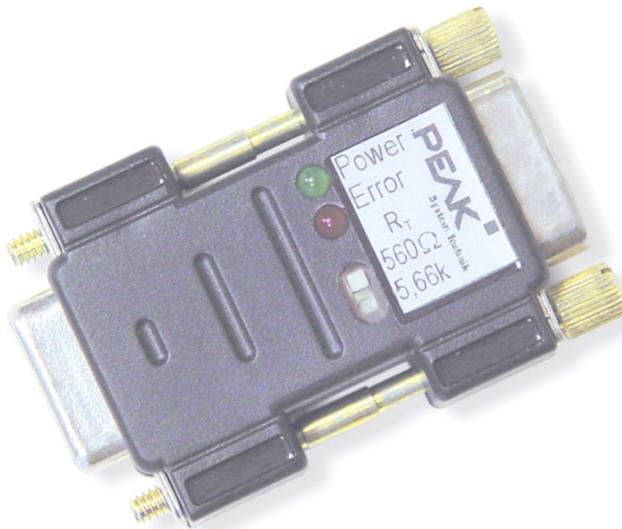


PCAN-TJA1054

Converter High-speed CAN/
Low-speed CAN

User Manual



Products taken into account

Product Name	Model	Item Number
PCAN-TJA1054		IPEH-002039

Last Updates

June 1, 2005

- Completion of the technical specifications

March 6, 2006

- Minor changes and corrections in the text
- Updated technical specifications

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1 Introduction



Tip: At the end of this manual (Appendix B) you can find a **Quick Reference** with brief information about the installation and operation of the PCAN-TJA1054.

With the bus converter PCAN-TJA1054 you can connect a High-speed CAN component (like one of the PC/CAN adapters from the PCAN series, the PCAN-Dongle for example) to a Low-speed CAN. The name TJA1054 refers to the LS-CAN transceiver of the same name by Philips, which is used in this bus converter.

Low-speed CAN (LS-CAN)

The LS-CAN is primarily intended for low-speed applications up to 125 kBaud in passenger cars. Like the High-speed CAN (HS-CAN) the LS-CAN transmits signals differentially through two wires. However, its fault tolerance (at a short circuit, for example) automatically provides an operation with only a single wire.

1.1 Properties at a Glance

- └ Direct connection to a HS-CAN component (Sub-D, 9 pins)
- └ Terminierung des HS-CANs mit 62 Ω
- └ Voltage supply (5 V) via HS-CAN connector (additional AC adaptor is not needed)
- └ Indicator LEDs for power supply and errors on LS-CAN
- └ Low-speed CAN functionality (error tolerant)
- └ Transfer rates up to 125 kBit/s
- └ Switchable LS-CAN termination (560 Ω or 5.66 k Ω)



Tip: You can find additional information about the properties and the behavior of the LS-CAN transceiver TJA1054 in the corresponding data sheet, which you can download from the web site of Philips (<http://www.semiconductors.philips.com>).

1.1 System Requirements

The following prerequisites must be given, so that the PCAN-TJA1054 can be used properly:

- HS-CAN component capable of routing a 5-Volt supply (minimum 80 mA) to the CAN connector (can be set for all PC/CAN adapters from the PCAN series)

1.2 Scope of supply

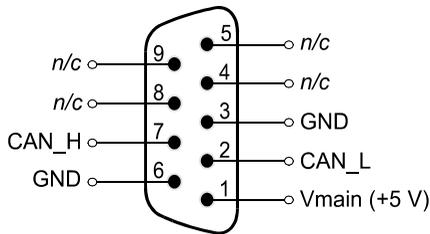
The scope of supply normally consists of the following parts:

- Manual in printed form
- Bus converter PCAN-TJA1054 in small Sub-D adapter case

2 Installation

2.1 Connecting the High-speed CAN Side

The PCAN-TJA1054 is designed for a direct connection to a HS-CAN component (PCAN-Dongle, for example). The HS-CAN side has a **female** Sub-D connector (9 pins).



n/c = not connected

Figure 1: Assignment of the Sub-D socket for the HS-CAN connection



Attention! Make sure, that the HS-CAN component always is turned off when connecting or disconnecting the PCAN-TJA1054. Otherwise the PCAN-TJA1054 or the hardware connected may be damaged or destroyed.

Between CAN_L and CAN_H a **terminating resistor** of 60 Ω is installed internally. Therefore an additional line termination is not needed for the connected HS-CAN component.

For **power supply** the PCAN-TJA1054 uses a direct voltage of +5 V (V_{main}). This must be applied to pin 1 of the HS-CAN connector.



Note: Please see the documentation of the HS-CAN component the PCAN-TJA1054 shall be connected to, to obtain information about a power supply on pin 1.

The **green LED** ("Power") indicates that the 5-Volt supply is on.

2.2 Connecting the Low-speed CAN Side

For the connection of the LS-CAN bus a 9-pin **male** Sub-D port is used. The assignment is as follows:

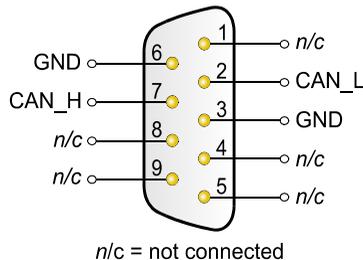


Figure 2: Assignment of the Sub-D plug for the LS-CAN connection

Bus termination Low-speed CAN

Every node in a Low-speed CAN has a terminating resistor. For optimum system conditions the whole CAN should be terminated with $100\ \Omega$ (parallel connection of all terminating resistors). A single node should be terminated with at least $500\ \Omega$ and at most $6\ \text{k}\Omega$.

To simplify the adaptation of the PCAN-TJA1054 to existing CANs you can switch between the terminating resistors $560\ \Omega$ and $5.66\ \text{k}\Omega$ with a slide switch.

For smaller CANs or for testing a single component the slide switch should be set to $560\ \Omega$. For monitoring or configuration of existing CANs, that are already optimized regarding termination, the slide switch should be set to $5.66\ \text{k}\Omega$ to minimize an influence on the total termination.

3 Application Notes

3.1 Transfer Rate

For operating the PCAN-TJA1054 pay attention to the transfer rate of the connected HS-CAN component. It should match the transfer rate of the LS-CAN bus. No conversion or automatic adaptation of the transfer rate is done in the PCAN-TJA1054.

3.2 Low-power Modes

 **Note:** The LS-CAN transceiver always works with the normal operating mode. The operation in one of the low-power modes "Sleep" or "Standby" is not possible.

Because the PCAN-TJA1054 is connected to further hardware (controllers, for example) only through the CAN bus, it is not capable of activating one of the low-power modes.

If the PCAN-TJA1054 shall be connected to the LS-CAN bus of a motor vehicle, that uses a low-power mode, the following should be considered:

In a low-power mode all transceivers in a motor vehicle terminate CAN_L against the battery. However, the PCAN-TJA1054 still terminates CAN_L against V_{CC} . On CAN_L the voltage adjusts to a level above or below the recognition threshold for short circuits on CAN_L (7.3 V) depending on the network size and termination.

If the voltage on CAN_L stays below 7.3 V, a shunt current leads to an increased current consumption in the motor vehicle.

If however the voltage on CAN_L is above 7.3 V, the PCAN-TJA1054 detects a short circuit on CAN_L and switches to one-wire operation (CAN_H). The communication is ensured but an error is indicated by the red LED.

3.3 Red Error LED

The red LED indicates the state of the error output of the LS-CAN transceiver. This output is active for the following error conditions on the Low-speed CAN side:

- └ Interrupt on CAN_H
- └ Interrupt on CAN_L
- └ Short circuit between CAN_H and GND
- └ Short circuit between CAN_H and VCC
- └ Short circuit between CAN_L and GND
- └ Short circuit between CAN_L and VCC
- └ Short circuit between CAN_H and CAN_L

Please see the data sheet for the CAN transceiver TJA1054 (Philips) for further details.

4 Frequently Asked Questions (FAQ)

Question	Answer
How do I configure the transfer rate at the bus converter?	Not at all! The PCAN-TJA1054 doesn't convert the incoming data with regard to timing. Because of this it doesn't have direct influence on the transfer rate. This is determined by the nodes of the connected CAN. You should make sure to use the same transfer rate for both the connected HS-CAN component and all nodes in the LS-CAN.

5 Technical specifications

Supply	
Supply voltage	+5 V DC (via pin 1 of the Sub-D socket)
Current consumption	Normal operation: 20 – 30 mA At an error: 40 mA Maximum: 80 mA (peak)
CAN	
HS-CAN	ISO 11898-2 Standards 2.0A and 2.0B Transceiver Philips PCA82C251 Sub-D socket, 9 pins (according to CiA DS 102) Internal bus termination with 62 Ω (fixed)
CAN	ISO 11898-3 Transceiver Philips TJA1054 Sub-D plug, 9 pins Internal bus termination with 560 Ω or 5.66 k Ω (switchable)
Transfer rate	max. 125 kBit/s
EMC	
Directives	EN 50081-1:1992 EN 50082-1:1997 EC directive 89/336/EEC
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
Measures	
Dimension	50 x 32 x 17 mm (2 x 1 1/4 x 5/8 inches)
Weight	max. 30 g (2.5 oz.)

Design and specifications are subject to change without notice.

Appendix A Certificates

A.1 CE

PCAN-TJA1054 IPEH-002039 PEAK-System Technik GmbH	EC declaration of conformity
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Notes on the CE Symbol CE

The following applies to the PCAN-TJA1054 product IPEH-002039.

EC Directive This product fulfills the requirements of EC directive 89/336/EEC on "Electromagnetic Compatibility," and is designed for the following fields of application as per the CE marking:

Field of Application	Requirement for Emitted Interference	Requirement for Noise Immunity
Residential, commercial and small businesses	EN 61000-6-3: 2001	EN 61000-6-1: 2001

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:

PEAK-System Technik GmbH
Mr. Wilhelm
Otto-Röhm-Str. 69
D-64293 Darmstadt
Germany

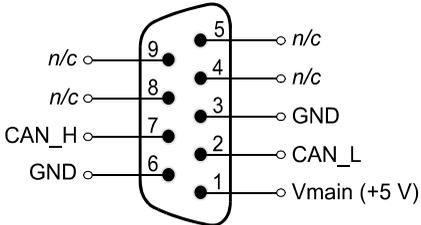
phone: +49 6151 81 73-20
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Signed this 10th day of June 2004

Appendix B Quick Reference

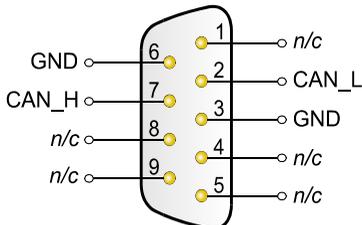
HS-CAN socket



n/c = not connected

Connect or disconnect the PCAN-TJA1054 only, when the relevant HS-CAN component is turned off!

LS-CAN plug



n/c = not connected

Slide switch LS-CAN termination

560 Ω for building smaller networks, testing single components

5.66 k Ω for monitoring or configuring existing networks (already optimum termination)

Indicator LEDs

Green "Power" Voltage supply +5 V

Red "Error" Error condition on the LS-CAN bus

Transfer rate

is configured in the connected HS-CAN component.