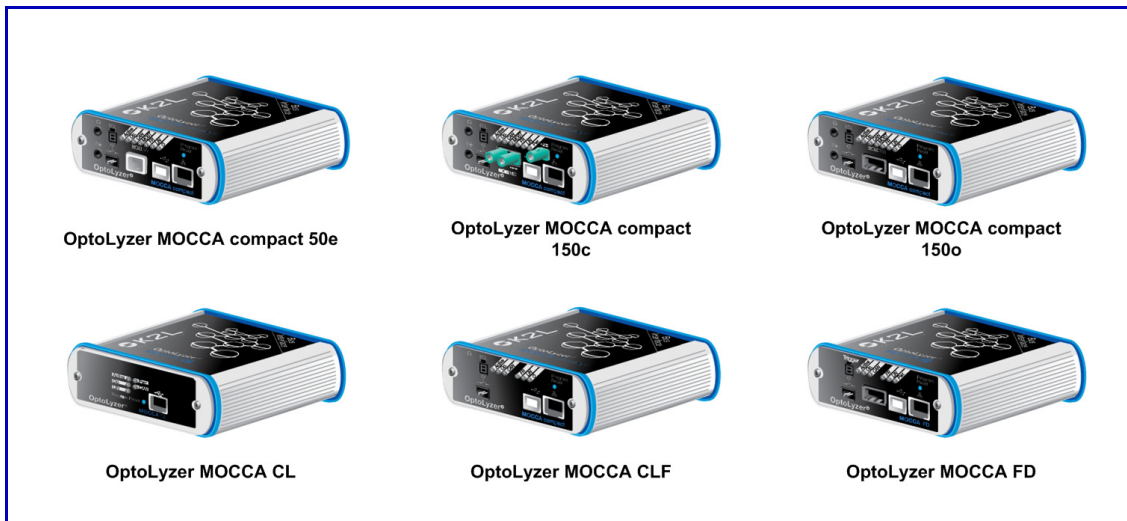


OptoLyzer® MOCCA Devices



ISBN: 978-1-5224-2574-8

Copyright © 2013 - 2018 K2L GmbH & Co. KG ("K2L"). All rights reserved.

Please make sure that all information within a document marked as 'Confidential' or 'Restricted Access' is handled solely in accordance with the agreement pursuant to which it is provided, and is not reproduced or disclosed to others without the prior written consent of K2L. The confidential ranking of a document can be found in the footer of every page. This document supersedes and replaces all information previously supplied. The technical information in this document loses its validity with the next edition. Although the information is believed to be accurate, no responsibility is assumed for inaccuracies. Specifications and other documents mentioned in this document are subject to change without notice. K2L reserves the right to make changes to this document and to the products at any time without notice. Neither the provision of this information nor the sale of the described products conveys any licenses under any patent rights or other intellectual property rights of K2L or others. The products may contain design defects or errors known as anomalies, including but not necessarily limited to any which may be identified in this document, which may cause the product to deviate from published descriptions. Anomalies are described in errata sheets available upon request. K2L products are not designed, intended, authorized or warranted for use in any life support or other application where product failure could cause or contribute to personal injury or severe property damage. Any and all such uses without prior written approval of an officer of K2L will be fully at your own risk. The K2L logo is a trademark of K2L. Other names mentioned may be trademarks of their respective holders.

K2L disclaims and excludes any and all warranties, including without limitation any and all implied warranties of merchantability, fitness for a particular purpose, title, and against infringement and the like, and any and all warranties arising from any course of dealing or usage of trade. In no event shall K2L be liable for any direct, incidental, indirect, special, punitive, or consequential damages; or for lost data, profits, savings or revenues of any kind; regardless of the form of action, whether based on contract; tort; negligence of K2L or others; strict liability; breach of warranty; or otherwise; whether or not any remedy of buyer is held to have failed of its essential purpose, and whether or not K2L has been advised of the possibility of such damages.

Table of Contents

Chapter 1 Preface	6
1.1 Intended Use	6
1.2 Scope of Delivery	6
1.3 Device Variants	7
1.4 Definitions of Terms	8
1.5 References	9

Chapter 2 Safety Instructions	10
2.1 Supply and Synchronization	10
2.2 Relay	10
2.3 Restrictions in Operation	10

Chapter 3 Definitions Limit Class	11
3.1 Emission	11

Chapter 4 Introduction	12
4.1 Feature Summary	12
4.2 Block Diagram	13
4.3 Properties of Supported Bus Systems	15
4.3.1 CAN	15
4.3.1.1 High-Speed Transceiver.....	15
4.3.1.2 Fault Tolerant Transceiver.....	15
4.3.1.3 Single Wire Transceiver	15
4.3.2 CAN FD	15
4.3.3 FlexRay	15
4.3.4 LIN	16
4.3.5 MOST	16
4.3.5.1 MOST50	16
4.3.5.2 MOST150	16
4.3.5.3 SpyNIC for MOST.....	16
4.3.5.4 StressNIC for MOST.....	17
4.3.6 Ethernet	17
4.3.7 Sleep Mode	17

Chapter 5 Hardware Description	18
5.1 Front Panel	18
5.2 Rear Panel	22

Chapter 6 Pin Assignment of the Connectors	24
6.1 High-Speed CAN	24
6.2 LIN / FlexRay	25
6.3 LIN / Low Speed CAN and Single Wire CAN2/6	26
6.4 Synchronization and Power	26
6.5 Digital Audio In/Out (S/PDIF)	27
6.6 Analog Audio In/Out	27
6.7 USB	27
6.8 Relay	28
6.9 Trigger/ECL	28

6.10	MOST Network Connector	29
6.10.1	MOST50 Network Electrical Connector	29
6.10.2	MOST150 Network Optical Connector	29
6.10.3	MOST150 Network Coaxial Connector	29
6.10.3.1	Simplex Use Case	30
6.10.3.2	Duplex Use Case	30
6.10.3.3	Duplex Endpoint Use Case	31
<hr/>		
Chapter 7	Technical Specifications	32
<hr/>		
Chapter 8	Maintenance	34
8.1	How to Release cPHY Connector	34
<hr/>		
Chapter 9	Revision History	35

List of Figures

Figure 2.1	Relay Circuitry	10
Figure 2.2	Device Arrangement	10
Figure 4.1	Block Diagram for OptoLyzer MOCCA compact Variants	13
Figure 4.2	Block Diagram for OptoLyzer MOCCA CLF Variant	13
Figure 4.3	Block Diagram for OptoLyzer MOCCA CL Variant	14
Figure 4.4	Block Diagram for OptoLyzer MOCCA FD	14
Figure 4.5	Order of MOST Network ICs	16
Figure 5.1	Front Panel (MOST150 oPHY and MOST150 cPHY Variant)	18
Figure 5.2	Rear Panel (Variant with S/PDIF Interfaces)	22
Figure 6.1	DE-9 Connector	24
Figure 6.2	Pin Assignment of the Sync and Power Connector	26
Figure 6.3	Pin Assignment of the S/PDIF Connector	27
Figure 6.4	Pin Assignment of the Analog Audio In/Out Connector	27
Figure 6.5	PIN Assignment of the MOST50 Network Connector	29
Figure 6.6	Simplex Use Case	30
Figure 6.7	Duplex Use Case	30
Figure 6.8	Duplex Endpoint Use Case	31
Figure 8.1	How To Release cPHY Connector	34

List of Tables

Table 1.1	Device Variants	7
Table 1.2	Definitions of Terms	8
Table 5.1	Connectors on the Front Panel	19
Table 5.2	LEDs	21
Table 5.3	Connectors on the Rear Panel	22
Table 6.1	Pin Assignment of Connector High Speed CAN 1/3/5	24
Table 6.2	Pin Assignment of Connector High Speed CAN 2/4/6	25
Table 6.3	Pin Assignment of Connector LIN / FlexRay A/B	25
Table 6.4	Pin Assignment of Connector LIN / Low Speed CAN	26
Table 6.5	Pin Assignment of the Sync and Power Connector	26
Table 6.6	Pin Assignment of the Relay Connector	28
Table 6.7	Technical Values	28
Table 6.8	Pin Assignment of the MOST50 Network Connector	29
Table 7.1	Device and Bus Characteristics	32
Table 7.2	Mechanical Characteristics	32
Table 7.3	Electrical Characteristics	33
Table 9.1	Customer Revision History	35

Chapter 1 Preface

1.1 Intended Use

The OptoLyzer MOCCA device is intended to be used for developing, testing, or analyzing CAN[®], CAN FD, FlexRay[™], LIN[®], or MOST[®] network based automotive products and systems by persons with experience in developing automotive devices.

1.2 Scope of Delivery

The delivery covers the following:

- OptoLyzer MOCCA device
- Power cable
- MOST cable (optional)
- USB cable
- USB stick (license dongle, optional)
- CAN termination resistors (optional)
- SYNC cable V3 (optional)
- CAN breakout cable (optional)

Check your shipment for completeness. If you have any objections, direct them to Sales@K2L.de. Providing the delivery note number eases the handling.

1.3 Device Variants

Table 1.1 shows the feature sets of the OptoLyzer MOCCA device variants. The numbers indicate how many interfaces/channels are available. Devices without MOST network support provide a trigger. This trigger takes the role of ECL in cases the OptoLyzer MOCCA device supports the MOST network.

Table 1.1 Device Variants

	OptoLyzer MOCCA	compact 50e	compact 150o	compact 150c	CLF	CL	FD	LAN
INTERFACE								
Analog Audio Out		1x	1x	1x				1x
Analog Line In		1x	1x	1x				1x
CAN		6x	6x	6x	6x	6x	4x ^a	2x
CAN FD							2x ^a	
Ethernet		1x	1x	1x	1x		1x	4x ^b
FlexRay ^c		1x	1x	1x	1x		1x	
LIN		6x	6x	6x	6x	6x	6x	
MOST		1x	1x	1x				
Relay		1x	1x	1x	1x		1x	
S/PDIF		1x	1x	1x				
Trigger/ECL		1x	1x	1x	1x		1x	
USB		1x	1x	1x	1x	1x	1x	1x

- a. The OptoLyzer MOCCA FD supports 6 CAN channels, 2 of them can be used as CAN FD channels.
- b. 2x TX, 2x T1
- c. FlexRay A/B

1.4 Definitions of Terms

For better understanding of the following chapters, this section provides explanation to special terms used in the description of the OptoLyzer MOCCA device user manual.

Table 1.2 Definitions of Terms

TERM / ABBREVIATION	DESCRIPTION
ABI	Automotive Bus Interface
ATS	Automotive Test System
CAN	Controller Area Network
CAN FD	CAN with flexible data rate
cPHY	Coaxial electrical physical layer; used e.g., in OptoLyzer MOCCA compact 150c variant
D	Depth
DUT	Device Under Test
ECL	Electrical Control Line, a method to start a diagnosis process over the MOST network.
ePHY	Electrical physical layer; used e.g., in OptoLyzer MOCCA compact 50e variant
FlexRay	Automotive network communications bus system
H	Height
LIN	Local Interconnect Network
Low speed CAN Transceiver	Fault tolerant CAN Transceiver
MDIX	Medium Dependent Interface Crossover
MediaLB [®]	Media Local Bus
MOST	Media Oriented Systems Transport
oPHY	Optical physical layer; used e.g., in OptoLyzer MOCCA compact 150o variant
RCA	Type of electrical connector used for transmitting audio and video signals (also known as cinch, introduced by Radio Corporation of America).
Sync	Synchronization
S/PDIF	Sony/Philips Digital Interconnect Format
USB	Universal Serial Bus
W	Width

1.5 References

- [1] Electrical Physical Layer Specification Version 2.0
Refer to FlexRay Consortium.
- [2] International Organization for Standardization
<http://www.iso.org>
- [3] Telecommunications Industry Association
<http://www.tiaonline.org>
- [4] International Electrotechnical Commission
<http://www.iec.ch>

Chapter 2 Safety Instructions

2.1 Supply and Synchronization

When concatenating OptoLyzer MOCCA devices one of the two Sync/Power connectors is intended to be used for the power supply and the other for cascading the OptoLyzer MOCCA device by using the optional SYNC cable V3.

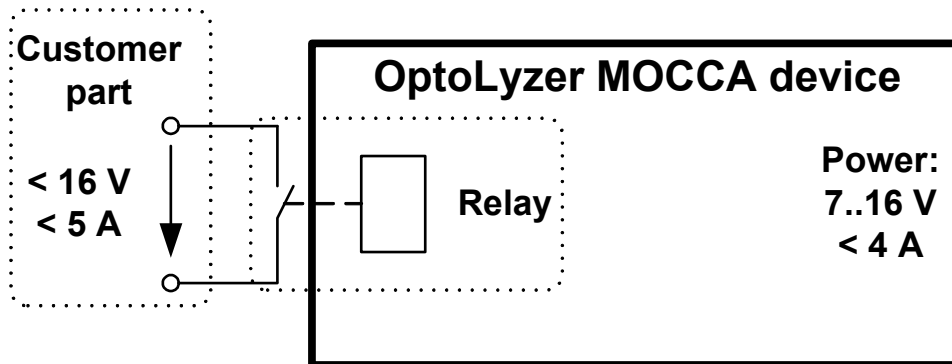
During cascading, caution has to be taken, since the first device in the chain can take the maximum current of 3 A. Do not cascade more than eight devices in chain.

For all setups either a fuse of max. 4 A in the supply cable to the first device or the use of the current limitation of the laboratory power supply is mandatory.

2.2 Relay

The Relay feature of the device is designed to switch other 12 V powered devices. The capability is limited to 5 A at 16 V maximum. Always use core cable ends of appropriate length and diameter to prevent unintended connections. Lengths and diameters depend on country-specific technical specifications. [Section 1.3, "Device Variants," on page 7](#) informs about which device variant of the OptoLyzer MOCCA supports the Relay feature.

Figure 2.1 Relay Circuitry



2.3 Restrictions in Operation

The OptoLyzer MOCCA device integrates temperature sensitive components. Therefore do not cover the device with any objects. Covering disables the passive cooling. Make sure to allow enough airflow to the OptoLyzer MOCCA device, when the device is assembled. Do never place the running OptoLyzer MOCCA device in a closed case or box. Do not stack any OptoLyzer MOCCA devices.

Figure 2.2 Device Arrangement



Chapter 3 Definitions Limit Class

3.1 Emission

The OptoLyzer MOCCA device has passed the requirements according to the standard EN 55022:2010, class A.

Warning

The OptoLyzer MOCCA device is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Chapter 4 Introduction

The OptoLyzer MOCCA device is an out of the box automotive bus interface, combining most of the current automotive field buses. The device features e.g., simulation via PC or can be used as an analyzing device for the different automotive bus systems.

Due to its PC compatible connections including USB 2.0 and 10/100 Mbit/s Ethernet, it is easily possible to control the embedded OptoLyzer MOCCA device software from the PC including monitoring, tracing, and logging of data exchange over the different field bus systems. The OptoLyzer MOCCA device provides comfortable spy and stress functionalities when used within a MOST network.

The OptoLyzer MOCCA device is available in different hardware variants optimized for dedicated use cases (e.g., with or without MOST network connector (oPHY, ePHY, and cPHY variants), different MOST speed grades). In addition, some hardware variants support also the bus systems CAN, CAN FD, LIN or FlexRay. Refer to [Section 1.3, "Device Variants," on page 7](#) for details.

4.1 Feature Summary

The following list covers the key features of the hardware platform. Some of the options may not be available in specific configurations ([Section 1.3, "Device Variants"](#)).

- 6 High-Speed CAN interfaces, two of them selectable either as CAN FD, High-Speed, fault tolerant transceiver or single wire CAN
- 1 FlexRay A/B interface
- 6 LIN interfaces
- MOST150 network (cPHY or oPHY), MOST50 network (ePHY)
- USB 2.0 port supporting Full-Speed with 12 Mbit/s and High-Speed with 480 Mbit/s
- Ethernet connection with 10/100 Mbit/s
- S/PDIF coaxial input and output for audio streaming over MOST network
- Analog audio input and output for audio streaming over MOST network
- Generic trigger in-/output functionality or MOST network ECL support
- Relay to switch external loads of up to 5 A
- Time stamp synchronization with cascaded OptoLyzer MOCCA devices over power cables
- SpyNIC for MOST
- StressNIC for MOST
- Simplex, duplex and duplex endpoint use case support in cPHY variant of MOST150

4.2 Block Diagram

The block diagrams show the features available for the different variants of the OptoLyzor MOCCA devices. They are different for the different OptoLyzor MOCCA devices. In order to minimize crossing lines in Figure 4.1 below the FPGA was split into two blocks in some block diagrams.

Figure 4.1 Block Diagram for OptoLyzor MOCCA compact Variants

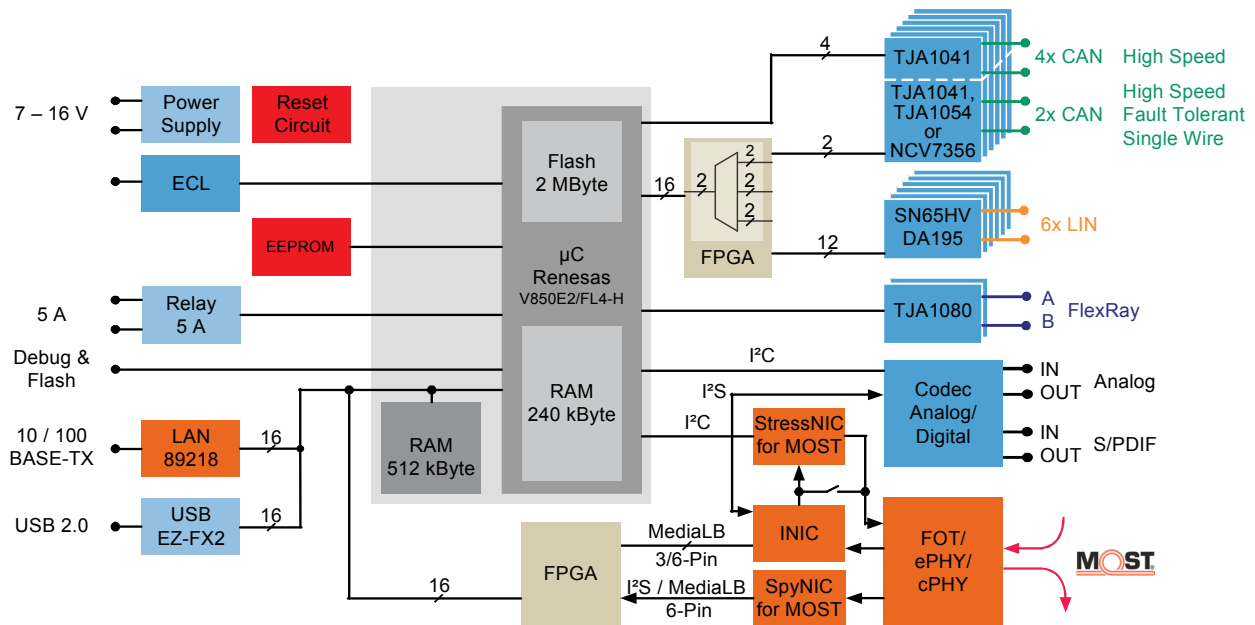


Figure 4.2 Block Diagram for OptoLyzor MOCCA CLF Variant

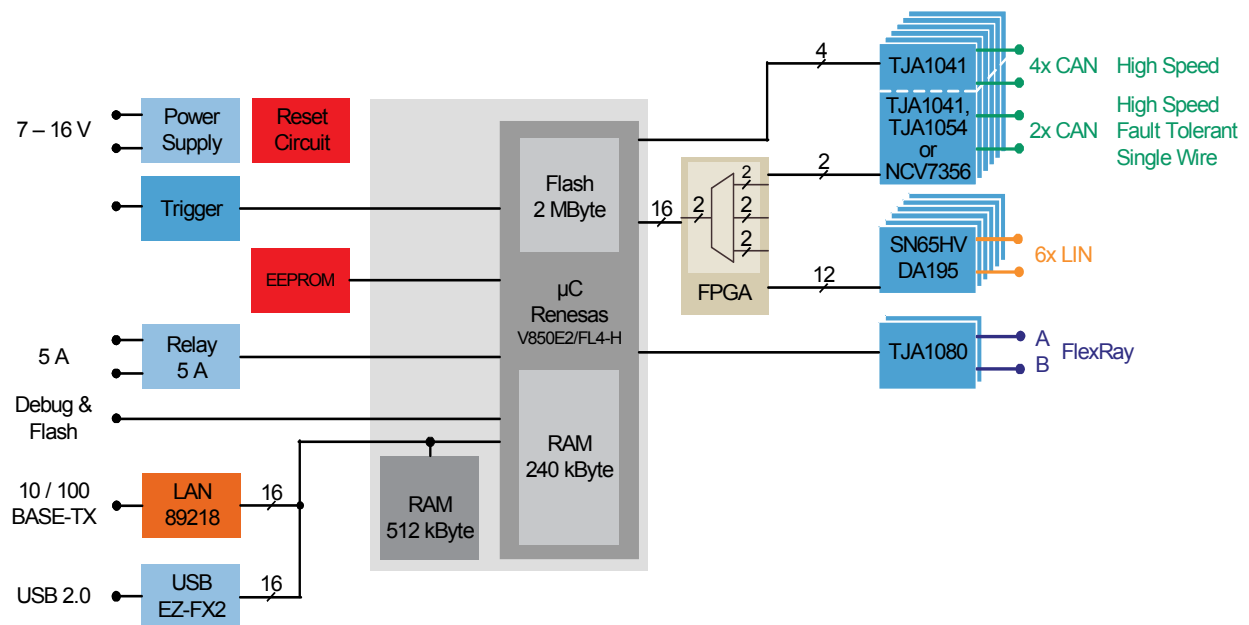


Figure 4.3 Block Diagram for OptoLyzer MOCCA CL Variant

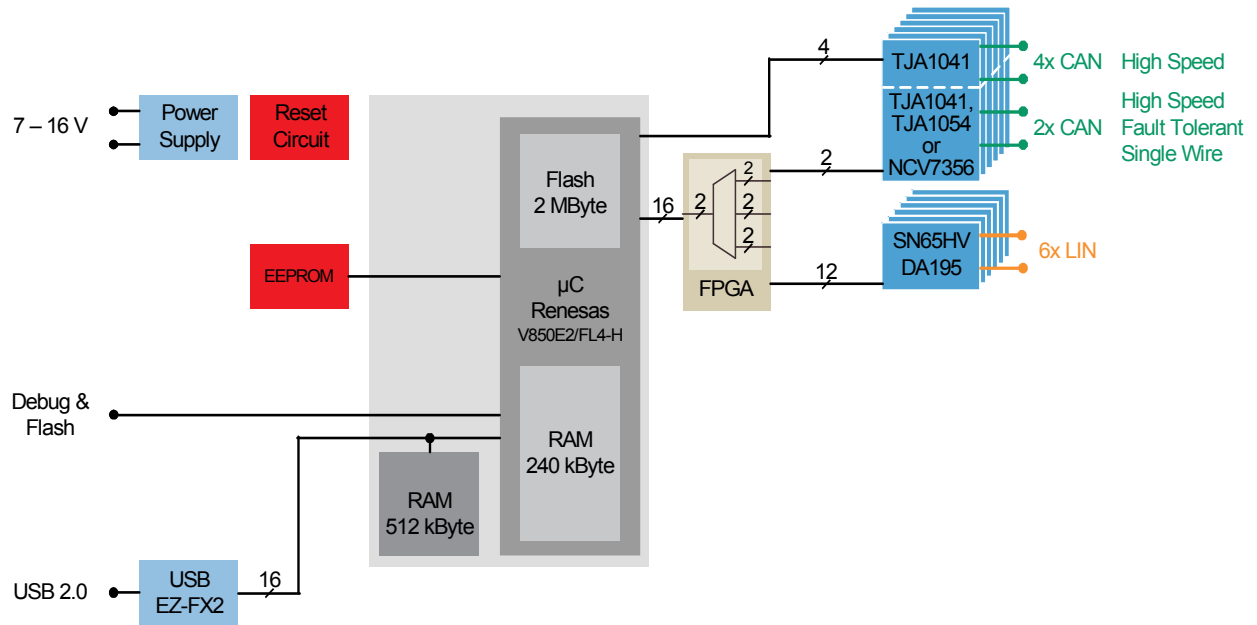
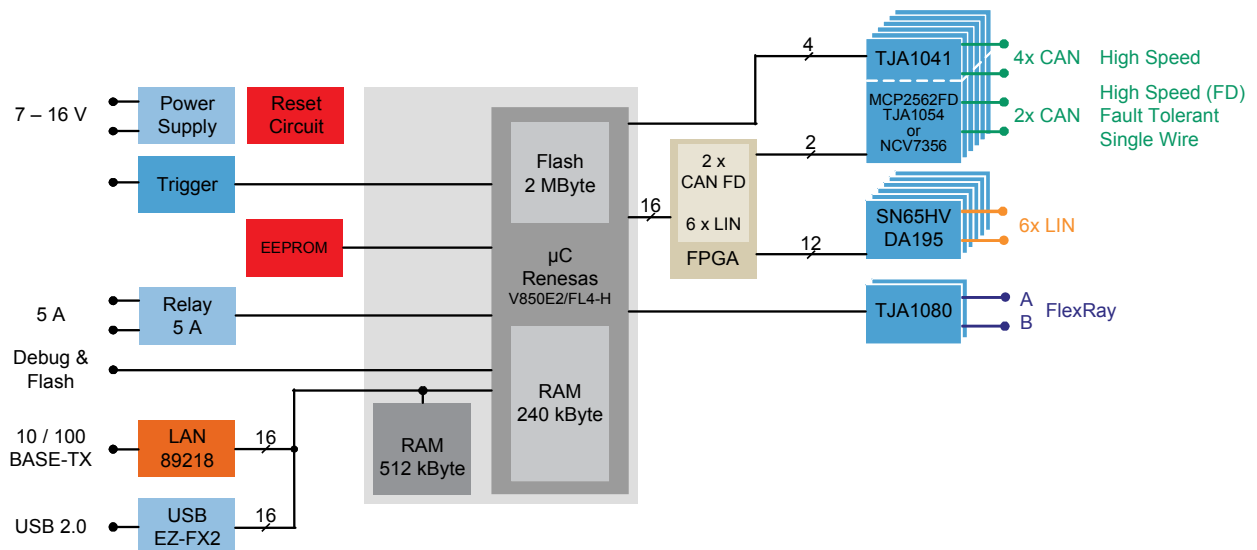


Figure 4.4 Block Diagram for OptoLyzer MOCCA FD



4.3 Properties of Supported Bus Systems

The OptoLyzer MOCCA device is intended to be used as stimulation, test and analysis device for automotive field buses with DUTs connected to them. Therefore the design is constrained to ensure the behavior to be as passive as possible.

4.3.1 CAN

The accuracy of CAN time stamps is 500 μ s (or better).

4.3.1.1 High-Speed Transceiver

High-Speed CAN bus systems according to ISO 11898-2:2015 [2] are terminated with 120 Ω at each end. Therefore the OptoLyzer MOCCA device does not terminate the bus. The transmission speed ranges from 33.333 kbits/s to 1 Mbits/s.

4.3.1.2 Fault Tolerant Transceiver

Low-Speed / Fault Tolerant CAN bus systems according to ISO 11898-3 [2] usually have a distributed termination. The value of the termination in each node depends on the number of nodes in the network. To avoid effects on the total impedance of the network the OptoLyzer MOCCA device has a weak termination of 5.6 k Ω . A communication via the fault tolerant transceivers ranges from a speed of 33.333 kbits/s up to a speed of 125 kbits/s.

4.3.1.3 Single Wire Transceiver

The single wire CAN is terminated with 9.1 k Ω . The transmission speeds for single wire CAN are 33.333 kbits/s (on-board communication) and between 33.333 kbits/s up to 100 kbits/s (off-board communication, single wire - High-Speed). The option single wire - high voltage is able to wake up devices (transmission speed: 33.333 kbits/s).

4.3.2 CAN FD

CAN FD bus systems according to ISO 11898-2:2015 [2] are terminated with 120 Ω at each end. The OptoLyzer MOCCA device can be used at the end of the bus system (in this case plug in the optional termination resistor, [Section 1.2, "Scope of Delivery," on page 6](#)) or somewhere between the ends (in this case don't plug in the optional termination resistor). The accuracy of CAN FD time stamps is 1 μ s. The transmission speed for CAN FD goes up to 8 Mbits/s. It is designed to operate with up to 64 byte payload. CAN FD requires a prescaler (data phase) of 1 or 2 for 500 kbit/s and above in case a custom bit rate (named StartCanFdExt in ABI Framework or ConfigureExtended in the K2L Bus Framework) is used.

4.3.3 FlexRay

The termination of a FlexRay bus depends on the bus topology. Two terminations are mandatory in each active branch. The OptoLyzer MOCCA device can be installed in various topologies. Therefore a termination is not implemented in the device. Thus the terminations have to be realized in a different way. In addition, the OptoLyzer MOCCA device does not act as a bus guardian.

The OptoLyzer MOCCA device provides one FlexRay interface and is able to switch from sleep mode to wake-up mode stimulated by the FlexRay bus. The OptoLyzer MOCCA device is capable of transmitting up to 10 Mbit/s as per "Electrical Physical Layer Specification Version 2.0" [1]. The accuracy of FlexRay time stamps is 500 μ s (or better) for the static part of the schedule.

4.3.4 LIN

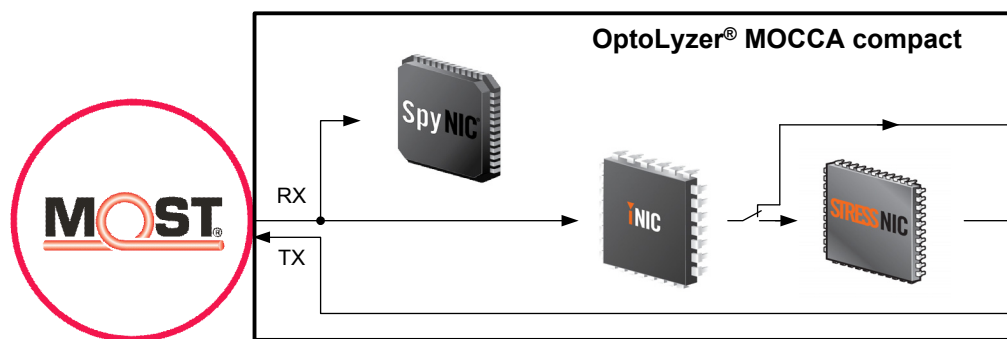
Both LIN master and LIN slave functionality are supported. The accuracy of LIN time stamps is 1 μ s. The OptoLyzer MOCCA device supports a maximum transmission speed of 20 kbit/s.

4.3.5 MOST

The OptoLyzer MOCCA compact variant supporting MOST50 technology is able to switch the clock mode of the embedded OS81082 INIC and thus supports a 44.1 kHz as well as a 48 kHz network whereas the OptoLyzer MOCCA compact variant designed for a MOST150 network (cPHY or oPHY) has a fixed clock mode of 48 kHz. OptoLyzer MOCCA compact variants of any speed grade have an INIC, a SpyNIC for MOST and a StressNIC for MOST on-board. If desired, the StressNIC for MOST can be added to the ring via software. The accuracy of INIC MOST network time stamps is 500 μ s (or better) for the node and 1 μ s for the spy.

When analyzing data e.g., when interpreting an acknowledged code, it is important to know how the chips (INIC, SpyNIC for MOST, StressNIC for MOST) are arranged inside the OptoLyzer MOCCA compact.

Figure 4.5 Order of MOST Network ICs



The MOST technology is an optional feature for OptoLyzer MOCCA devices i.e., there are OptoLyzer MOCCA devices supporting MOST technology (MOST50 or MOST150) and variants that do not support MOST technology (OptoLyzer MOCCA CL, OptoLyzer MOCCA CLF or OptoLyzer MOCCA FD).¹

4.3.5.1 MOST50

Data exchange between the OptoLyzer MOCCA compact and the embedded OS81082 INIC is realized by MediaLB 3-Pin with 512Fs.

4.3.5.2 MOST150

Data exchange between the OptoLyzer MOCCA compact and the embedded OS81110 INIC is realized by MediaLB 6-Pin with 2048Fs.

4.3.5.3 SpyNIC for MOST

Each speed grade of an OptoLyzer MOCCA compact has also an appropriate SpyNIC for MOST on-board. Both speed grade variants of the SpyNIC are spying control, packet, and allocation messages.

1. An optical MOST25 network interface is provided by the former hardware version MOCCA compact V2.3.

The accuracy of SpyNIC time stamps is 1 μ s. In a MOST150 network four synchronous/isochronous channels can be spied all the time. In a MOST50 network all synchronous channels can be spied all the time.

4.3.5.4 StressNIC for MOST

Each speed grade of an OptoLyzer MOCCA compact has also an appropriate StressNIC for MOST on-board. Both speed grade variants of the StressNIC are supporting dedicated use cases for simulating some common network error situations (e.g., light (activity)¹/lock stress, buffer full simulation, etc.). By default the StressNIC for MOST is electrically bypassed but can be enabled by appropriate software (e.g., ATS) (see [Figure 4.5 on page 16](#)).

4.3.6 Ethernet

Auto MDIX is supported, therefore the LAN interface can connect via straight and crossed patch cables. The physical layer 100Base-TX is supported. Thereby the MAC address of the Ethernet controller has a unique address. The accuracy of Ethernet time stamps is 500 μ s (or better).

4.3.7 Sleep Mode

The OptoLyzer MOCCA device is able to scan the six CAN buses (1, 3, 4, 5 but not CAN FD) in sleep mode and if stimulated to switch from sleep mode into wake-up mode. In addition, the OptoLyzer MOCCA device can be woken-up via FlexRay, LIN or ECL. For controlling the sleep mode software has to be developed by the customer on a PC.

¹.Light relates to the OptoLyzer MOCCA compact 150o variant, activity relates to the OptoLyzer MOCCA compact 50e and OptoLyzer MOCCA compact 150c variants.

Chapter 5 Hardware Description

The following chapter describes all connectors. To get details which feature set is supported by which OptoLyzer MOCCA device refer to [Section 1.3, "Device Variants,"](#) on page 7.

5.1 Front Panel

Different hardware variants are available for the OptoLyzer MOCCA device. [Figure 5.1](#) depicts a variant supporting the MOST150 oPHY variant (top) and the MOST150 cPHY variant (bottom).

Figure 5.1 Front Panel (MOST150 oPHY and MOST150 cPHY Variant)



All possible components of the front panel are described below:

- [Table 5.1](#) describes the connectors from left to right and top to down.
- [Table 5.2](#) describes the LEDs.

Table 5.1 Connectors on the Front Panel














INTERFACE	SYMBOL	DESCRIPTION
Analog Audio OUT		<p>Device variants supporting the MOST network also provide an analog audio out interface (a stereo headphone output). It has a 3.5 mm jack plug. Output Power: $P_{o, Max, Rms} = 1.4 \text{ mW}$ (at $R = 16 \Omega$, $V_{out} = 150 \text{ mV}_{RMS}$) The bandwidth (16 bit mono/stereo or 24 bit stereo) specified for this interface is also used for the S/PDIF OUT and vice versa. Rx and Tx transmission must cover the same bit number per channel. Refer to the S/PDIF description inclusive examples in Table 5.3 on page 22.</p>
Trigger or ECL	 	<p>OptoLyzer MOCCA device variants without a MOST network interface:</p> <ul style="list-style-type: none"> ■ The trigger can be used to wake-up the OptoLyzer MOCCA device. Both variants are realized using a LIN transceiver. <p>OptoLyzer MOCCA device variants supporting the MOST network:</p> <ul style="list-style-type: none"> ■ ECL can be used to start a diagnosis process over the MOST network according to different ECL implementations. <p>For the pin out refer to Section 6.9, "Trigger/ECL," on page 28.</p>
MOST (ePHY variant oPHY variant cPHY variant)	 	<p>These interfaces are only available on variants that are supporting the MOST technology^a. The MOST50 network connector bases on an electrical physical layer (ePHY) whereas the MOST150 network connectors base either on an optical physical layer (oPHY) or a coaxial electrical physical layer (cPHY) described separately below. For the pin out refer to Section 6.10, "MOST Network Connector," on page 29.</p>
MOST (cPHY variant Rx connector)		<p>The icon refers to an OptoLyzer MOCCA compact 150c (Figure 5.1). The connectors base on a coaxial electrical physical layer (cPHY). This connector provides an Rx interface. It is used</p> <ul style="list-style-type: none"> ■ in simplex use cases as Rx (indicated by the single-headed arrow). <p>For more details refer to Section 6.10, "MOST Network Connector," on page 29.</p>
MOST (cPHY variant Rx/Tx connector)		<p>The icon refers to an OptoLyzer MOCCA compact 150c (Figure 5.1). The connectors base on a coaxial electrical physical layer (cPHY). This connector provides a duplex interface (Rx/Tx connection). It is used</p> <ul style="list-style-type: none"> ■ in duplex use cases as Rx/Tx (indicated by the double-headed arrow). <p>For more details refer to Section 6.10, "MOST Network Connector," on page 29.</p>

Table 5.1 Connectors on the Front Panel

INTERFACE	SYMBOL	DESCRIPTION
MOST (cPHY variant Tx and Rx/Tx connector)		<p>The icon refers to an OptoLyzer MOCCA compact 150c (Figure 5.1). The connectors base on a coaxial electrical physical layer (cPHY). This connector provides a Tx or a duplex interface (Rx/Tx connection). It is used</p> <ul style="list-style-type: none"> ■ in simplex use cases as Tx (indicated by the single-headed arrow) and ■ in duplex use cases as Rx/Tx (indicated by the double-headed arrow) and ■ in duplex endpoint use cases (indicated by the double-headed arrow). <p>For more details refer to Section 6.10, "MOST Network Connector," on page 29.</p>
Program Reset		<p>The device can be reset by the push button. If the button is pressed for less than 1 s, the device is reset. The same button is used for switching into the flashing mode if it is pressed for more than 2 seconds. For details see the "K2L Flasher Online Help" that is part of the shipment.</p>
Analog Line IN		<p>The OptoLyzer MOCCA devices supporting the MOST technology provide one analog audio Line IN. The analog Line IN input impedance is 10 kΩ. The analog input is converted into a digital stream with resolutions of 16 bits / channel (mono/stereo) or 24 bits / channel (stereo). It has a 3.5 mm jack plug. It is possible to use either the Analog Line IN or the S/PDIF IN interface. Rx and Tx transmission must cover the same bit number per channel. Refer to the S/PDIF description inclusive examples in Table 5.3 on page 22.</p>
Relay		<p>The relay is able to switch 5 A as a potential free shutter. For safety purposes refer to Chapter 2, "Safety Instructions," on page 10. For the pin out refer to Section 6.8, "Relay," on page 28.</p>
USB		<p>The USB port is a standard USB B-type receptacle.</p>
LAN		<p>The LAN connector is an RJ45 receptacle according to TIA-568 [3].</p>

a.Each OptoLyzer MOCCA compact device has either one MOST150 oPHY, three MOST150 cPHY or one MOST50 ePHY connector(s).

The OptoLyzor MOCCA device offers up to seven LEDs. All LEDs except the Power LED are tri-colors.

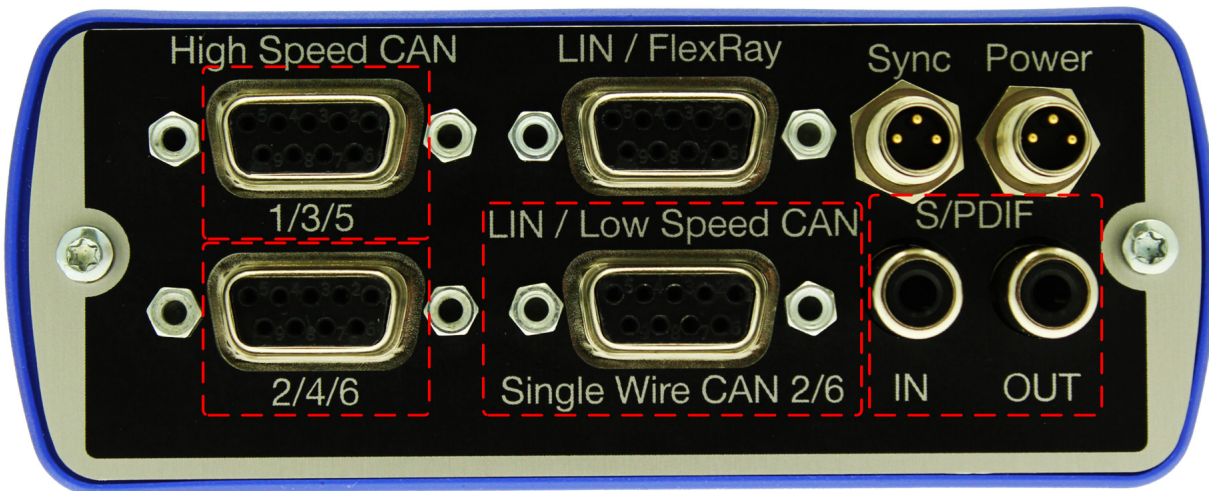
Table 5.2 LEDs

INTERFACE	SYMBOL	DESCRIPTION	COLOR	DESCRIPTION
Active	Active	This LED indicates any activity.	Red	Reserved
			Green	Reserved
			Blue (Twinkling)	Slowly: Firmware running Fast: Flash mode
Operation	Op.	This LED indicates different states dependent on the installed firmware (e.g., for ATS etc.).	Red	Depending on firmware
			Green	Depending on firmware
			Blue	Depending on firmware
CAN	CAN	This LED indicates the bus state of the CAN bus.	Red	Error
			Green	Operational
			White (Twinkling)	Bus activity
MOST	MOST	This LED indicates the bus state of the MOST network. The LED is only available for variants that are supporting a MOST network.	Red	Error
			Green	Net on
			White (Twinkling)	Bus activity
FlexRay	FR	This LED indicates the bus state of the FlexRay bus.	Red	Error
			Green	Synced
			White (Twinkling)	Bus activity
LIN	LIN	This LED indicates the bus state of the LIN bus.	Red	Error
			Green	Operational
			White (Twinkling)	Bus activity
Power	PWR	This LED indicates a powered device.	Green	Powered device

5.2 Rear Panel

Different hardware variants and software configurations are available for an OptoLyzer MOCCA device. As a result some connectors might not be available for a specific variant of the OptoLyzer MOCCA device. [Figure 5.2](#) depicts an OptoLyzer MOCCA variant supporting S/PDIF interfaces.

Figure 5.2 Rear Panel (Variant with S/PDIF Interfaces)



Notes: The rear panel ([Figure 5.2](#)) shows four DE-9 connectors, two on the left side and two in the middle of the panel. View the red frames above to get an impression which description belongs to which interface.

[Table 5.3](#) describes the connectors of the rear panel from top to bottom and left to right.

Table 5.3 Connectors on the Rear Panel

INTERFACE	DESCRIPTION
High Speed CAN 1/3/5 2/4/6	These two connectors offer six High-Speed CAN instances with baud rates from 33.333 kbit/s to 1 Mbit/s depending on the cable length. The CAN instances 1, 3, 4 and 5 are hard specified as High-Speed CAN interfaces. The CAN instances 2 and 6 can also be used as CAN FD, Low-Speed or as single wire CAN interfaces. If the instances are used as Low-Speed or as single wire CAN interfaces, the instances are routed to the 'LIN / Low-Speed CAN Single Wire CAN 2 / 6' interface. The CAN interfaces can be controlled by a customer application. Details about the CAN bus properties are described in Section 4.3.1, "CAN," on page 15 . For the pin out refer to Section 6.1, "High-Speed CAN," on page 24 .
LIN / FlexRay	This DE-9 socket combines pins assigned to the FlexRay bus and pins assigned to the LIN channels 3, 4, 5 and 6. For the pin out refer to Section 6.2, "LIN / FlexRay," on page 25 .
LIN / Low Speed CAN Single Wire CAN 2/6	This DE-9 socket combines two Low-Speed and two single wire CAN interfaces (CAN instances 2 and 6) as well as two LIN channels (1 and 2). If the CAN instances 2 and/or 6 are specified as Low-Speed or as single wire CAN interfaces, they are automatically routed to this interface. The CAN interfaces can be controlled by a customer application. For the pin out refer to Section 6.3, "LIN / Low Speed CAN and Single Wire CAN2/6," on page 26 .

Table 5.3 Connectors on the Rear Panel

INTERFACE	DESCRIPTION																	
Sync / Power	<p>The Synchronization (Sync) and the Power connector have the identical pin assignment i.e., each socket can be used either for synchronization or power purposes. Restrictions are described in Section Chapter 2, "Safety Instructions," on page 10. The OptoLyzer MOCCA device is intended to be powered by the wall power supply (optionally available) or by any other power supply which is capable to deliver 12 V and 1 A. If the wall power supply is not used, the included power cable has to be used to connect the 12 V supply to the OptoLyzer MOCCA device. For the pin out refer to Section 6.4, "Synchronization and Power," on page 26.</p>																	
S/PDIF IN / OUT	<p>These interfaces are only available on variants supporting the MOST technology. The output is compliant to the specification IEC 60958 [4] with 75 Ω and 0.5 Vpp (+ / -20%). The output is short circuit proof. The input circuit expects an unbalanced input and has an impedance of 75 Ω. Input sample rates from 32 to 96 kHz are accepted. For the pin out refer to Section 6.5, "Digital Audio In/Out (S/PDIF)," on page 27. The OptoLyzer MOCCA device offers the bidirectional transfer of audio streams between the MOST synchronous channel and the S/PDIF connectors. An audio stream on a MOST synchronous channel can be routed to the S/PDIF output of the device. It is also possible to route a digital audio stream from S/PDIF input of the device to the MOST synchronous channel at the same time. The bandwidth (16 bit mono/stereo or 24 bit stereo) specified for this interface is also used for the Analog Audio Out and vice versa. Rx and Tx transmission must cover the same bit number per channel. Examples:</p> <ul style="list-style-type: none"> ■ If a 24 bit signal is selected and activated for Tx transmission, only 24 bit transmission is supported for Rx transmission and vice versa. ■ If a 16 bit stereo signal is selected and activated for Tx transmission, both a 16 bit mono and 16 bit stereo signal transmission is supported for Rx transmission and vice versa. <p>The following tables describe which S/PDIF formats are supported by the OptoLyzer MOCCA device.</p> <p>Direction S/PDIF (IN) to MOST: S/PDIF data from an external S/PDIF source routed to the MOST network. The S/PDIF (IN) is routed through a sample rate converter. The signal can be either a 16 bit mono/stereo signal or a 24 bit stereo signal. It is possible to use either the S/PDIF IN or the Analog Line IN interface.</p> <table border="1" data-bbox="456 1266 1422 1465"> <thead> <tr> <th data-bbox="456 1266 634 1314">IN</th> <th data-bbox="634 1266 854 1314">MOST</th> <th data-bbox="854 1266 1422 1314">Supported Frame Rates</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1314 634 1388">16 bit / channel</td> <td data-bbox="634 1314 854 1388">16 bit / channel</td> <td data-bbox="854 1314 1422 1388">32 - 96 kHz</td> </tr> <tr> <td data-bbox="456 1388 634 1465">24 bit / channel</td> <td data-bbox="634 1388 854 1465">24 bit / channel</td> <td data-bbox="854 1388 1422 1465"></td> </tr> </tbody> </table> <p>Direction MOST to S/PDIF (OUT): S/PDIF data from the MOST network routed to an external S/PDIF sink. The signal can be either a 16 bit mono/stereo signal or a 24 bit stereo signal.</p> <table border="1" data-bbox="456 1562 1422 1749"> <thead> <tr> <th data-bbox="456 1562 634 1610">MOST</th> <th data-bbox="634 1562 854 1610">OUT</th> <th data-bbox="854 1562 1422 1610">Supported Frame Rates</th> </tr> </thead> <tbody> <tr> <td data-bbox="456 1610 634 1684">16 bit / channel</td> <td data-bbox="634 1610 854 1684">16 bit / channel</td> <td data-bbox="854 1610 1422 1684" rowspan="2">32 - 96 kHz</td> </tr> <tr> <td data-bbox="456 1684 634 1749">24 bit / channel</td> <td data-bbox="634 1684 854 1749">24 bit / channel</td> </tr> </tbody> </table>	IN	MOST	Supported Frame Rates	16 bit / channel	16 bit / channel	32 - 96 kHz	24 bit / channel	24 bit / channel		MOST	OUT	Supported Frame Rates	16 bit / channel	16 bit / channel	32 - 96 kHz	24 bit / channel	24 bit / channel
IN	MOST	Supported Frame Rates																
16 bit / channel	16 bit / channel	32 - 96 kHz																
24 bit / channel	24 bit / channel																	
MOST	OUT	Supported Frame Rates																
16 bit / channel	16 bit / channel	32 - 96 kHz																
24 bit / channel	24 bit / channel																	

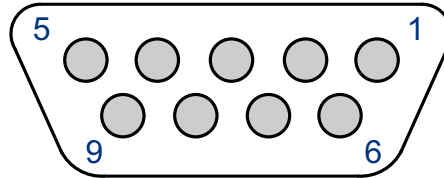
Chapter 6 Pin Assignment of the Connectors

6.1 High-Speed CAN

Connector type for both High-Speed CAN connectors: DE-9

Figure 6.1 shows the connector pin assignment as it is visible on the rear panel.

Figure 6.1 DE-9 Connector



The provided GND pins (Table 6.1) must not be used unless there is no other GND connection. These pins must not be used for supply purpose.

Table 6.1 Pin Assignment of Connector High Speed CAN 1/3/5

PIN NO.	SIGNAL	DESCRIPTION
1	CAN 5-Low	Low-level CAN 5 bus line
2	CAN 1-Low	Low-level CAN 1 bus line
3	GND	Signal ground
4	CAN 3-Low	Low-level CAN 3 bus line
5		Not connected
6		Not connected
7	CAN 1-High	High-level CAN 1 bus line
8	CAN 5-High	High-level CAN 5 bus line
9	CAN 3-High	High-level CAN 3 bus line

The table below is valid for both High-Speed CAN interfaces and CAN FD interfaces. If the CAN instances 2 and 6 are used as low speed or as single wire CAN interfaces, the instances are routed to the 'LIN / Low Speed CAN Single Wire CAN 2 / 6' interface ([Section 6.3, "LIN / Low Speed CAN and Single Wire CAN2/6," on page 26](#)). The provided GND pins must not be used unless there is no other GND connection. These pins must not be used for supply purpose.

Table 6.2 Pin Assignment of Connector High Speed CAN 2/4/6

PIN NO.	SIGNAL	DESCRIPTION
1	CAN 6-Low, CAN FD 6-Low	Low-level CAN 6 bus line, low-level CAN FD 6 bus line
2	CAN 2-Low, CAN FD 2-Low	Low-level CAN 2 bus line, low-level CAN FD 2 bus line
3	GND	Signal ground
4	CAN 4-Low	Low-level CAN 4 bus line
5		Not connected
6		Not connected
7	CAN 2-High, CAN FD 2-High	High-level CAN 2 bus line, high-level CAN FD 2 bus line
8	CAN 6-High, CAN FD 6-High	High-level CAN 6 bus line, high-level CAN FD 6 bus line
9	CAN 4-High	High-level CAN 4 bus line

6.2 LIN / FlexRay

Connector type (see [Figure 6.1](#)): DE-9

The provided GND pin must not be used unless there is no other GND connection. This pin must not be used for supply purpose.

Table 6.3 Pin Assignment of Connector LIN / FlexRay A/B

PIN NO.	SIGNAL	DESCRIPTION
1	LIN 3	3 rd LIN channel
2	Channel B BP	Positive bus line
3	GND	Signal ground
4	Channel A BM	Negative bus line
5	LIN 4	4 th LIN channel
6	LIN 5	5 th LIN channel
7	Channel B BM	Negative bus line
8	Channel A BP	Positive bus line
9	LIN 6	6 th LIN channel

6.3 LIN / Low Speed CAN and Single Wire CAN2/6

Connector type (see [Figure 6.1](#)): DE-9

The provided GND pin must not be used unless there is no other GND connection. This pin must not be used for supply purpose.

Table 6.4 Pin Assignment of Connector LIN / Low Speed CAN

PIN NO.	SIGNAL	DESCRIPTION
1	CAN 2-SW	High-level CAN 2 bus line (single wire)
2	CAN 2-Low	Low-level CAN 2 bus line (low speed)
3	GND	Signal ground
4	CAN 6-Low	Low-level CAN 6 bus line (low speed)
5	LIN 1	1 st LIN channel
6	LIN 2	2 nd LIN channel
7	CAN 2-High	High-level CAN 2 bus line (low speed)
8	CAN 6-SW	High-level CAN 6 bus line (single wire)
9	CAN 6-High	High-level CAN 6 bus line (low speed)

6.4 Synchronization and Power

Connector type: Binder sensor connector series 768, 3 pole, ordering number: 09 3419 82 03

Suitable female connector: Binder M8 IP40 series 768, 3 pole, ordering number: 99 3400 100 03

There are two connectors for synchronization and power. [Figure 6.2](#) shows the pin assignment as it is visible on the rear panel for these connectors. For more details about synchronization and power refer to [Section 2.1, "Supply and Synchronization,"](#) on page 10.

Figure 6.2 Pin Assignment of the Sync and Power Connector

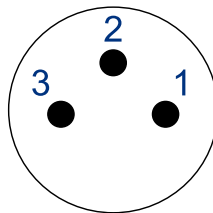


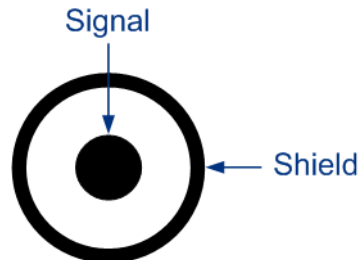
Table 6.5 Pin Assignment of the Sync and Power Connector

PIN NO.	SIGNAL	DESCRIPTION
1	12 V	Power supply
2	Sync	Synchronization line
3	GND	System ground

6.5 Digital Audio In/Out (S/PDIF)

Both digital connectors (S/PDIF In/Out) interface to a RCA phono socket.

Figure 6.3 Pin Assignment of the S/PDIF Connector

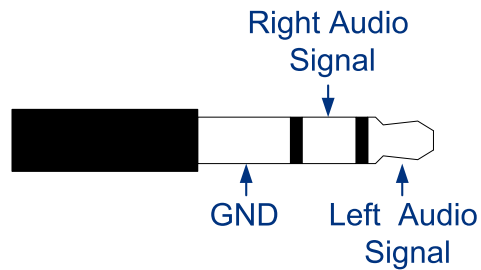


The input circuit expects an unbalanced input and has an impedance of 75 Ω . The shield connects to system ground.

6.6 Analog Audio In/Out

Both the stereo line-in and the stereo headphone output are connected to an audio phone connector.

Figure 6.4 Pin Assignment of the Analog Audio In/Out Connector



6.7 USB

The USB port is a standard USB 2.0 B-type receptacle.

6.8 Relay

The relay is able to switch 5 A as a potential free shutter. Please refer also to [Chapter 2, "Safety Instructions,"](#) on page 10.

Relay type:

- assembled connector type: RIA 31182102
- connector type to be plugged: RIA 31169102

The pin assignment below is described as it is visible on the front panel.

Table 6.6 Pin Assignment of the Relay Connector

PIN NUMBER	DESCRIPTION
1 (left pin)	Shutter input
2 (right pin)	Shutter output

6.9 Trigger/ECL

This connector provides two pins: The upper pin is for connecting the Trigger/ECL signal, the lower pin for connecting GND.

Connector type:

- assembled connector type: Molex 43045-0201
- connector type to be plugged: Molex 43025-0200

Table 6.7 Technical Values

PARAMETER	VALUE
Frequency	0..20 kHz
V_{Out}	7..16 V
R_{out}	20..60 k Ω
$V_{In, Low, Max}$	0.4 V_{Bat}
$V_{I, High, Min}$	0.6 V_{Bat}
$V_{In Hysteresis}$	0.175 V_{Bat}

6.10 MOST Network Connector

6.10.1 MOST50 Network Electrical Connector

Connector type: AMP 1376350-1

Figure 6.5 shows the pin assignment as it is visible on the front panel.

Figure 6.5 PIN Assignment of the MOST50 Network Connector

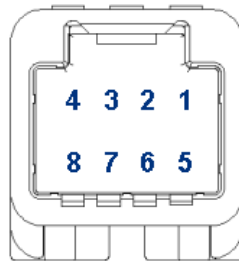


Table 6.8 Pin Assignment of the MOST50 Network Connector

PIN NUMBER	DESCRIPTION
1, 4, 5, 8	Not connected
2	ETXP
3	ETXN
6	ERXN
7	ERXP

6.10.2 MOST150 Network Optical Connector

Connector type: Tyco Micro FOT (2+0).

The orientation of the Rx and Tx path is printed on the panel.

The MOST150 Network connector is designated for a 2+0 optical header cable. The direction is visible on the cable:

- Tx: Optical output for MOST network
- Rx: Optical input for MOST network

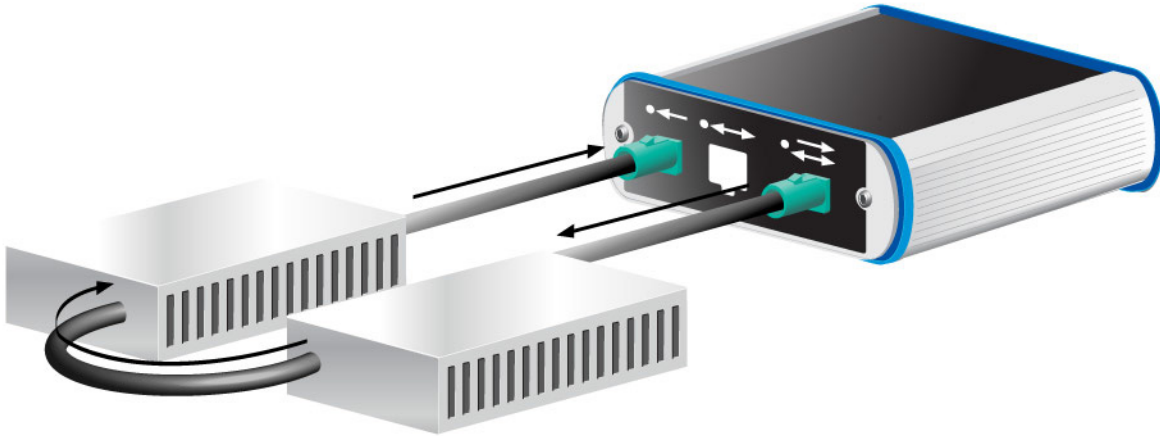
6.10.3 MOST150 Network Coaxial Connector

Connector type: 59S20X-40ML5-Z FAKRA

Three different use cases are supported. They are shown together with the appropriate connection diagrams in the following sections. Each use case presents logically a ring, even if the devices are physically connected by one cable (e.g., duplex endpoint use case). For more details about the coaxial interfaces refer to [Table 5.1 on page 19](#).

6.10.3.1 Simplex Use Case

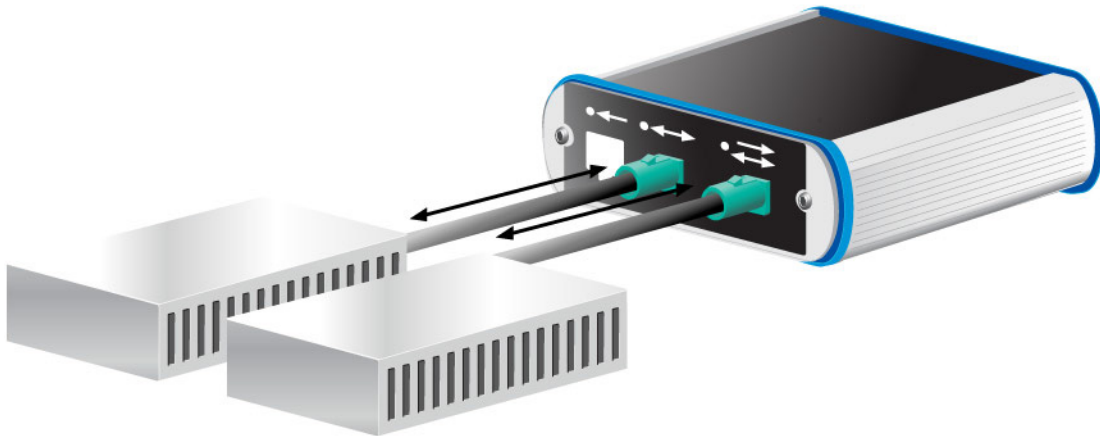
Figure 6.6 Simplex Use Case



In this use case the OptoLyzer MOCCA compact 150c observes and participates in a simplex ring. Data is transmitted in one direction. Thereby the single-headed arrow shows the direction. The OptoLyzer MOCCA compact 150c can appear as an extra node in the ring.

6.10.3.2 Duplex Use Case

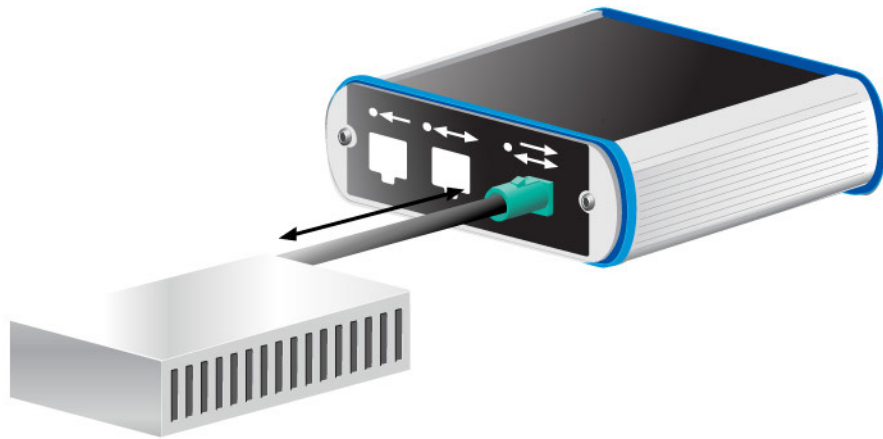
Figure 6.7 Duplex Use Case



In this use case the OptoLyzer MOCCA compact 150c observes and participates in a duplex ring e.g., between a head unit and a camera. Data is transmitted in both directions indicated by double-headed arrows. The OptoLyzer MOCCA compact 150c can appear as an extra node in the ring.

6.10.3.3 Duplex Endpoint Use Case

Figure 6.8 Duplex Endpoint Use Case



In this use case the OptoLyzer MOCCA compact 150c observes and participates at one end in a duplex ring e.g., is acting either as a head unit or a camera. Data is transmitted in both directions indicated by a double-headed arrow. The OptoLyzer MOCCA compact 150c can appear as an extra node in the ring.

Chapter 7 Technical Specifications

The table below covers characteristics of the OptoLyzer MOCCA device and its networking interfaces.

Table 7.1 Device and Bus Characteristics

PARAMETER		VALUE
RAM		512 kB external / 240 kB internal
Flash Memory		2 MB internal
Controllers		
µController		Renesas V850E2/FL4-H @ 160 MHz
CAN Transceivers		
	CAN FD	MCP2562FD
	Low-Speed CAN Transceiver	NXP TJA 1055
	High-Speed CAN Transceiver	NXP TJA 1041
	Single-Wire CAN Transceiver	On Semiconductor® NCV7356
FlexRay Transceiver		NXP TJA 1080
LAN Transceiver		Microchip LAN89218
LIN Transceiver		SN65HVDA195
MOST Network Controllers and Transceivers		
	MOST25 (optical)	Microchip OS81050
	MOST50 (electrical)	Microchip OS81082
	MOST150 (optical)	Microchip OS81110
	MOST150 (coaxial)	Microchip OS81110 Microchip OS82150
S/PDIF		I/O electrical via 2 x cinch, input sample rate 32 - 96 kHz
USB		Cypress EZ-USB 2.0

The table below covers mechanical characteristics of the OptoLyzer MOCCA device.

Table 7.2 Mechanical Characteristics

PARAMETER	VALUE	UNIT
Dimensions (H x W x D)	45 x 112 x 116	mm
Weight	360	g
Ambient Temperature Range	-40..+70	°C

The table below covers electrical characteristics of the OptoLyzer MOCCA device.

Table 7.3 Electrical Characteristics

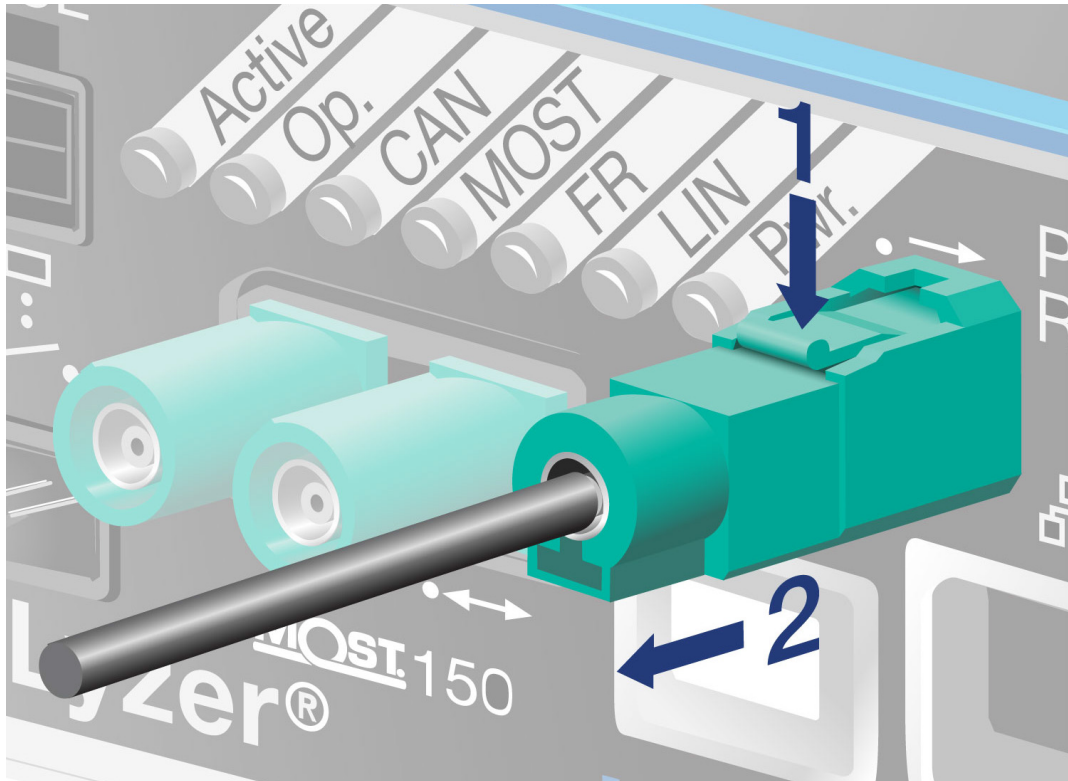
PARAMETER	MIN	TYP	MAX	UNIT	COMMENT
Operating Voltage Range	7		16	V	
OptoLyzer MOCCA compact device Current Consumption (operation)		500		mA	
OptoLyzer MOCCA CL Current Consumption (operation)		150		mA	
OptoLyzer MOCCA FD, CLF Current Consumption (operation)		210		mA	
Current Consumption (sleep)		< 1		mA	
Relay for external load (potential free shutter)			5	A	@ 12 V DC

Chapter 8 Maintenance

8.1 How to Release cPHY Connector

Figure 8.1 shows how a cPHY connector of the OptoLyzer MOCCA compact 150c can be released or exchanged.

Figure 8.1 How To Release cPHY Connector



Follow these steps:

1. Press the locking tab of the snap-on coupling.
2. Pull the jack away from the device while still pressing the locking tab.

Chapter 9 Revision History

Table 9.1 Customer Revision History

REVISION LEVEL	SECTION/FIGURE/ ENTRY	CORRECTION
DS60001258E	Section 1.2, "Scope of Delivery," on page 6	Proper cable names inserted.
	Section 1.3, "Device Variants," on page 7	OptoLyzer MOCCA LAN added, remarks added below table.
	Section 1.4, "Definitions of Terms," on page 8	ECU removed.
	Section 2.1, "Supply and Synchronization," on page 10	Paragraph adapted, new cable names inserted.
	Section 2.3, "Restrictions in Operation," on page 10	Figure 2.2 added.
	Section 4.1, "Feature Summary," on page 12	FlexRay A/B added.
	Section 4.3.2, "CAN FD," on page 15	Valid prescaler values added for 500 kbit/s and above.
	Section 4.3.7, "Sleep Mode," on page 17	CAN channels listed.
	Section 5.2, "Rear Panel," on page 22	Note below Figure 5.2: Description improved.
	Section 6.1, "High-Speed CAN," on page 24	CAN channel numbers added in tables.
	Section 6.4, "Synchronization and Power," on page 26	Correction of the Binder connectors
Section Chapter 7, "Technical Specifications," on page 32	OS82150 added.	
DS60001258D	All	OptoLyzer MOCCA FD added.
	Chapter 4, "Introduction," on page 12	CAN FD added
	Section 4.2, "Block Diagram," on page 13	Block diagrams added for OptoLyzer MOCCA CAN FD variant.
	Section 4.3, "Properties of Supported Bus Systems," on page 15	New Section 4.3.2 referring to CAN FD.
	Section 5.2, "Rear Panel," on page 22	CAN FD description added in Table 5.3.

Table 9.1 Customer Revision History (continued)

REVISION LEVEL	SECTION/FIGURE/ ENTRY	CORRECTION
DS60001258D cont	Section 6.1, "High-Speed CAN," on page 24	CAN FD added in Table 6.2 : Pin: 1, 2, 7, 8.
	Chapter 7, "Technical Specifications," on page 32	CAN FD transceiver added in Table 7.1 . Typical values added for current consumption (Table 7.3).
DS60001258C	All	OptoLyzer MOCCA CL added.
	Section 1.3, "Device Variants," on page 7	Table added that shows the feature set supported by the different OptoLyzer MOCCA devices.
	Section 2.2, "Relay," on page 10	2.3 added.
	Section 4.3, "Properties of Supported Bus Systems," on page 15	Block diagrams added for OptoLyzer MOCCA CLF variant, CL variant.
	Section 4.3, "Properties of Supported Bus Systems," on page 15	Section 4.3.1.2 renamed (now: Fault Tolerant Transceiver). Ranges added in Section 4.3.1.3 . Accuracy of time stamp added for spy in Section 4.3.5 . Figure 4.5 renamed.
	Section 5.1, "Front Panel," on page 18	Description corrected and improved in Table 5.1 .
	Section 5.2, "Rear Panel," on page 22	Description of rear panel corrected and improved (e.g., note added below Figure 5.2).
	Section 6.4, "Synchronization and Power," on page 26	Connector types added.
	Section 6.9, "Trigger/ECL," on page 28	Title changed. It refers also to triggers. $V_{In\ Hysteresis}$ corrected.
	Chapter 7, "Technical Specifications," on page 32	Typical values added for current consumption (Table 7.3).
DS60001258B	Section 4.2, "Block Diagram," on page 13	Figure 4.1 : LIN Transceiver corrected: SN65HVDA195
DS60001258A	All	New: OptoLyzer compact 150c variant. DS number replaces version number. ISBN number inserted (cover page). General improvement of wording.
	Section 1.4, "Definitions of Terms," on page 8	New terms added: cPHY, ePHY and oPHY
	Section 2.3, "Restrictions in Operation," on page 10	New section
	Section 4.1, "Feature Summary," on page 12	MOST feature adapted, new feature added: support of simplex, duplex and duplex endpoint use cases
	Section 4.2, "Block Diagram," on page 13	cPHY added for MOST connector.

Table 9.1 Customer Revision History (continued)

REVISION LEVEL	SECTION/FIGURE/ ENTRY	CORRECTION
DS60001258A cont	Section 4.3.5, "MOST," on page 16	Description improved (StressNIC for MOST can be connected optionally), Figure 4.5 modified.
	Section 4.3.5.1, "MOST50," on page 16	Currently 512Fs are used (1024Fs removed).
	Section 4.3.5.4, "StressNIC for MOST," on page 17	Description improved: light/lock stress -> light (activity)/lock stress
	Section 4.3.6, "Ethernet," on page 17	Description improved (relating to MAC address).
	Section 4.3.7, "Sleep Mode," on page 17	Description improved (hint added that software is needed to control sleep mode).
	Section 5.1, "Front Panel," on page 18	Figure 5.1 : cPHY variant of MOST150 added. Table 5.1 : New cPHY interfaces added. Description of "Program Reset" button extended. Table 5.2 : Power icon replaced by 'Pwr.'.
	Section 6.10.3, "MOST150 Network Coaxial Connector," on page 29	New section
	Chapter 7, "Technical Specifications," on page 32	Low Speed CAN Transceiver changed from NXP TJA 1054 to NXP TJA 1055.
	Chapter 8, "Maintenance," on page 34	New chapter
Rev. 1.0 (04-29-13)	Initial Version	

Further Information

For more information on K2L automotive products, including integrated circuits, software, and MOST® development tools and modules, visit our web site: <http://www.K2L.de>. Direct contact information is available at: <http://www.K2L.de/contact>.

K2L GmbH & Co. KG
Emmy-Noether-Str. 14
76131 Karlsruhe
Germany

Technical Support

Contact information for technical support is available at: <http://www.K2L.de/contact>.