otherwise stated.

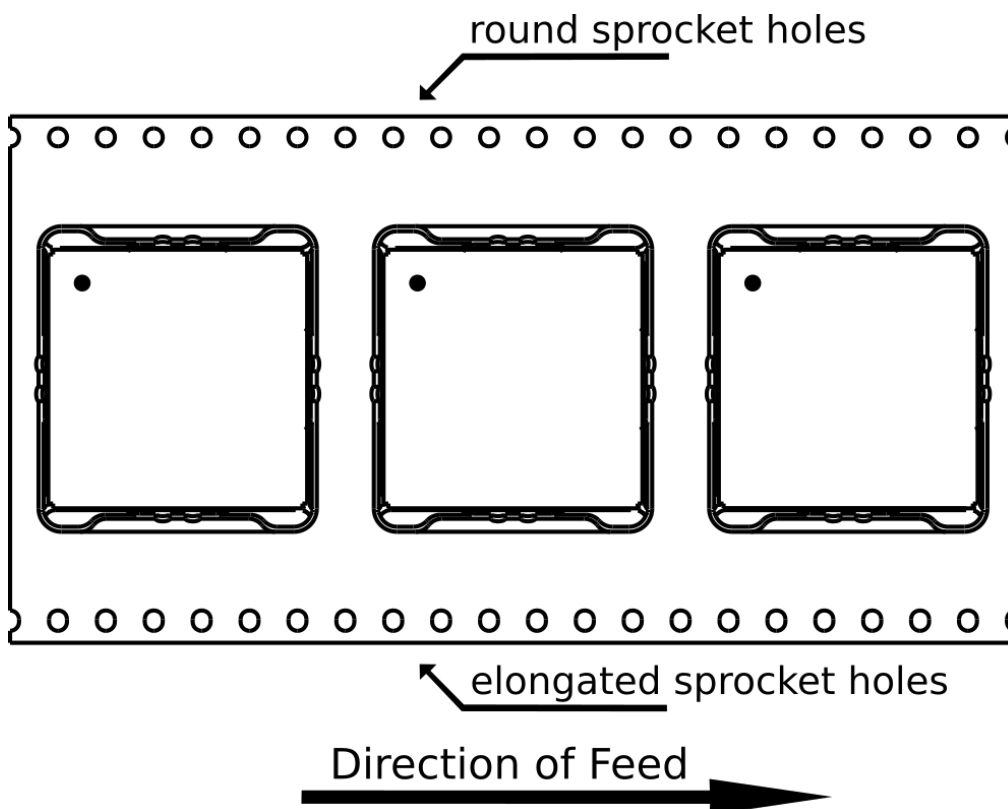
Material: Polystyrene

(I)	Measured from centreline of sprocket hole to centreline of pocket
(II)	Cumulative tolerance of 10 sprocket holes is ± 0,20
(III)	Measured from centreline of sprocket hole to centreline of sprocket

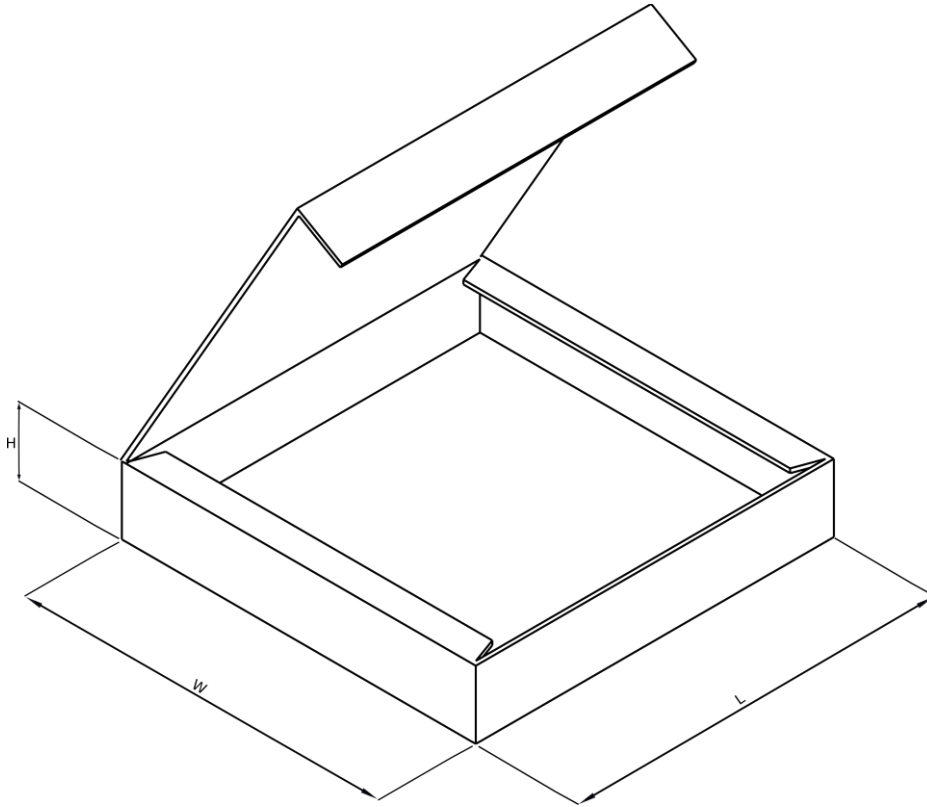
Reel Dimensions

Reel inner Diameter	4"
Reel outer Diameter	13"
Reel inner Width	44
Parts/Carrier Tape-Reel	370
Tape leader empty cavities	7..12
Tape trailer empty cavities	7..12

14.2 Orientation of the Module



14.3 Tape and Reel Cardboard Box Dimensions



H	65 mm
W	340 mm
L	340 mm

15 Contact

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