

	Project: SLA – 4C – GMSL		
	Document: Technical Datasheet		
	Rev: 10	Date: 26. April 2023	Company: AED Vantage GmbH

SLA – 4C – GMSL

Technical Datasheet

Classification: Public

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Author: T. Averka

REVISION HISTORY			
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09	2023-02-07	P. Zimmer	New AED logo Added max GPIO toggle rate Update additional devices Document classification to public
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Terms and Acronyms

Term/Acronym	Definition
CPU	Central Processing Unit
DLM	Data Logger Module
ECU	Electronic Control Unit
ECUlink	Name used for the interface to ECU specific Adapter Board connecting to ECU debug interfaces
FPGA	Field-Programmable Gate Array
FW	Firmware
GMSL	Maxim Gigabit Multimedia Serial Link
HIL	Hardware In The Loop
HW	Hardware
ICMP	Internet Control Message Protocol
IP	Intellectual Property
IP v4	Internet Protocol version 4
JTAG	Joint Test Action Group
MFP	Multi-Functional Pin
MIPI	Mobile Industry Processor Interface
MIPI CSI-2	MIPI Camera Serial Interface 2
MPO/MTP	Multi-fiber Termination Push-on
MTA	Messtechnikadapter (Measurement Equipment Adapter)
MTBF	Mean Time Between Failures
MTU	Maximum Transmission Unit
PCB	Printed Circuit Board
PHY	Physical layer of the OSI model and/or the circuitry required to implement it.
PLP	Probe-Logger Interface Protocol
PoC	Power over Coax
PTP	Precision Time Protocol
SerDes	De-/serializer pair of blocks: hardware for serial/parallel intercommunication
SFP+	Small Form-factor Pluggable (10Gb/s capable)
SLA	Serdes Data Logging Adaptor
STP	Shielded Twisted Pair
SW	Software
tbd	To Be Determined
TCP	Transmission Control Protocol
TDMA	Time-Division Multiple Access
UART	Universal Asynchronous Receiver Transmitter
USB	Universal Serial Bus

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1 Introduction

1.1 Abstract

The Serdes Data Logging Adapter (SLA) is part of the measurement infrastructure used in test vehicles with ECU systems based on with MIPI CSI-2 sensors. The SLA is one of several Measurement Equipment Adapter (MTA) devices, often also referred to as “probe”, used for logging of data during test drives.

SLA-4C-GMSL: 4 MIPI CSI-2 channels based on Coax connectors, Maxim GMSL2 Serdes interface

- Initial variant
- For applications requiring logging of multiple (up to 4) Serdes GMSL2 channels



Figure 1.1: SLA - 4C-GMSL Device.

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2 Overview – SLA-4C

2.1 Functional description

The SLA may operate in one of the following general modes:

- Sleep Mode -1
- Transparent Mode 0
- Logging Mode 1
- HIL Mode 2
- Sensor operation Mode 3

2.1.1 Sleep Mode: -1

Low-power mode for minimal power consumption; almost all circuitry powered-down.

The SLA is only monitoring for wake events to power-up again. Possible Wake events are:

- Trigger event at Wake1 input
- Trigger event at Wake2 input
- PoC voltage changes to active at any of the SerDes Out channels

In Sleep Mode (-1) all interfaces of the SLA are disabled including the Control Ethernet port.

Upon a wake event is being observed the SLA's circuitry will boot-up and enter the operating mode pre-defined by configuration.

The SLA may enter Sleep Mode (-1) by any of the following conditions:

- All PoC voltages turn to zero AND a configurable timeout exceeds (PoC supervision can be disabled)
- By configuration command via Control port

2.1.2 Transparent Mode: 0

In Transparent Mode (0) data received at a SerDes input of any channel will be forwarded to the respective SerDes output.

There won't be any data sent to the DLM via Data link.

The Control Ethernet port is enabled and may be used to change the SLA's configuration and Operating mode.

2.1.3 Logging Mode: 1

In Logging Mode (1) data received at a SerDes input of any channel will be forwarded to the respective SerDes output.

Simultaneously data will be processed for logging (time-stamped, optionally compressed, packetized) and sent to the DLM via Data link.

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The Control Ethernet port is enabled and may be used to change the SLA's configuration and Operating mode.

2.1.4 HIL Mode: 2

In HIL Mode (2) data received via the Data link from the HIL Server will be processed (de-packetized, optionally uncompressed) and (re-)injected to the ECU via the SerDes out ports. This mode can be used for both the Open-loop HIL mode reinjecting previously recorded data and the Closed-loop HIL mode injecting synthetic (simulated) data.

It is supported to log some of the debug interfaces (connected via Adapter Board) at the same time.

The Control Ethernet port is enabled and may be used to change the SLA's configuration and Operating mode.

2.1.5 Sensor Operation Mode: 3

The Sensor Operation Mode (3) is similar to the Logging Mode (1); however, there is no ECU connected to the SerDes output ports.

In Sensor Operation Mode (3) data received at a SerDes input will be processed for logging (time-stamped, optionally compressed, packetized) and sent to the DLM via Data link. If the sideband interface (I²C or SPI) is used for sensor configuration, the SLA will offer a method for this including

- Acting as master for the used sideband interface
- Run a sequence of transactions needed to statically configure the sensor

The Control Ethernet port is enabled and may be used to change the SLA's configuration and Operating mode.

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2.2 SLA-1C Block Diagram

Figure 2.1 is presented a detailed overview of the entire SLA system, main hardware blocks and their respective interconnections.

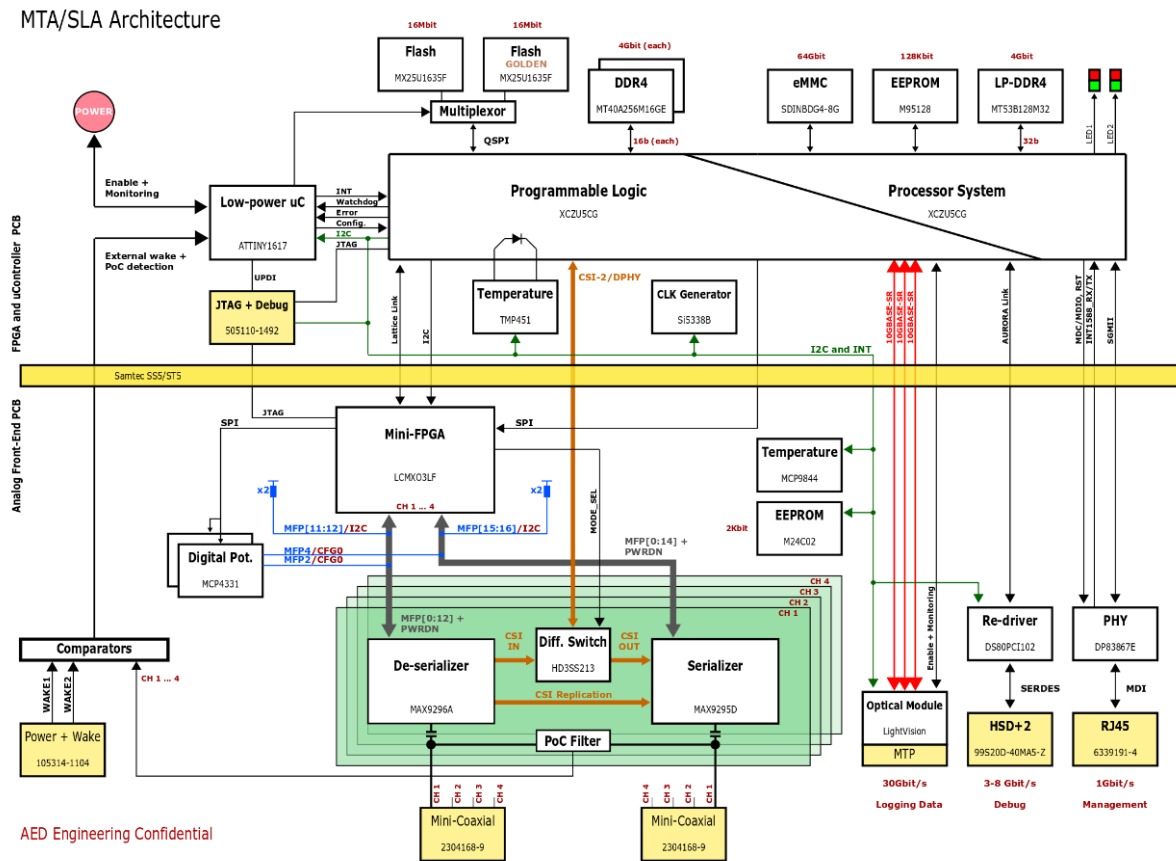


Figure 2.1: SLA Block Diagram – 4-channel Maxim Coax variant

2.3 Interfaces

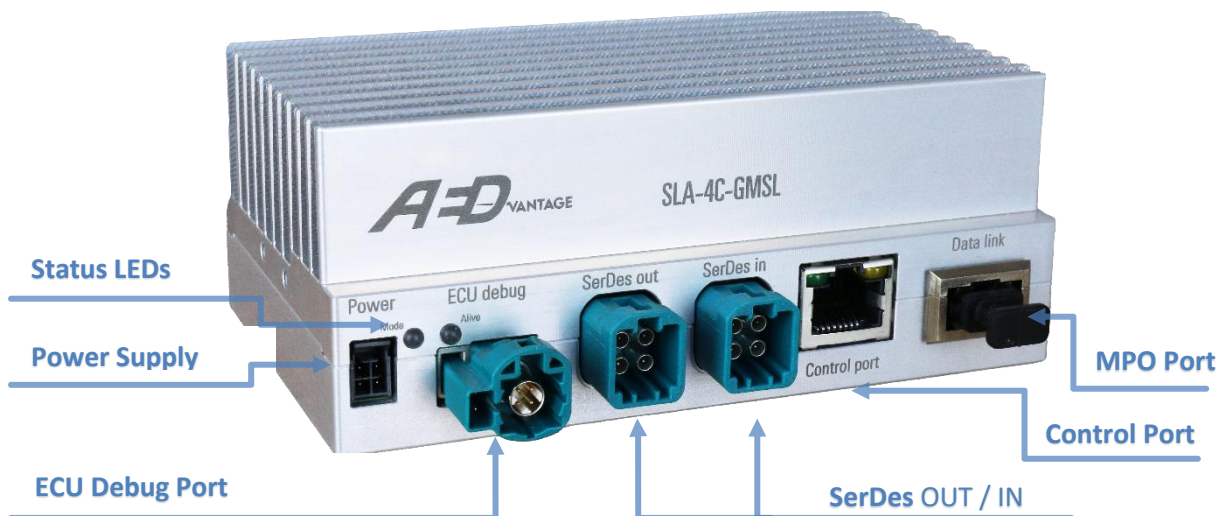


Figure 2.2: SLA - 4C-GMSL Interfaces.

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Power Supply

Supply voltage from 8 V to 16 V
Connector type Molex Nano-Fit 4 pin

SerDes GMSL

Connector type Coax TE Mate-AX 4 pos.
Forward Channel data rate up to 6 Gb/s
Back Channel data rate 187.5 Mb/s
PoC up to 500mA

MPO

Connector type MPO optical connector
Data rate 30 Gb/s
Number of ports 3x 10 Gb
Connection to Logger Device MPO to 3xLC

Control Port

Interface type 1000Base-T
Connector Type RJ45
Data rate 1 Gb/s
Indicators LEDs for Link and Activity

ECU Debug Port

Connector type Rosenberger HSD+2
Data rate 3.125 Gb/s
Protocol Aurora
Cable length up to 2m
Power supply Extension Board optionally
supplied from SLA
Output power available up to 8W

Status LED

left LED of the SLA

Green (continuous): Logging
Red (continuous): Replay

right LED of the SLA

Green (blinking): operational
Red (continuous): fault detected

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3 SLA-4C Specifications

3.1 Identification

Name	SLA-4C
Model	SLA-4C-GMSL/01

3.2 Processing

FPGA / CPU	XCZU5CG
	Dual-core ARM Cortex-A53
	ARM Cortex-R5
Memory:	DDR-4, LP DDR-4, eMMC

3.3 Absolute Maximum Ratings

	Min	Max
Supply voltage	8 V	16 V
Voltage drops (following LV 124)	4.5 V / 7 V	
	declared as non start-up relevant device	
GMSL 2 Input/Output Voltage	-0.3 V	3.9 V
ECU Debug port output current	@ 12 VDC	750mA VDC
Power over Coax		500mA VDC
Ambient temperature	-30 °C	+70 °C
Storage temperature	-40 °C	+85 °C

3.4 Electrical Data

Supply voltage		+8 VDC ... +16 VDC 12 VDC nominal
GMSL2 Output	peak-to-peak differential Voltage Swing	< 1000 mVp-p
GMSL2 Forward Channel		6 Gb/s
GMSL2 Back Channel data rate		187.5 Mb/s
GMSL2 Back Channel GPIO toggle rate	Maximum	26.79 kHz
GMSL2 Input / Output Termination		50 Ω
ECU Debug port Input / Output	peak-to-peak differential Voltage Swing	< 1200 mVp-p
ECU Debug port Differential Input / Output Termination		100 Ω
ECU Debug port output Power	@ 12 VDC	≤ 750 mA DC
Power consumption	Nominal	< 900 mA DC @ 12 VDC
	Maximum	< 1.5 A DC @ 12 VDC
	Standby	< 2 mA DC @ 12 VDC
Input protection		Integrated ceramic slow-blow fuse - Max 4A VDC
Short-circuit prove		durable

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3.5 Software

Update functionality

Web Interface
Secure Shell (ssh)

3.6 Environmental Conditions

3.6.1 Operating

operating temperature

-30 °C ... +70 °C

operating humidity

0 ... 95% RH non-condensing

3.6.2 Storage

storage temperature

-40 °C ... +85 °C

storage humidity

0 ... 99% RH non-condensing

3.6.3 Lifetime

MTBF

> 2500h

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3.7 Mechanical

Dimension	120 x 86 x 48 mm
Weight	Approx. 510 g
Material	Aluminum enclosure
Mounting	Side mounting brackets
IP code	IP30

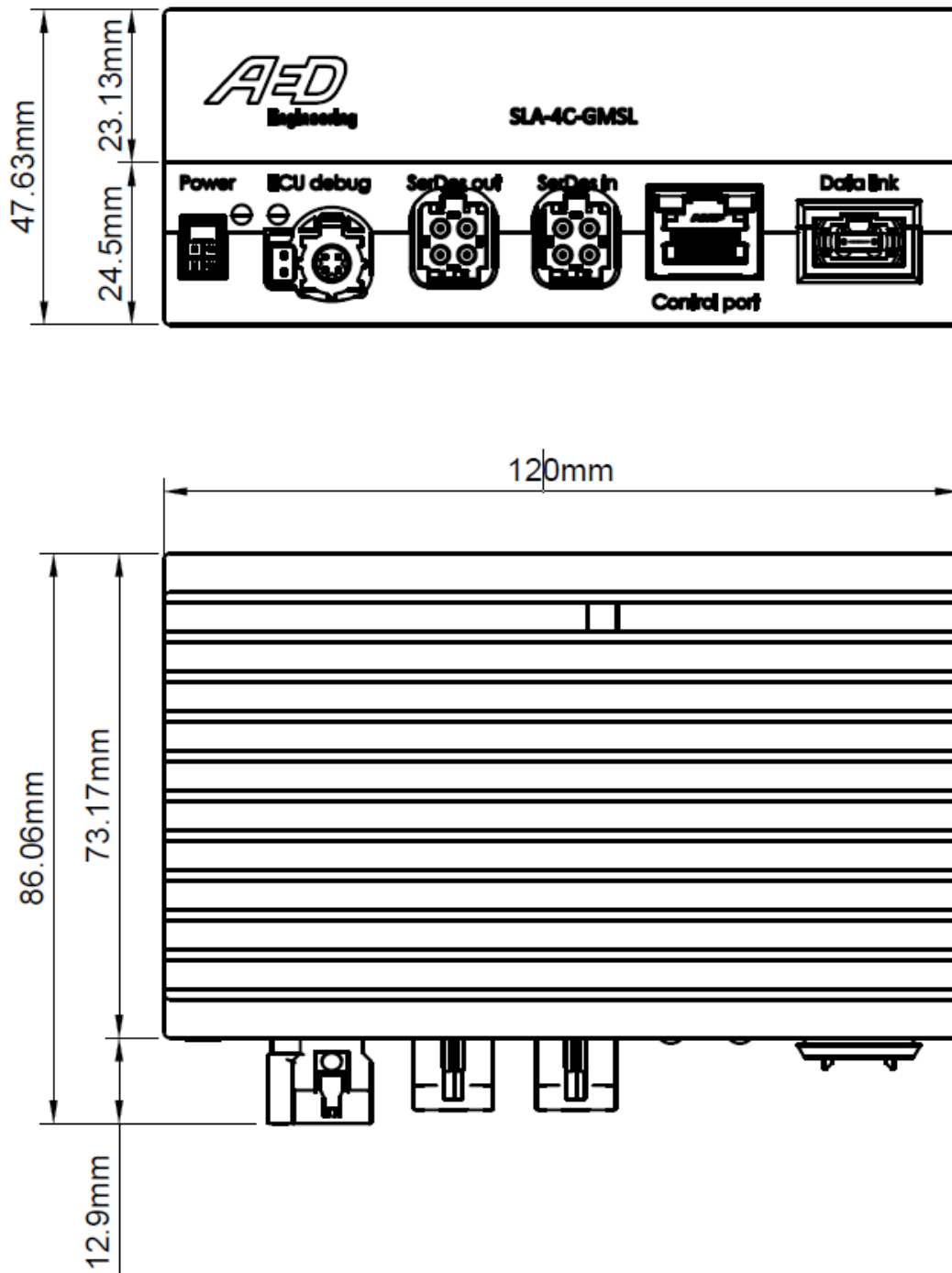


Figure 3.1: Mechanical outlines.

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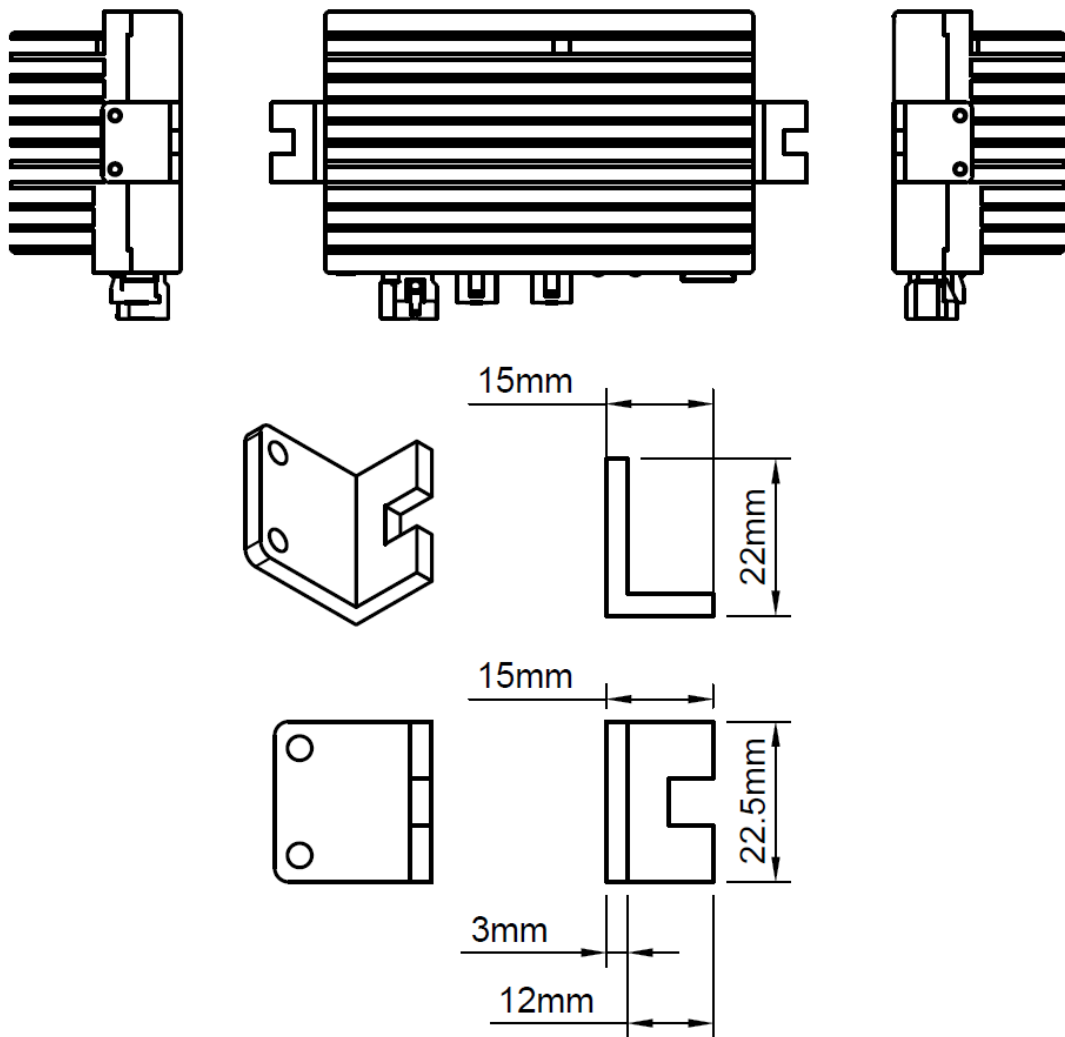


Figure 3.2: Mechanical Outlines

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4 Compliance / Approvals

General approvals	CE conformity	2014/30/EU
	Safety	EN 61010-1:2010
	RoHS	2011/65/EU
	EMC	EN 61326-1:2013 in parts
Automotive approvals	EMC	EN 50489:2010-07 in parts

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5 Order Information

5.1 Device

SLA – 4C – GMSL (MAXIM)

Order-No.: SLA-4C-GMSL/01

5.2 Accessories

Power Supply Cable (open end)	0.5 m	Order-No.:	CBL-004-0007-001
	2 m	Order-No.:	CBL-004-0002-001
	5 m	Order-No.:	CBL-004-0001-001
	10 m	Order-No.:	CBL-004-0008
ECU Debug port cable	1 m	Order-No.:	CBL-002-0001
	2 m	Order-No.:	CBL-002-0002
Ethernet Cable 1Gb	1 m	Order-No.:	CBL-003-0004
	2 m	Order-No.:	CBL-003-0010
	3 m	Order-No.:	CBL-003-0003
	8 m	Order-No.:	CBL-010-0004
	10 m	Order-No.:	CBL-003-0012
SFP+ Module + DAC cable passive 10Gb	1 m	Order-No.:	CBL-003-0002
	3 m	Order-No.:	CBL-003-0001
SFP+ Module		Order-No.:	CBL-003-0009
Optical ethernet cable OM3 10Gb	2 m	Order-No.:	CBL-003-0008
	3 m	Order-No.:	CBL-003-0013
	10 m	Order-No.:	CBL-003-0011
Optical ethernet cable OM4 10Gb	10 m	Order-No.:	CBL-003-0014
MATE-AX 4-pole plug housing with 2 Coax cables	8 m / 4 m	Order-No.:	CBL-001-0100
MATE-AX 4-pole plug housing with Coax cable	8 m	Order-No.:	CBL-001-0101
MATE-AX 4-pole plug housing to MATE-AX 6-pole plug housing with Coax cable	2 m	Order-No.:	CBL-001-0108

5.3 Additional devices

SLA – 4C10 – FPD (TI)

Order-No.: SLA-4C10-FPD

SLA – 1C – GMSL (MAXIM)

Order-No.: SLA-1C-GMSL

SLA – 1S – GMSL (MAXIM)

Order-No.: SLA-1S-GMSL

SLA – DCDC – ISO

Order-No.: SLA-DCDC-30W

SLA – AB-ADCAM-MID

Order-No.: AB-ADCAM-MID