Application note

dLAN® Green PHY module

ANdGPM 1820 V1.2

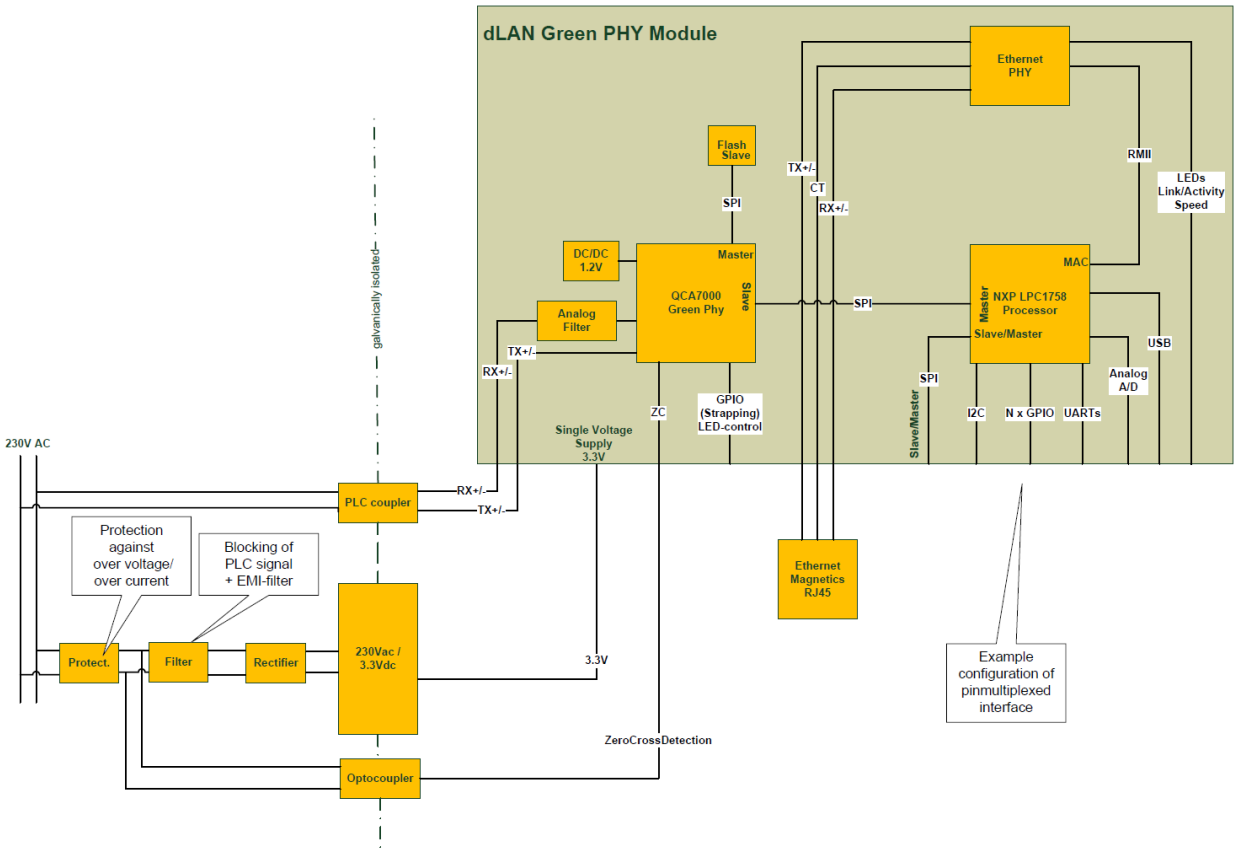

Fig.1: Block Diagram PLC Adapter with devolo dLAN Green PHY Module

Application 1: Coupling MDI signals to the module

The used 10/100Mbps Fast Ethernet Transceiver on the Green PHY Module supports full- or half-duplex, Auto MDI/MDIX function, IEEE 802.3u auto-negotiation and is fully compliant with IEEE 802.3/802.3u.

A 10/100 Base-TX magnetics and RJ45 connector is connected to the MDI-Interface of the Green PHY Module. It is also possible to use a RJ45 connector with integrated 10/100 Base-TX magnetics.

The application is completed with a reset controller, status LEDs, pushbutton and decoupling circuit. The power supply has to provide a DC Voltage of 3.3V. Therefore, in this application no hazardous voltages have to be handled.

Please refer to the schematics of this application 1 in Fig.2.

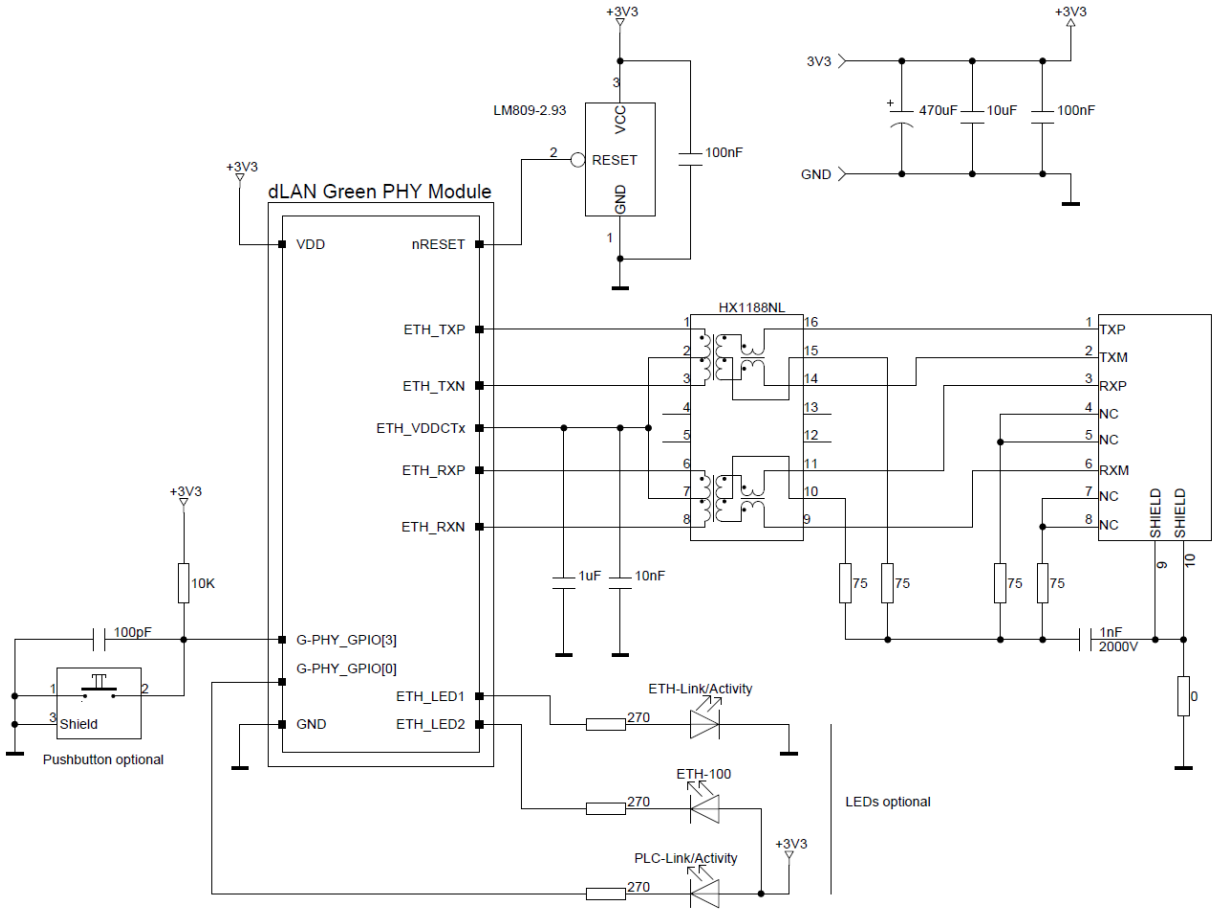

Fig.2: Schematics of Application 1: MDI signal coupling

Layout Guidelines

To achieve optimum performance and low EMI following guidelines should be considered:

- Place decoupling capacitors as close as possible to the Green PHY module
- Use at least a 4-layer stack board and assign signal traces on component and bottom side, power plane on third layer and ground plane on second layer.
- Keep ground region as one continuous and unbroken plane.
- Avoid signals path parallel to clock signals. If possible, use guard traces to protect clock traces.
- Keep high speed MDI signal traces as short as possible.
- Route the dLAN® RXP/RXN TXP/TXN signal traces as 20mil differential pairs.
- Route the MDI TXP/TXN, RXP/RXN signal traces as differential pairs.

Application 2: Coupling PLC signals and Zero cross to the module

This application example shows the required signal coupling circuitry and zero cross detection for communication over the power line.

MOV and GDT in series is the first transient protection stage and limits large voltage spikes. For 230Vac networks at least a 300Vac MOV should be used.

The AC zero cross detector is based on an opto-isolator to provide the required safety isolation between the power line and the low voltage secondary circuitry. The LED of the opto-isolator is connected to the power line in series with a high value resistor and capacitor. The emitter of the phototransistor connects to low voltage ground and the collector to ZC-IN pin.

Please refer to the schematics of this application 2 in Fig.3.

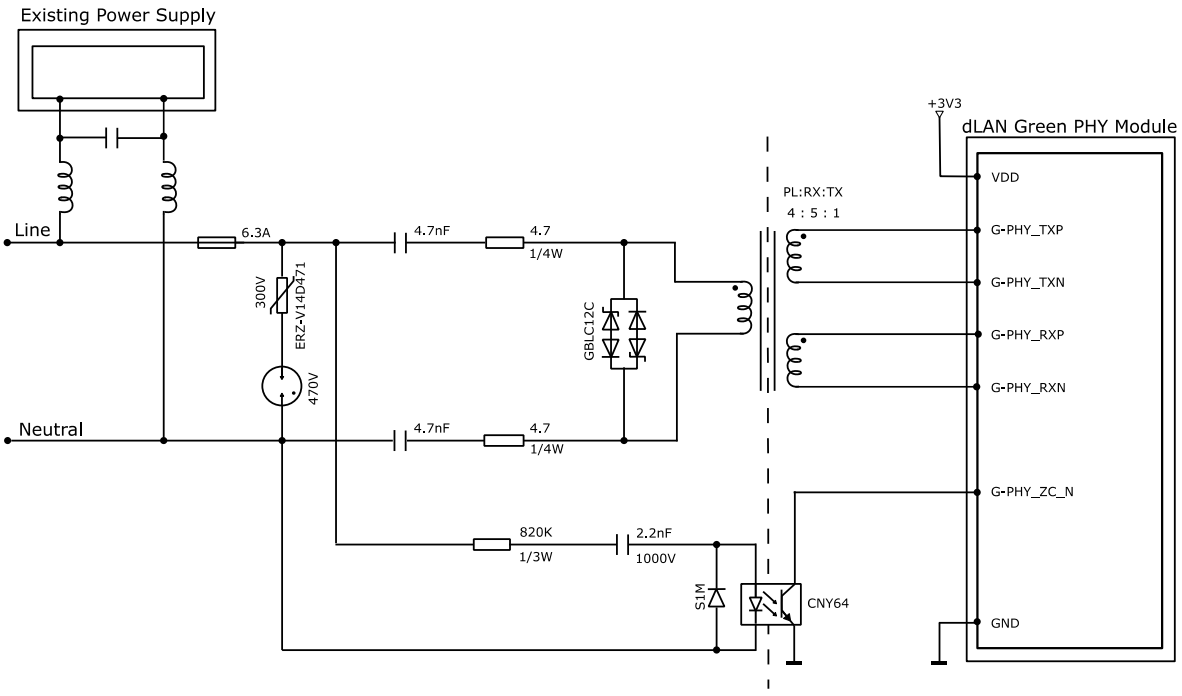

Fig.3: Schematics of Application 2: PLC coupling and zero cross detection

Application 3: Coupling PLC signals and Zero cross to the module for Communication over Pilot (CP)

This application example shows the required signal coupling circuitry and zero cross detection for communication over Pilot (CP).

For Pilot Lines with 100Ohms line impedance two resistors of 36 Ohms may be equipped on the TX Path. The value depends on the specific application scenario. Furthermore, to prevent diode clipping the GBLC clamping voltage needs to be adjusted to fit the output power level.

Please refer to the schematics of this application 3 in Fig.4.

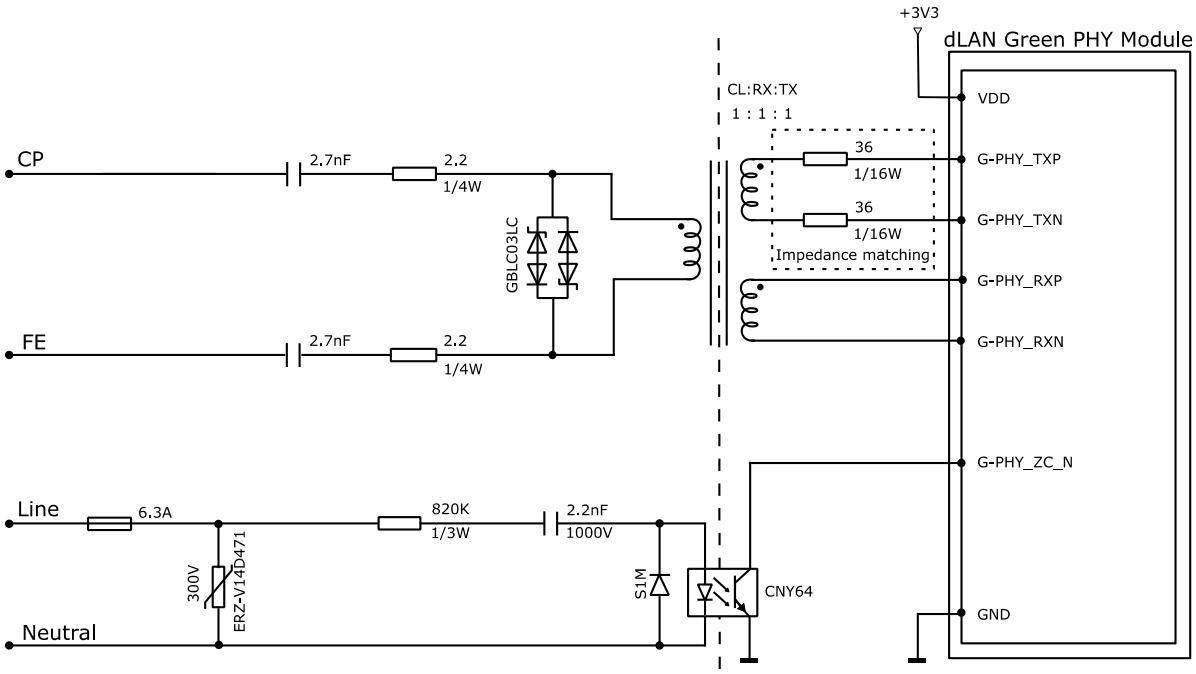

Fig.4: Schematics of Application 3: Coupling for communication over pilot

Hint:
If functional Earth (FE) is connected to protected Earth (PE) the CP DC-Decoupling may be done asymmetrically. The requirements on PE/FE e.g. for safety distances and ampacity must correspond to the applicable safety standard.

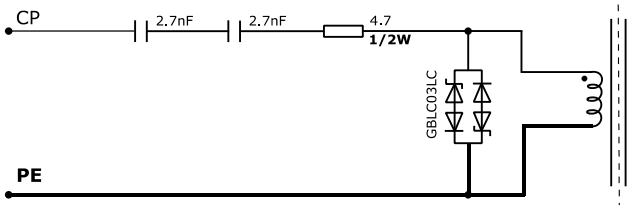

Fig. 5: asymmetrical DC decoupling for Application 3

Application 4: Firmware update of the LPC1758 via the serial port 0.

This application example shows the required circuitry for firmware update over UART0.

Please refer to the schematics of this application 4.

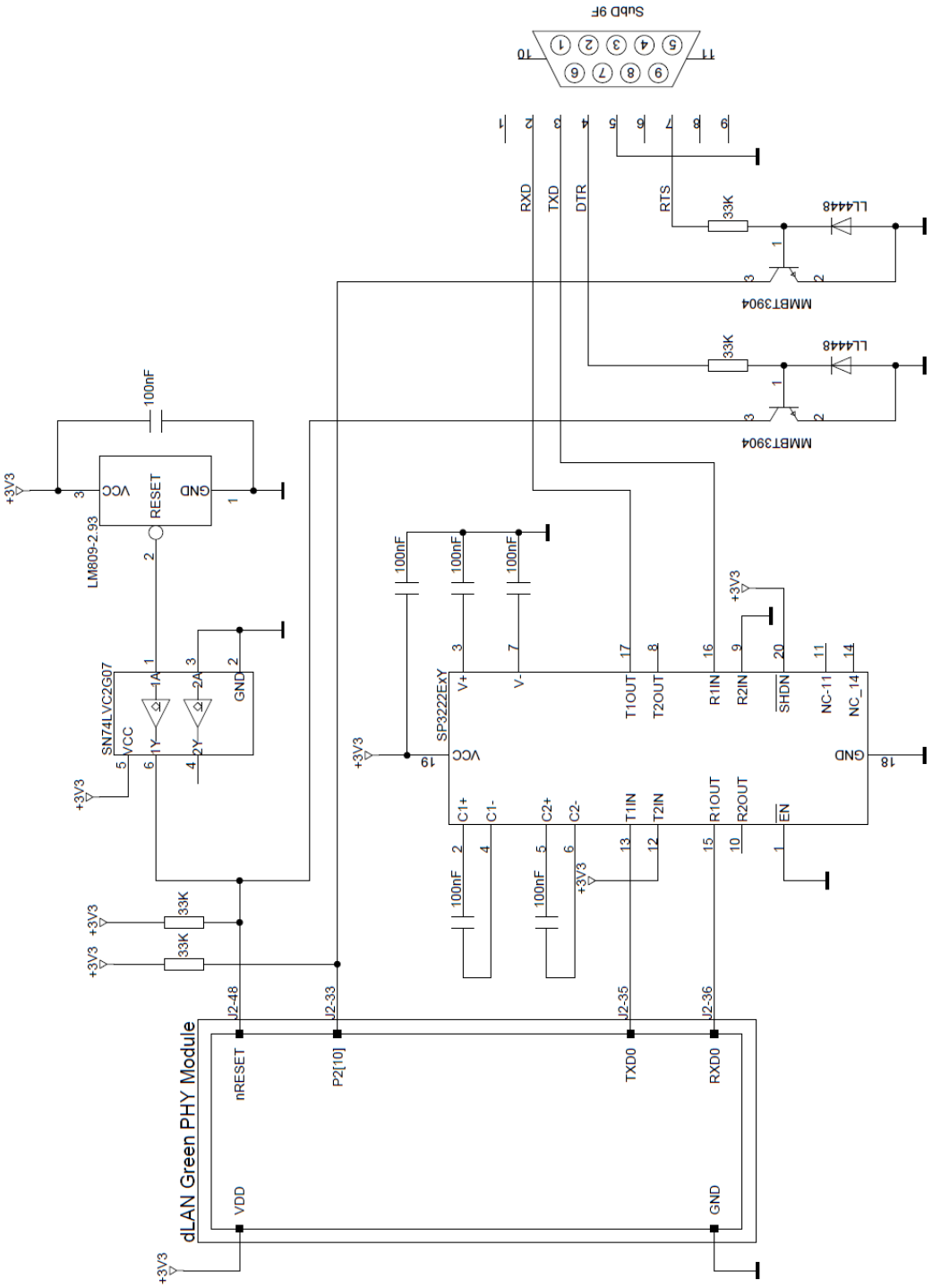

Fig.6: Schematics of Application 4: Firmware update via serial port

Suitable Signal Transformers

For choice of a suitable signal transformer please contact your module supplier. Numerous transformers are available, differing in size, overvoltage category, winding ratio etc.

Revision History

Revision	Modifications
1.0	• Original Issue
1.1	• Added header and footer
1.2	• Review (App 2 & 3)