

EMCtools

**Fiber optic CAN/LIN transceiver
Type Canbox
19" Rackversion 3HU / 6HU**



EMCtools
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EMCtools — lab life made easy

1. Introduction and use

Functional tests e.g. in test-labs often require CAN- (Controller Area Network) and LIN (Local Interconnect Network) transceivers to control the device under test. They provide bidirectional and isolated data transmission.

For use during EMC tests and inside the EMC chamber the EMCtools Microbox is widely used in automotive test labs. It was specially designed to comply with customers specifications for immunity and emission tests.

We developed the EMCtools Canbox as a reliable replacement for the transceivers outside the EMC chamber. One Canbox replaces 5 single transceivers. It simplifies the setup and is prepared for direct connection of the electrical bus (e.g. CAN/LIN-cab) over standard Sub-D connectors.

2. Versions

Based on an analysis of commonly used bus systems in automotive tests, EMCtools Canbox provides 15 or 30 independent bus transceivers:

Free choice of bus transceivers:

- High-Speed CAN / CAN FD (Flexible datarate)
- Low-Speed CAN
- Low-Speed Single Wire CAN
- LIN-Bus
- K/L-Line
- FlexRay
- J1850
- J1709
- Sent Bus (unidirectional)
- 100Base-T1 (automotive Ethernet)
- 100Base-TX (standard Ethernet)

The CANBOX is built into a robust 19" rack of 3 or 6 height units (HU).

The CANBOX has a modular design. Each Channel is located in a 3 HU and 5HP module.

It is powered by a built in wide range power supply.

On the front panel you find the lighted POWER switch to switch the CANBOX on and off.

Green LEDs marked with "5V" and "12V" show that the power supply voltages are in tolerance.



Picture: Front panel Canbox 19" rack version 6HU

2.1 HS-CAN / CAN FD – Module:

Each CAN FD Transceiver module has 3 LEDs:

Po	green LED	power good
Rx	red LED	transmission of fiber optic data
Tx	red LED	reception of fiber optic data

A toggle switch lets you set the bus termination options:

- 60 Ohm
- 120 Ohm
- no termination

9-pin Sub-D (female) connectors provide connection to the electrical CAN bus.



Picture: Front panel Canbox 19" rack version

2.2 FlexRay – Module:

Each FlexRay Transceiver module has 6 LEDs:

Po	green LED	power good
Rx	red LED	transmission of fiber optic data
Tx	red LED	reception of fiber optic data

2,5 Mbit/s	green LED	timing optimized for FlexRay bus speed of 2,5 Mbit/s
5 Mbit/s	green LED	timing optimized for FlexRay bus speed of 5 Mbit/s
10 Mbit/s	green LED	timing optimized for FlexRay bus speed of 10 Mbit/s

This optimized timing can be setting Jumpers. To do this please remove the module from the 19" case. On the PCB you will find the Jumpers and a description of the Jumper setting. Always set the 2 Jumpers accordingly:

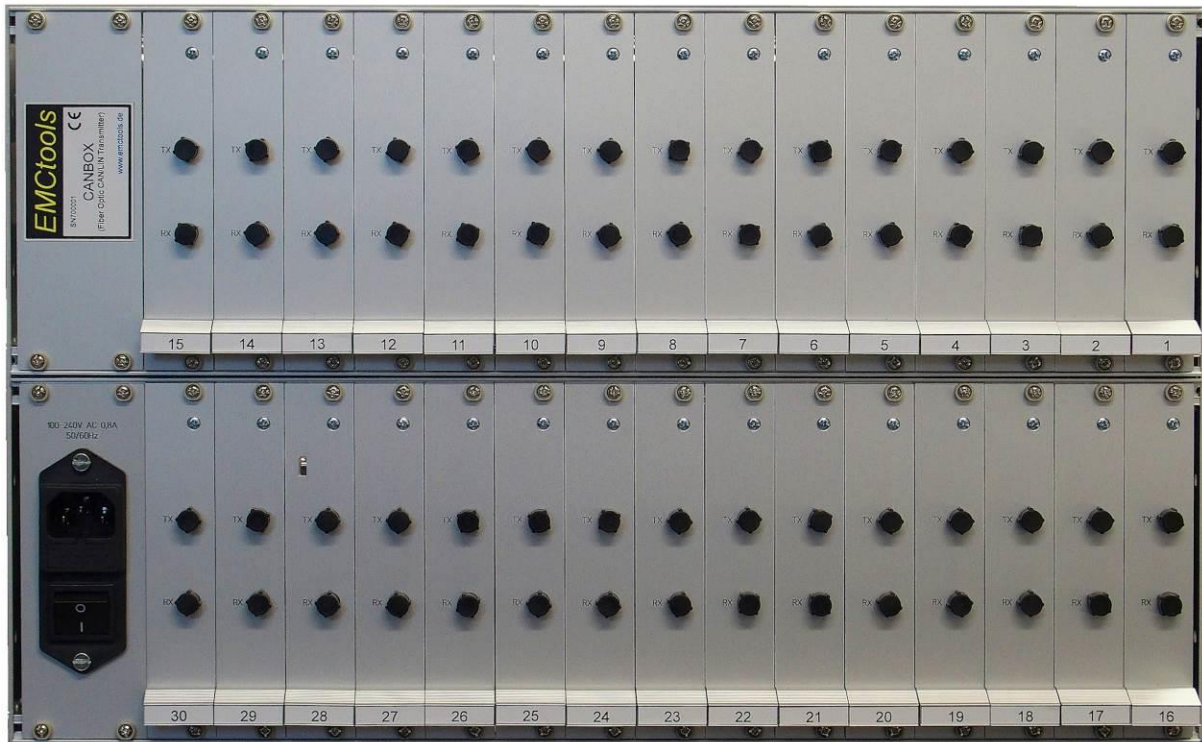
A toggle switch lets you set the bus termination options:

- 90 Ohm
- no termination

9-pin Sub-D (female) connectors provide connection to the electrical FlexRay bus.



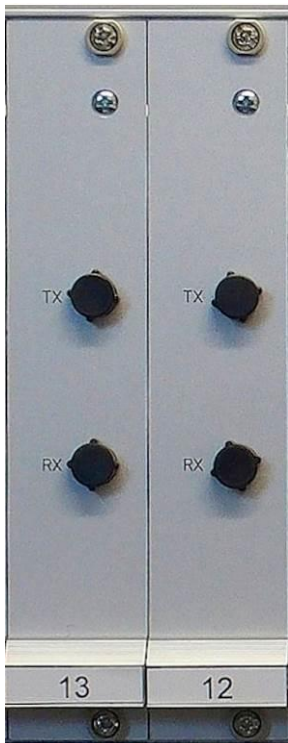
Picture: Front panel FlexRay 19" rack version



Picture: Rear panel example Canbox 19" rack version 6HU

On the back panel you can find the power connector for the mains power supply.

Located right next to it are the modules with F-SMA connectors „TX“ and „RX“ for the optical data transmission for each channel. Here the fiber optic cables to the transceivers inside the test environment (e.g. EMC chamber) may be connected.



Picture: Rear panel Canbox 19" rack version

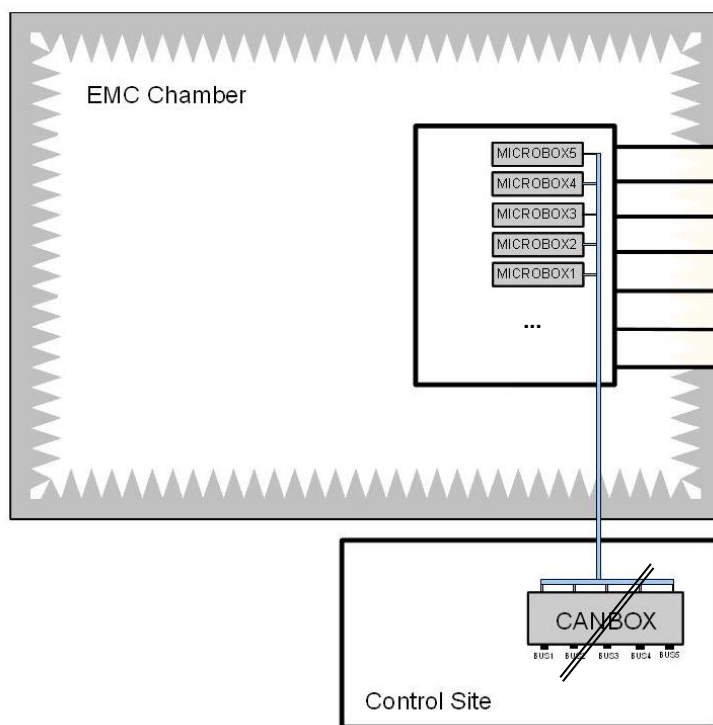
3. Setup of EMCtools Microbox

The setup for operating a fiber optic data transmission for CAN/LIN using the Canbox is easy:

1. Connect the Canbox and the Microbox with crossed fiber optic cables:
 - connect „Microbox TXD“ with Canbox „RXD“
 - connect „Microbox RXD“ with Canbox „TXD“
2. connect the electrical CAN-bus to Microbox fiber optic transceivers
3. Set the bus impedances (CAN)
4. connect the electrical bus to the Canbox Sub-D (see chapter 5 for pinning)
5. switch on the Canbox and Microbox

For unidirectional operation („listen only“) only one fiber optic cable is needed: Connect „Microbox TXD“ with Canbox „RXD“).

All electrical bus inputs have been designed to allow a direct connection of CAN-Caps.



Possible Setup:

1-15 Microbox transceivers (3HU)
or
1-30 Microbox transceivers (6HU)

Same number of
duplex fiber optic cables

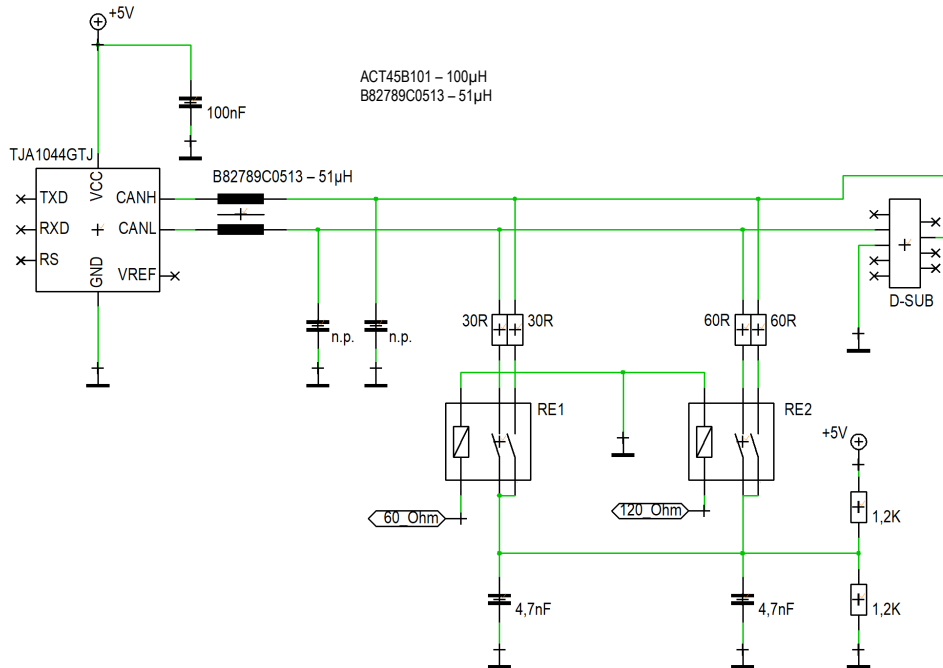
1 Canbox (3HU/6HU)

4. Delivered devices of the system and accessories:

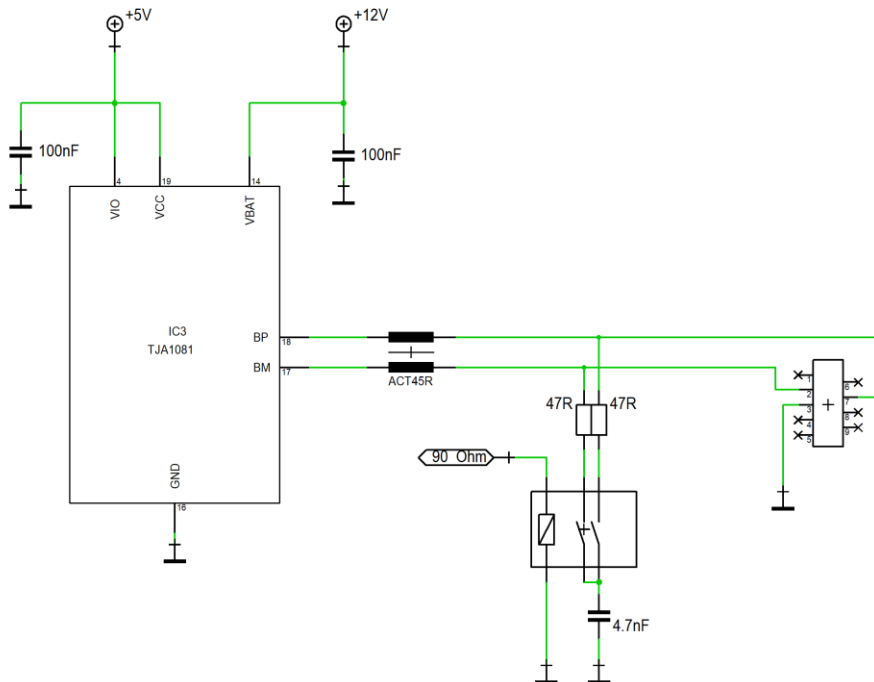
- 1 pcs EMCtools Canbox
- 1 pcs printed manual

5. Bus front end circuit of EMCtools Canbox

All electrical bus inputs have been designed to eliminate the need for configuration and to allow a direct connection of CAN- / LIN-Caps.



Picture: High-Speed CAN CAN FD (capacitors at CANH_x/CANL_x not populated)



Picture: FlexRay

6. Technical data:

maximum bitrate:

CAN-FD: max. 1 MBit/s (standard CAN)
CAN FD (flexible datarate) max. 8 MBit/s

FlexRay: max. 10 MBit/s

signal delay time: typ. 75 ns
typ. 200ns – complete setup: 10m fiber optic cable,
1xCANBOX, 1x Microbox

power supply: built in power supply 100-240V AC / 0.8A

fuse type: 1,25A slow

fiber optic: F-SMA, standard multimode optical fiber 50/125µm or 62,5/125µm

bus-connector: 9-pin Sub-D (female)

bus-impedance: CAN FD: 60Ohm / 120Ohm / no termination
FlexRay: 90Ohm / no termination

ambient temperatur: -10 – 50°C

compatibility: *EMCtools* Canbox CAN FD may be combined with:

- *EMCtools* Microbox - High Speed CAN
- *EMCtools* Microbox - CAN FD

EMCtools Canbox FlexRay may be combined with:

- *EMCtools* Microbox - FlexRay

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Declaration of Conformity

Hereby we declare, that our product is compliant with the CE directives and standards listed below.

Product: **EMCtools Canbox**

Model: - Canbox 3HU
- Canbox 6HU

Directives: 2004/108/EG (EMC)

Standards: DIN EN 61326-1 (2006)
DIN EN 61000-4-3 (2008)
DIN EN 61000-4-2 (2009)
DIN EN 55022 (2008)

Tested Setup: Typical setup for fiber optic conversion of automotive busses, supplied by power supply.

Ostrach, September 30th 2020

Lenk
Dipl.-Ing. (FH)

