

# PLIN-LWL

Optical Coupler for  
LIN Data Transmission

## User Manual



Document version 1.1.0 (2015-11-16)

**PEAK**  
System

## Relevant products

Product Name	Model	Part number
PLIN-LWL		IPEH-004049

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# 1 Introduction

For use in explosion-proof areas or for EMC measurements, the PLIN-LWL can be used to replace a stretch of LIN network with a fiber-optic line at any point. The modules are supplied with power externally.

## 1.1 Properties at a Glance

- └ Bit rates from 2.4 kbit/s<sup>1</sup> up to 20 kbit/s
- └ 2 types of the TJA1028T LIN transceiver built in, use depending on the bit rates and EMC requirements
- └ LED display for power supply and transceiver status
- └ Switchable master termination
- └ LIN bus connection via D-Sub, 9-pin
- └ Fiber-optic duplex line, 62.5/125 µm, ST connectors
- └ Supply voltage 8 to 30 V DC
- └ Supply via D-Sub 9-pin or DC connector (jumper)
- └ Aluminum casing
- └ Extended operating temperature range from -40 to 85 °C (-40 to 185 °F)

<sup>1</sup> 2.7 kbit/s if 16 (instead of 13) bits are used for the break pulse

## 1.2 Operation Requirements

- └ LIN network (Master or Slave termination can be selected per module)
- └ D-Sub sockets for connection to the PLIN-LWL modules
- └ Power supply with power supply unit or via the D-Sub connector

## 1.3 Scope of Supply

- └ 2 PLIN-LWL modules including power supply units
- └ A choice of 5 or 10 m FO cable, 62.5/125  $\mu\text{m}$  duplex line ST connector, other lengths available on request
- └ Manual in PDF format

## 2 Connectors

### 2.1 LIN

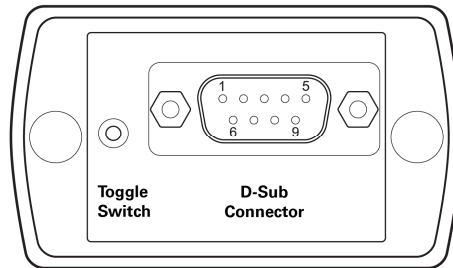


Figure 1: Casing side with toggle switch and D-Sub connector for LIN

The LIN bus is connected to the 9-pin D-Sub connector on the left casing side.

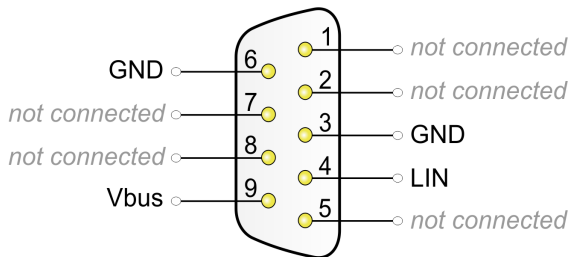


Figure 2: Pin assignment D-Sub connector

Pin 9 can be used to supply a PLIN-LWL module. See section 3.2 *Configuration Power Supply* on page 11 for further information.

## 2.2 optical waveguides (OWG)

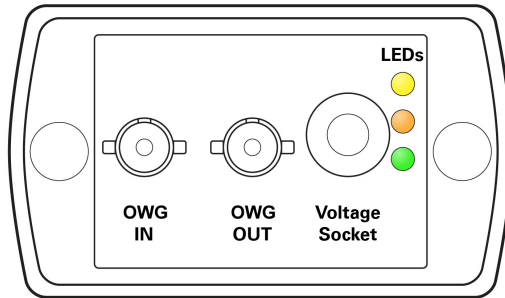


Figure 3: Casing side with OWG connectors, voltage socket, and LEDs

A PLIN-LWL module has two standardized ST connectors for the optical waveguides. The connections are separately in charge of sending and receiving light signals.

Both optical waveguides of the duplex line are marked with colors at each connector (red/black). For both modules, connect the OWG output of one module with the OWG input of the other.

Optical wave guide (marker)	Connector at 1 <sup>st</sup> PLIN-LWL module	Connector at 2 <sup>nd</sup> PLIN-LWL module
Red	OWG IN (gray)	OWG OUT (light gray)
Black	OWG OUT (light gray)	OWG IN (gray)

## 2.3 voltage supply

A PLIN-LWL module needs a DC voltage of 8 to 30 V. At the voltage input socket you can connect the supplied 12-Volt power supply unit.

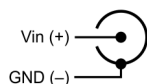


Figure 4:  
Assignment voltage input socket



Figure 5:  
Diameter barrel connector:  
 $a = 5.5 \text{ mm}$ ,  $b = 2.1 \text{ mm}$

See section 3.2 *Configuration Power Supply* on page 11 for further information.



## 3 Configuration

At the PLIN-LWL housing, a termination for the Master operation mode can be switched on with a toggle switch. On the circuit board of the module, you can do the following jumper settings affecting the basic operation:

- └ Choice between High-speed and Low-speed LIN transceiver
- └ Configuration of the power supply
- └ Configuration of the internal supply



**Tip:** At delivery, the PLIN-LWL modules use the High-speed transceiver for the data transmission. The power supply for the module and the LIN bus is configured to be done with the power supply units via the DC socket. If you use this common configuration, a change of the settings as described in this chapter is not needed.

For doing jumper settings, the circuit board must be taken out of the casing.

➡ To do so, do the following:

1. If extant, remove the protecting caps from the OWG connectors (right housing side).
2. Remove the two screws on the left housing side (the one with the D-Sub connector).
3. Pull the circuit board with the lid out of the case.

After changing the settings (see the following subsections), the assembly is done in the reversed order.



## 3.2 Configuration Power Supply

A PLIN-LWL module can be supplied either by an external voltage source (e.g. the supplied power supply unit) via the corresponding input socket or via pin 9 of the D-Sub connector (in each case 8 - 30 V DC). The input for the power supply is set with various jumper blocks. It is possible to determine the supply of LIN and the module separately.

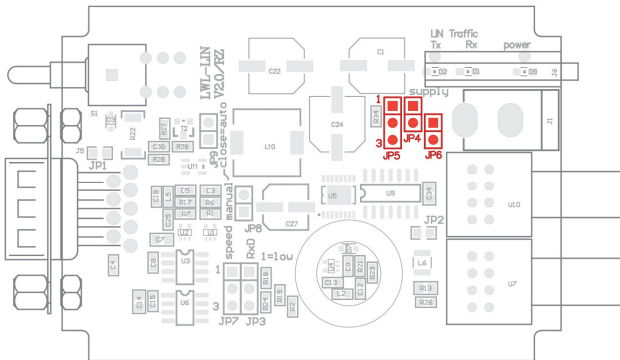


Figure 7: Position of the jumpers JP4, JP5, and JP6

LIN voltage supply via...	Jumper JP5	Comment
D-Sub connector, pin 9	1-2	
Supply socket	2-3	Default setting at delivery

Module voltage supply via...	Jumper JP4 and JP6	Comment
D-Sub connector, pin 9	JP4 closed JP6 open	
Supply socket	JP4 open JP6 closed	Default setting at delivery

When having increased EMC requirements, it is recommended to use a shielded cable for the supply and for LIN. In addition, the power supply via the DC socket should be preferred.

The unused power supply input (according to the setting) is electrically isolated from the actual power supply.



**Attention!** Switch off the power supply at the D-Sub connector before connecting or removing the D-Sub plug to or from the PLIN-LWL module. Otherwise electronic parts may be destroyed, even on other nodes attached to the LIN bus.

### 3.3 Configuration Internal Supply

The PLIN-LWL has a linear and a switching regulator for generating the internal 5-volt supply. The jumpers JP8 and JP9 determine which voltage transformer is used.

Switching regulators can cause unwanted oscillations. Linear regulators are no problem regarding electromagnetic interference (EMI), but lead to warming in the upper voltage supply range instead. At delivery the PLIN-LWL is configured to switch automatically from the linear to the switching regulator at 20 V.

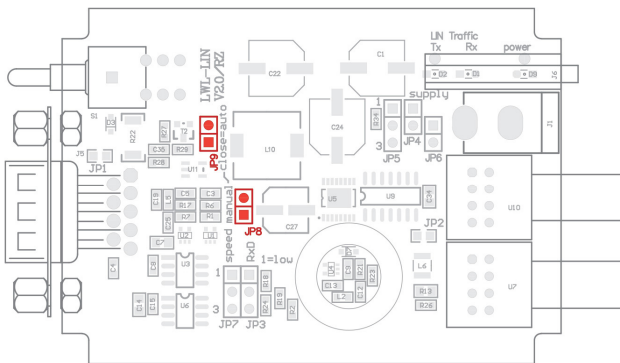


Figure 8: Position of the jumper blocks JP8 and JP9

Jumper	Used voltage transformer
JP8 open JP9 closed	For voltages lower 20 V the linear regulator is used. At 20 V the module switches automatically to the switching regulator. Default setting at delivery
JP8 open JP9 open	Only the switching regulator is used.
JP8 closed JP9 open	Only the linear regulator is used.

### 3.4 LIN Master Termination

The PLIN-LWL can be operated in a LIN bus as Master or Slave. If using as Master, the toggle switch at the left side must be set to the lower position. This enables a termination of 1 k $\Omega$  which enhances the level and the flanks of the transmitted signal.

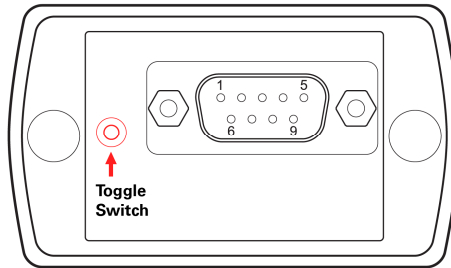


Figure 9: Toggle switch at the casing side with D-Sub connector

## 4 operation

### 4.1 LIN Transmission Rate

When operating the PLIN-LWL modules, it must be ensured that the transmission rate of all participants connected to the LIN bus is identical. There is no conversion or automatic adaptation of the bit rate.

### 4.2 Status LEDs

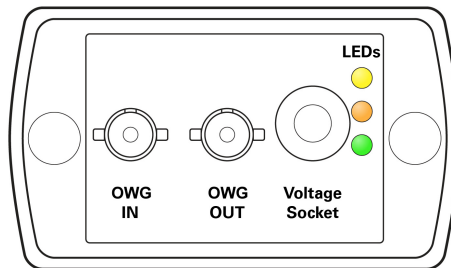


Figure 10: Casing side with OWG connectors, voltage socket, and LEDs

LED	Meaning
Yellow	Transmitting data onto the LIN bus (the orange LED is lit simultaneously)
Orange	Receiving data from the LIN bus
Green	Ready for operation, voltage is applied

## 5 Technical specifications

### LIN

High-speed LIN	D-Sub male connector, 9-pin Transceiver: TJA1028T/5V0/20 Bit rates: 2.4 <sup>2</sup> - 20 kbit/s
Low-speed LIN	D-Sub male connector, 9-pin Transceiver: TJA1028T/5V0/10 Bit rates: 2.4 <sup>2</sup> – 10.4 kbit/s
Optical waveguide	Fiber optic duplex line with ST connector

### Power supply

Supply voltage	8 - 30 V DC
Current consumption per module	max. 50 mA (at 12 V)

### Environment

Operating temperature	-40 - +85 °C (-40 - +185 °F)
Temperature for storage and transport	-40 - +100 °C (-40 - +212 °F)
Relative humidity	15 - 90 %, not condensing
EMC	EN 55024:2011-09 EN 55022:2011-12 EC directive 2004/108/EG
Ingress protection (IEC 60529)	IP20

### Measures

Size	60 x 35 x 80 mm (W x H x D) See also dimension drawing Appendix C on page 19
Weight per module	150 g

<sup>2</sup> 2.7 kbit/s if 16 (instead of 13) bits are used for the break pulse



# Appendix A CE Certificate

PLIN-LWL IPEH-004049 – EC Declaration of Conformity  
PEAK-System Technik GmbH



## Notes on the CE Symbol

The following applies to the "PLIN-LWL" product with the item number(s)  
IPEH-004049.

**EC Directive** This product fulfills the requirements of EU EMC Directive  
2004/108/EG (Electromagnetic Compatibility) and is designed  
for the following fields of application as for the CE marking:

### Electromagnetic Immunity

DIN EN 55024, publication date 2011-09  
Information technology equipment – Immunity characteristics – Limits and  
methods of measurement (CISPR 24:2010);  
German version EN 55024:2010

### Electromagnetic Emission

DIN EN 55022, publication date 2011-12  
Information technology equipment – Radio disturbance characteristics – Limits  
and methods of measurement (CISPR 22:2008, modified);  
German version EN 55022:2010

**Declarations of Conformity** In accordance with the above mentioned EU directives, the EC  
declarations of conformity and the associated documentation  
are held at the disposal of the competent authorities at the  
address below:

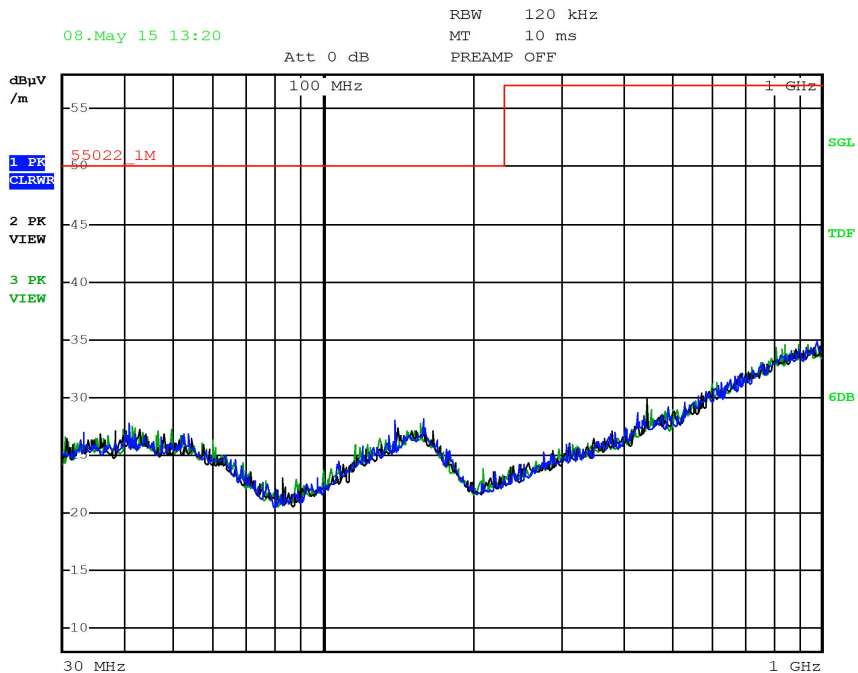
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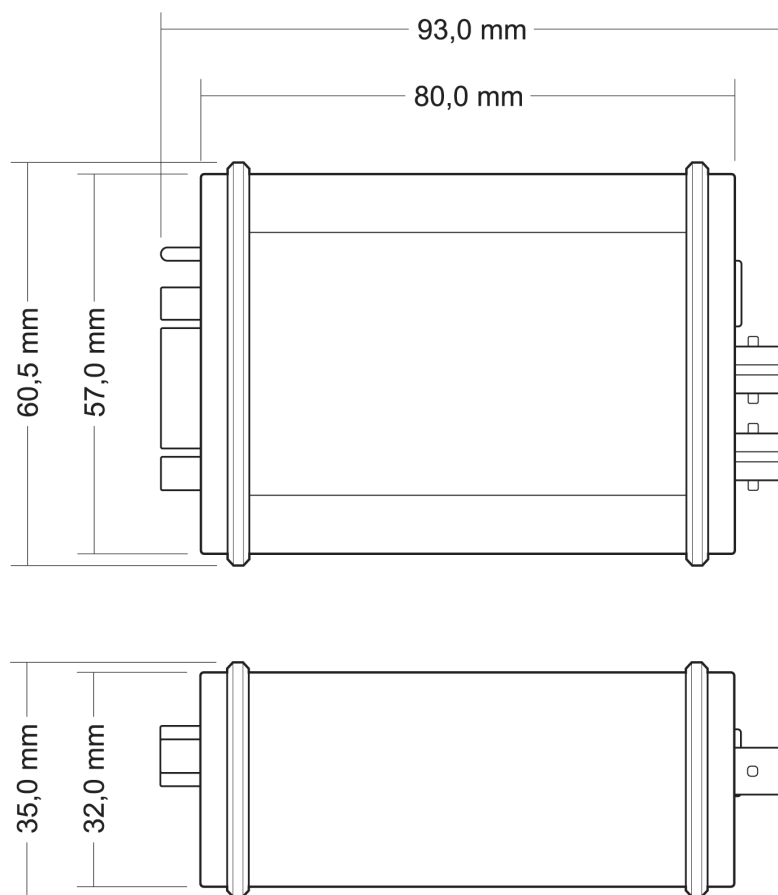
Signed this 10<sup>th</sup> day of November 2015

## Appendix B Emission Diagram

Emission with and without PLIN-LWL:



## Appendix C Dimension Drawing



The figure does not show the original size.