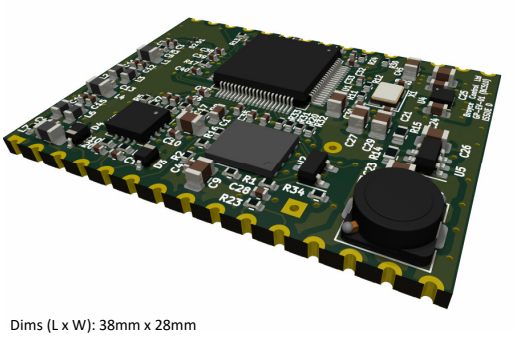
Type: GP-01

Green PHY powerline module



Dims (L x W): 38mm x 28mm

- Designed specifically for EVSE
- Compliant with IEC/ISO 15118-3
- 3.3V DC operation
- Built-in overvoltage protection
- Industrial temperature range operation
- Line-driver included resulting in greater noise immunity and allowing longer cable runs
- Low profile, small form factor design utilising single-sided components
- Surface mount assembly suitable for reflow soldering

OVERVIEW

A Green PHY compliant powerline communication (PLC) modem designed for use in Electric Vehicle Supply Equipment (EVSE) in accordance with the IEC/ISO 15118 standard for road vehicle to grid digital communication.
The module consists of a Green PHY transceiver and line driver together with filtering to allow it to be connected directly to a 1:1:1 signal transformer whose primary carries the –12V/+12V Control Pilot PWM signal as defined in IEC 61851 (Electric vehicle conductive charging system).
An optional non-isolated zero-cross digital input is provided to allow coexistence with PLC running over mains wiring.
The module can be communicated with, using either its slave SPI interface or through the much faster RMII Ethernet (MAC-MAC) interface.

BLOCK DIAGRAM

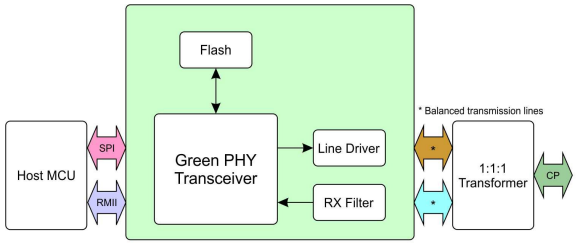


Fig. 1 Basic Block Diagram

PIN DESIGNATIONS & DESCRIPTIONS

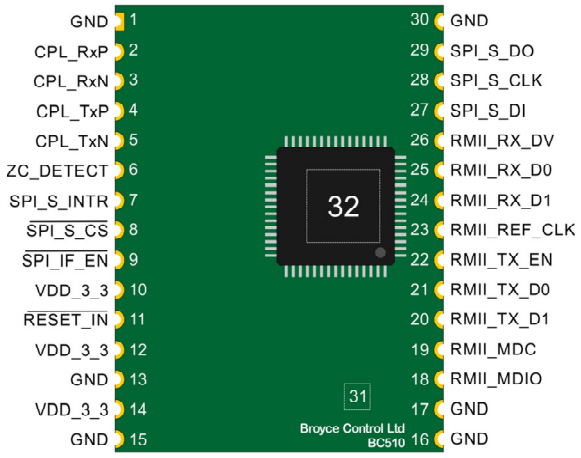


Fig. 2 Pin Arrangement

Pin	Name	Type	Description
1, 13, 15, 16, 17, 30, 31, 32	GND	Power	Ground
2	CPL_RxP	Signal	Control Pilot receive differential positive (to coupling transformer)
3	CPL_RxN	Signal	Control Pilot receive differential negative (to coupling transformer)
4	CPL_TxP	Signal	Control Pilot transmit differential positive (to coupling transformer)
5	CPL_TxN	Signal	Control Pilot transmit differential negative (to coupling transformer)
6	ZC_DETECT	Digital In	Non-isolated AC mains zero crossing detect input (3.3V, Optional)
7	SPI_S_INTR	Digital Out	Interrupt line to instruct the host microcontroller that the module has data to return (3.3V)
8	$\overline{\text{SPI_S_CS}}$	Digital In	Active low SPI chip select asserted by the host microcontroller when communicating with the module (3.3V)
9	$\overline{\text{SPI_IF_EN}}$	Digital In	Active low signal for selecting the SPI interface for communication between the host microcontroller and the module. 3.3V or not connected at boot selects the RMII (Ethernet) interface instead.
11	$\overline{\text{RESET_IN}}$	Reset In	Active low reset signal to allow the host microcontroller to manage booting of the module (Optional)
10, 12, 14	VDD_3_3	Power In	3.3V DC power input
18	RMII_MDIO	Data In/Out	Ethernet PHY management interface data line
19	RMII_MDC	Digital Out	Ethernet PHY management interface clock
20	RMII_TX_D1	Data Out	Transmit data bit 1
21	RMII_TX_D0	Data Out	Transmit data bit 0 (transmitted first)
22	RMII_TX_EN	Data Out	Transmit enable
23	RMII_REF_CLK	Data In	50MHz Clock input
24	RMII_RX_D1	Data In	Receive data bit 1
25	RMII_RX_D0	Data In	Receive data bit 0 (received first)
26	RMII_RX_DV	Data In	Receive data valid signal
27	SPI_S_DI	Data In	Master Out Slave In (MOSI) line of the module SPI slave interface
28	SPI_S_CLK	Data In	SPI clock input from the host microcontroller
29	SPI_S_DO	Data Out	Master In Slave Out (MISO) line of the module SPI slave interface

TECHNICAL SPECIFICATION

Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage:	V_{DD}_3_3			3.6	V
Supply current:	I			500	mA
Ambient operating temp.:	T_A	-40		+85	°C

Operating Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit
Supply voltage:	V_{DD}_3_3	3.13	3.3	3.47	V
SPI_S_CLK frequency:		6		7.14	MHz
RMII_REF_CLK frequency:				50	MHz

General

Printed Circuit Board	
Dimensions:	38.1 mm x 27.9mm
Thickness:	6mm
Material:	FR4, UL94-V0
Connections:	15 pins each side, 0.1" (2.54mm) pitch, 2 exposed thermal ground pads
Approvals:	CE and RoHS Compliant.

ADDITIONAL CONNECTIONS

In addition to connecting to either of SPI or RMII digital interfaces, the customer must also provide a coupling transformer with a primary winding connected to the Control Pilot and two secondary windings connected to the balanced outputs CPL_TxN/CPL_TxP and CPL_RxN/CPL_RxP.
The turns ratio for this transformer must be 1:1:1 with an inductance of around 9µH. The Pulse BMU6201NL PLC transformer would be a suitable part.

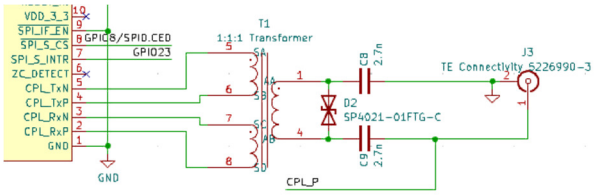
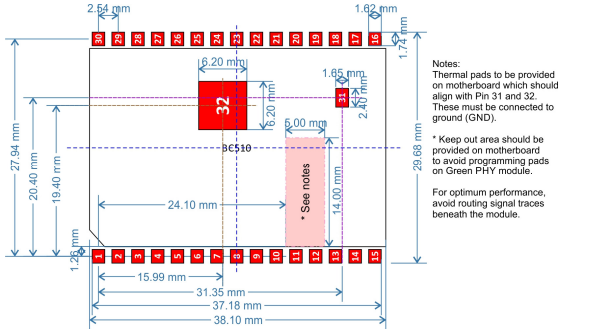


Fig. 3 Typical connection for PLC coupling

PCB FOOTPRINT

PCB footprint and schematic symbol can be downloaded here:
https://broycecontrol.com/wp-content/uploads/GP-01-Module_Kicad.zip



The Information provided in this literature is believed to be accurate (subject to change without prior notice); however, use of such information shall be entirely at the user's own risk.