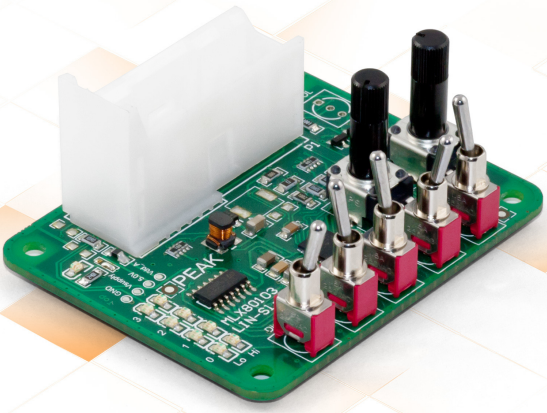
PLIN-Slave

Test-Slave for the LIN Bus with Various I/Os

User Manual v1.1.0



PEAK System

Products taken into account

Product name	Model	Part number
PLIN-Slave	Eval-Board	IPEH-004050

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1 Introduction

The PLIN-Slave is an evaluation board with an interface for a LIN 2.0 bus. The device also has comprehensive I/O functionality which is accessible through control and display elements.

The PIN-Slave is used in development and education, for example, for testing purpose or as a teaching aid for handling the LIN protocol.

The device is immediately ready for operation, a change of configuration or programming is neither necessary nor intended (no support).

1.1 Properties at a Glance

- Supply voltage: 7 - 18 V
- Based on Melexis MLX80103
- 1 LIN bus (v2.0), 19200 bit/s
- 5 digital inputs (low-active), already occupied
- 3 analog inputs (up to 18 V), already occupied
- 4 digital outputs (low-active), 500 mA each
- 4 digital outputs (high-active), 500 mA each
- Extended operating temperature range from -40 to 85 °C (-40 to 185 °F)

1.2 System Requirements

Note: A support to this topic can not be offered, because of the various network topologies, user interfaces, and configuration options.

- LIN network with a terminated master node.
- An existing `LIN description file`
- The supplied `node capability file` of the PLIN-Slave needs to be integrated into the `LIN description file`

1.3 Scope of Supply

- PLIN-Slave including mating connector
- Manual in PDF format

2 Operation

To supply the PLIN-Slave, a voltage of 12 V is recommended, 7 - 18 V are possible (similar to the electrical system in the car). The current consumption of the device is about 60 mA in operation. In this version the PLIN-Slave has all control elements onboard. The external circuit of the connector is reduced to the supply voltage GND (pin 14), Vbat (pin 26) and the LIN bus (pin 22).

Note: Wiring the other pins (particularly Ain and Din) with additional components could cause short circuits and can damage the device permanently.

2.1 Pin Assignment

An overview of pin assignments of the connector, see the following table:

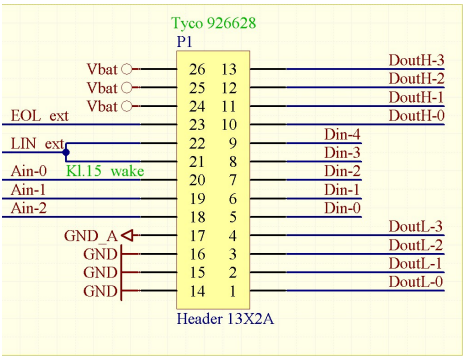

Figure 1: Pin assignments of connector

Pin	Description	Direction	Meaning
1, 2, 3, 4	DoutL-0…3	Output	Low-active, only for measurement purposes
5, 6, 7, 8, 9	Din-0...4	Input	DO NOT connect externally
10, 11, 12, 13	DoutH-0…3	Output	High-active, only for measurement purposes
14, 15, 16	GND	Input	Supply voltage, one of them needed for operation
17	Analog GND	Input	DO NOT connect externally
18, 19, 20	Ain-0...2	Input	DO NOT connect externally
21, 22	LIN	Bidirectional	LIN bus, one of them needed for operation
23	EOL	Input	Programming mode, DO NOT use
24, 25, 26	Vbat	Input	Supply voltage, one of them needed for operation

2.1.1 LIN Bus

The PLIN-Slave is connected to a LIN network as a slave node. The LIN master of this network reads out the positions of the 5 switches (Din-0...4) and potentiometers (Ain-0 and 1) as well as the applied power supply (Ain-2). Furthermore it sets the 8 LEDs (DoutL-0...3, DoutH-0...3). The necessary LIN messages are described in the attached file `PLIN-Slave.ncf` (ncf = node capability file).

2.1.2 Digital Inputs

The 5 digital inputs of the PLIN-Slave are already equipped with switches.

2.1.3 Analog Inputs

The 3 analog inputs of the PLIN-Slave are connected on the board. Ain-0 and Ain-1 are adjustable via potentiometer, Ain-2 digitalizes the applied supply voltage.

2.1.4 Digital Outputs

The lead-out pins can be used for measurement purposes. The digital outputs are connected with 8 LEDs on the board for the visualization (see the following chapter 2.2).

Note: The lead-out pins of the digital inputs/outputs as well as the analog inputs must not be wired with additional components, because this can cause short circuits or the destruction of the device.

2.2 Status LEDs

LED	Status	Meaning
Power	Green on	Voltage supply is connected
DoutL-0..3	Red on	Set via message Control_xxx_LIN
DoutH-0..3	Green on	Set via message Control_xxx_LIN

2.3 Programming the Chip Properties

The PLIN-Slave is programmed with a basic configuration ex factory, that is well suited for the intended purpose of demonstration and education. Reprogramming of the properties is only possible with good knowledge of the used LIN master node (respectively its operating software) and the data sheet[1] for Melexis MLX80103. Support for this can not be offered, because of the various network topologies, user interfaces, and configuration options.

[1] The data sheet of Melexis MLX80103 can be requested on: www.melexis.de

2.4 Multiple PLIN-Slaves on LIN Bus

LIN IDs can be changed by `Assign frame ID`. The procedure for this is described in the data sheet[1] for Melexis MLX80103.

3 LIN Communication

3.1 PLIN-Slave Query Inputs

To query the inputs (control elements: switches and potentiometers) a LIN frame with the following properties of PLIN-Slave must be requested by the LIN master:

Description	Meaning
Name	Status_xxx_LIN
LIN-ID	1
Direction	Subscriber
Data length	8
Checksum type	Enhanced
Time	Cyclical, e.g. 50 ms

The data in the LIN frame `Status_xxx_LIN` (see also file `*.ncf`) is arranged as follows:

Byte								
7	Ain-2 (= Vbat)							
6	Ain-1							
5	Ain-0							
4			DoutL-3	DoutH-3	DoutH-2	DoutH-1	DoutH-0	1
3	1	1	1	1	1	1	1	1
2	1	1	1	1	1	1	Din-4	Din-3
1	Din-2	Din-1	Din-0	1	1			
0								

3.2 PLIN-Slave Setting Outputs

For setting the outputs (LEDs) a LIN frame with the following properties of PLIN-Slave must be requested by the LIN master:

Description	Meaning
Name	Control_xxx_LIN
LIN-ID	5
Direction	Publisher
Data length	2
Checksum type	Enhanced
Time	If needed

The data in the LIN frame `Control_xxx_LIN` (see also file `*.ncf`) is arranged as follows:

Byte								
1				DoutL-3	DoutH-3	DoutH-2	DoutH-1	DoutH-0
0	DoutL-2	DoutL-1	DoutL-0					

3.3 Predefined LIN IDs

Direction Publisher and Subscriber each from the view of the controlling LIN master node.

Master asks, LIN answers:

LIN ID	Message ID	Length	Type	Checksum	Name
1	0x0001	8	Subscriber	Enhanced	Status_xxx_LIN

Master transmits command to slave:

LIN ID	Message ID	Length	Type	Checksum	Name
5	0x8002	2	Publisher	Enhanced	Control_xxx_LIN

4 Operation

The PLIN-Slave is equipped with a number of control elements, that can display the main features of the device.

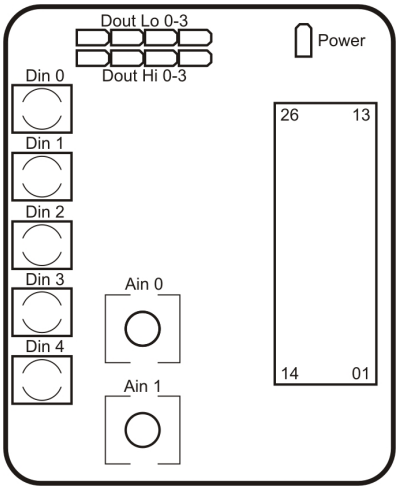

Figure 2: View of control elements

- Connector incl. assignment of the pin numbers (see section *2.1 Pin Assignment on page 6*)
- 5 switches for controlling Din-0...4 (see section *2.1.2 Digital Inputs on page 7*)
- 2 potentiometers of Ain-0...1 (see section *2.1.3 Analog Inputs on page 7*)
- 8 LEDs for representing DoutL-0...3 and DoutH-0...3 (see section *2.1.4 Digital Outputs on page 8*)
- Power LED to indicate the supply voltage (see section *2.2 Status* LEDs *on page 8*)

5 Technical Specifications

Power supply	
Supply voltage	7 - 18 V
Current consumption	60 mA
Inverse-polarity protection	yes
Overvoltage protection	yes

LIN	
Bus voltage	7 - 18 V
Bit rate	19200 bits/s
Protocol	Version 2.0
Transceiver	Melexis MLX80103

Measures	
Size	70 x 57 x 28 mm (B x H x T) See also dimension drawing Appendix A on page 14
Weight	50 g

Environment	
Operating temperature	-40 - +85 °C
Temperature for storage and transport	-40 - +100 °C
Relative humidity	15% - 90%, not condensing

Appendix A Dimension Drawing

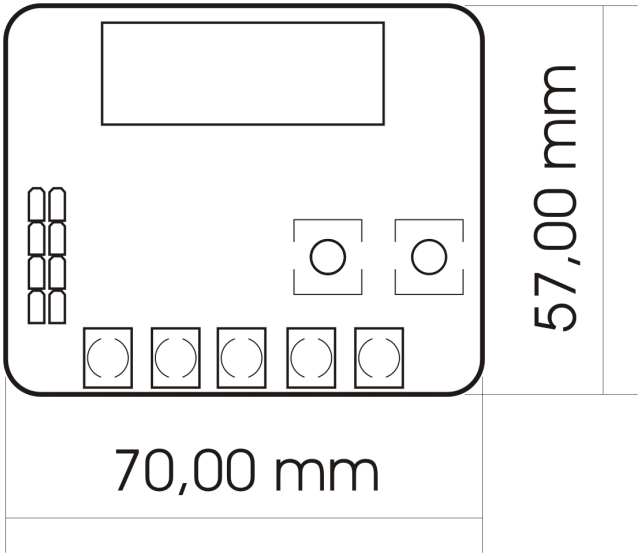

Figure 3: Top view PLIN-Slave.

The figure does not show the actual size of the product.