Product Information

CompactPCI® Serial • SL2-BRASS

9-Port Gigabit Ethernet Switch

Document No. 8206 • 1 April 2020

General

The SL2-BRASS is a 9-port Gigabit Ethernet switch on a peripheral slot card for CompactPCI® Serial systems. The on-board Marvell® 88E6390 GbE switch provides a rich feature set and includes an integrated microprocessor to enable lightly managed operation.

While four 1000Base-T GbE ports are wired to associated M12 X-coded front panel receptacles, another four GbE ports are available for backplane communication via the CompactPCI® Serial connector P6.

M12 X-coded connectors are optimized for industrial applications, and also for railway usage. X-coded cables and connectors comprise four data signal pairs and comply with Cat6A. Hence, M12 X-coded installations are ready for the forthcoming 2.5/5/10G Ethernet.

As an option, the SL2-BRASS is available with an Intel® I210-IS Gigabit Ethernet controller (NIC) in addition, which is internally connected to an SerDes port of the GbE switch. Usage of the NIC is based on a PCIe Express® enabled CompactPCI® Serial slot (via backplane connector P1).

The Gigabit Ethernet switch provides latest features such as 802.1 Audio Video Bridging (AVB/TSN) and Quality of Service (QoS) support.

Multiple SL2-BRASS boards on a suitable CompactPCI® Serial backplane can be cascaded to a switch fabric with a scalable number of GbE ports, with or w/o a CPU card on the backplane system slot. When completed with a CompactPCI® Serial CPU board and an LTE module carrier card, a high performance router system can be configured.

SL2-0200-BRASS (w. Rear I/O Backplane Connector P6)

Feature Summary

General

▸ PICMG® CompactPCI® Serial standard (CPCI-S.0) peripheral slot card or system slot card
▸ Single Size Eurocard 3U 4HP 100x160mm^2
▸ CompactPCI® Serial backplane connectors P1, P6
▸ Suitable for PCIe® x 1 capable standard peripheral slots (for option on-board NIC)
▸ Suitable for CompactPCI® Serial backplane with star archtitecture Ethernet (P6)

Front Panel I/O

▸ 4 x M12 X-coded front panel GbE receptacles, rail approved, Cat6A, IEC 61076-2-109
▸ 1000BASE-T, 100BASE-TX, 10BASE-T compliant data transfer rate front ports
▸ Future proof investment into cabling infrastructure - up to 10Gbps with M12 Cat6A
▸ M12 X-coded to RJ45 connector Cat6A cable assemblies available from several suppliers

Backplane I/O (Option)

▸ CompactPCI® Serial backplane connector P1 used for PCI Express® x 1 lane to optional Intel® I210-IS Gigabit Ethernet Controller
▸ Option GbE backplane communication - CompactPCI® Serial backplane connector P6 used for 4 x GbE over backplane
▸ CompactPCI® Serial star type Ethernet architecture backplane suitable for control via system slot CPU card, up to eight SL2-BRASS individually connected to system slot CPU P6 Ethernet ports, for a total of up to 32 x M12 linked front panel switch ports (link type depends on CPU card P6 solution either switch or NIC)
▸ CompactPCI® Serial star type Ethernet architecture backplane suitable for cascading of up to five SL2-BRASS w/o CPU card, one SL2-BRASS master (system slot) is wired via P6 to a maximum of four SL2-BRASS slave boards (peripheral slots), for a total of up to 20 x M12 directly interconnected front panel switch ports
▸ CompactPCI® Serial backplane w/o P6, suitable for CPU control over up to eight SL2-BRASS by means of the optional on-board NIC, for a total of up to 32 x M12 front panel switch ports, for highest application flexibility (routers, LAN segmentation e.g.)

Gigabit Ethernet Switch

▸ Marvell® 88E6390 based Gigabit Ethernet switch (in use 8 x GbE MAC/PHY 1000BASE-T, 1 x GbE MAC SerDes)
▸ High performance, non-blocking, Gigabit Ethernet
▸ Support for up to 16K MAC addresses, 10KByte Jumbo Frames
▸ Supports 802.1 Audio Video Bridging (AVB) Gen 2
▸ Time Sensitive Networking (TSN) Standards, IEEE 1588v2 one-step PTP
▸ Synchronous Ethernet
▸ Quality of Service (QoS) support with 8 traffic classes
▸ Supports 4096 802.1Q VLANs, three levels of 802.1Q security
▸ Unmanaged or managed solution
▸ Integrated microprocessor (IMP) enables enhanced managed switch designs (customer programming)
▸ IMP GUI debugger w. ANSI C compiler & assembler available on request from Marvell®
▸ Remote (in-band) management available on request via Marvell® SOHO Switch GUI Software
▸ Configurable in-band management through SerDes switch port (connected to the optional on-board NIC), or GbE PHY switch port via P6 backplane Ethernet (1_ETH)

Gigabit Ethernet Controller (Option)

▸ Intel® I210-IS Gigabit Ethernet controller internally wired to GbE switch via SerDes
▸ 9.5KB Jumbo Frame support
▸ Hardware-based time stamping (IEEE 1588) and support for 802.1AS
▸ Option IEEE 802.1Qav compliant Audio-Video Bridging (AVB)
▸ IPv4, IPv6, TCP/UDP checksum offloads
▸ Based on PCI Express® x 1 from CompactPCI® Serial backplane connector P1
▸ Driver support for all major operating systems

Applications

▸ Scalable (modular) GbE switching based on 19-inch rack mounting
▸ Light in-band management
▸ Industrial networks - IoT - TSN
▸ Railway usage via front panel M12 cabling

Environmental, Regulatory

▸ Designed & manufactured in Germany
▸ Certified quality management according to ISO 9001
▸ Long term availability
▸ Rugged solution
▸ Coating, sealing, underfilling on request
▸ RoHS compliant
▸ Operating temperature 0°C to +70°C (commercial temperature range) available
▸ Operating temperature -40°C to +85°C (industrial temperature range) available
▸ Storage temperature -40°C to +85°C, max. gradient 5°C/min
▸ Humidity 5% ... 95% RH non condensing
▸ Altitude -300m ... +3000m
▸ Shock 15g 0.33ms, 6g 6ms
▸ Vibration 1g 5-2000Hz
▸ MTBF 54.5 years
▸ EC Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)
▸ Power consumption 12V/0.4A max.

SL2-0100-BRASS (w/o Backplane Connector P6)

Theory of Operation

As the main component, the SL2-BRASS is equipped with a Marvell® 88E6390 Gigabit Ethernet switch. This device provides eight ports with integrated Gigabit Ethernet transceivers (PHY) and another three MAC ports with digital interfaces (2 x SerDes, 1 x RGMII).

A total of nine GbE ports are in use on-board, wired to the front panel receptacles (4), and the CompactPCI® Serial backplane connector P6 (up to 4). One of the SerDes ports is connected internally to the optional on-board Gigabit Ethernet controller.

The SL2-BRASS can be inserted into any CompactPCI® Serial peripheral slot. A single PCI Express® lane would be sufficient for communication via the on-board Gigabit Ethernet controller. The CompactPCI® Serial backplane connector P1 is populated anyway, for +12V power supply.

The backplane connector P6 will be provided as an option, to be used with a Gigabit Ethernet star architecture, which would allow to cascade up to eight SL2-BRASS cards with or w/o need of a CPU card.
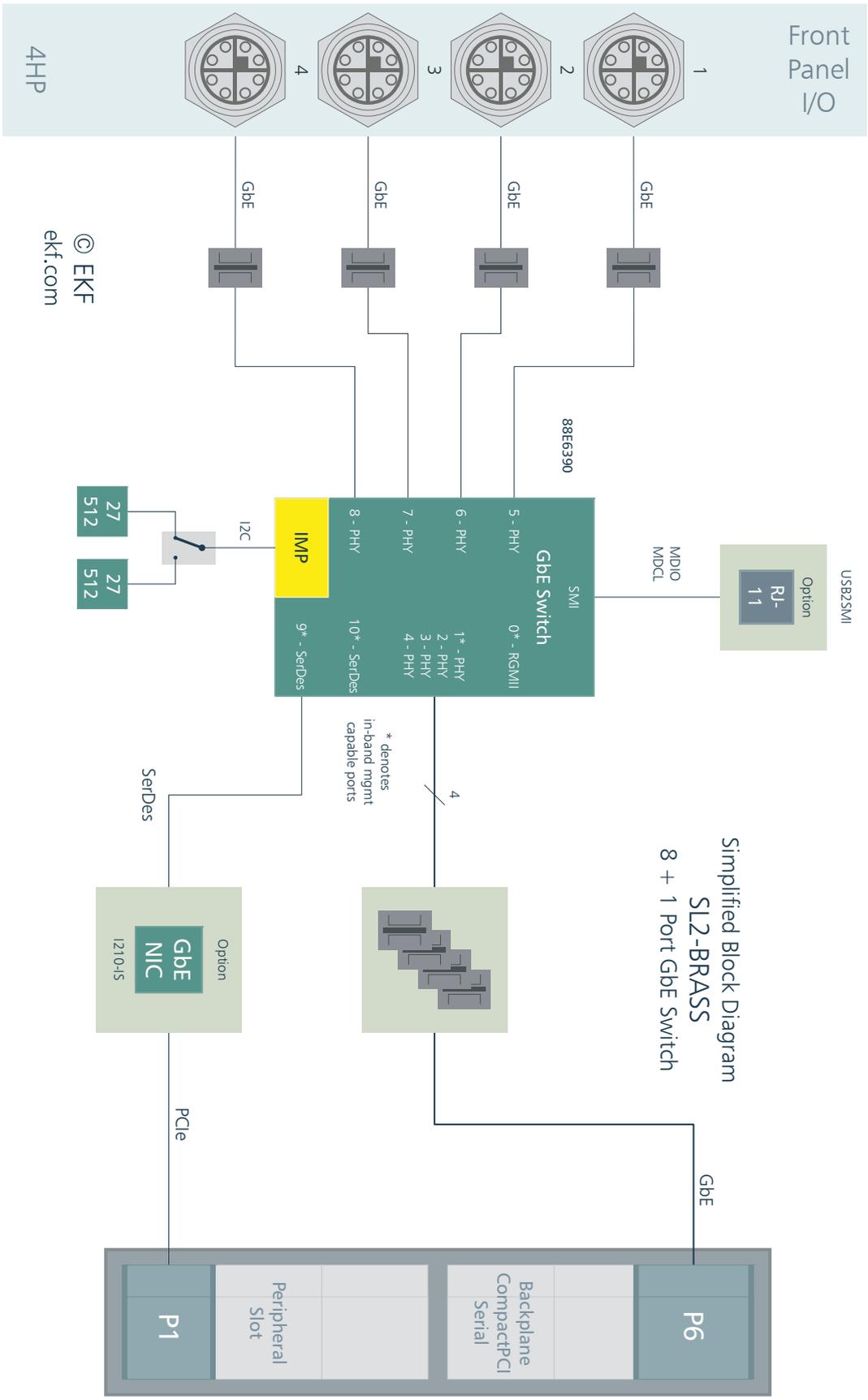

Scalable Design for Increased Number of Ports

Switch Management

By default, the SL2-BRASS comes self-managed. As an option, slight remote (in-band) management is available, by means of a Windows® based diagnostics tool, the Marvell® SOHO Switch GUI. Please contact support@ekf.de for details.

Remote management can be enabled either for the SerDes switch port internally connected to the optional I210 NIC, or for the switch port assigned to the backplane connector P6/1_ETH (neither path activated for management by default).
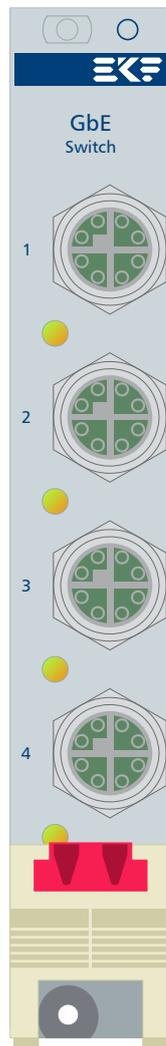
The Marvell® 88E6390 Gigabit Ethernet switch comprises an integrated microprocessor (IMP). This is a 200MHz CPU with on-chip RAM, which can be used to implement enhanced remote switch management, to execute protocols like Spanning Tree (RSTP), and offload time critical protocols like PTP. The IMP boots from EEPROM, and includes a NIC which is internally connected to the switch fabric (12th port). The CPU is fast enough to echo more then 100,000 Ethernet frames per second. ANSI C & Assembler development tools are supported by Marvell's IMP GUI package.

Block Diagram

Front Panel I/O

4HP

4   3   2   1

GbE   GbE   GbE   GbE

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88E6390

27 512
27 512

I2C

IMP

8 - PHY
7 - PHY
6 - PHY
5 - PHY

GbE Switch

9* - SerDes
10* - SerDes
4 - PHY
3 - PHY
2 - PHY
1* - PHY
0* - RGMII

SMI

MDIO
MDCL

Option
RJ-11

USB2SMI

SerDes

* denotes
in-band mgmt
capable ports

4

Option
GbE NIC
I210-IS

Simplified Block Diagram
SL2-BRASS
8 + 1 Port GbE Switch

PCIe

GbE

P1

Peripheral Slot

Backplane CompactPCI Serial

P6

Front Panel

SL2-BRASS

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LEDs (blink = activity)
green = 100Mbps link
orange = 1Gbps link

M12-X Front Panel Connectors

Please note: The front handle is provided with a built-in microswitch, which is used to disable the on-board power circuit when released. Vice versa, the *on-board devices are enabled not before the handle gets locked*. Please refer to the illustration below and make sure that the eject lever has reached its final position for proper board operation, as shown in picture 8. A gentle click should be audible, when the red actuator pin moves into its raised position, indicating that the board is locked and ready for use.
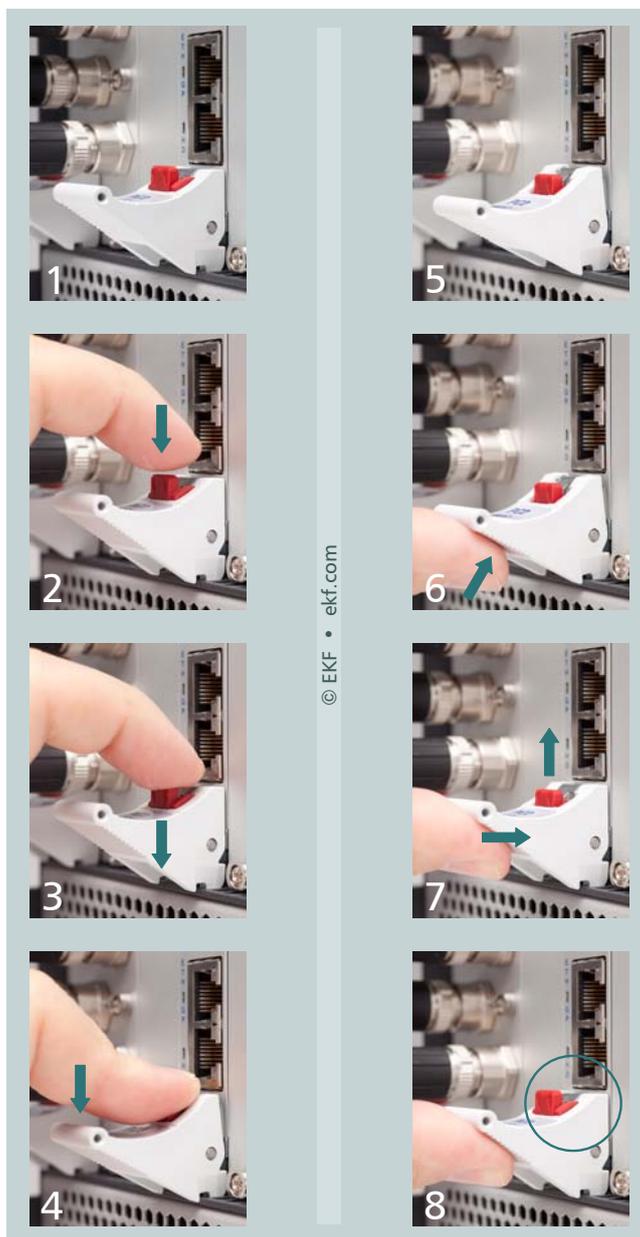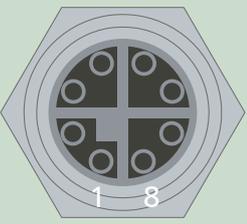

1 - 4: remove board
5 - 8: install board

1 & 8: on-board power enabled
2-7: on-board power disabled

M12 X-Coded Front Panel Receptacles 1 - 4

M12 X-Coded Front Panel I/O Receptacles 1 - 4			
Gigabit Ethernet • 271.12.008.20 • M12-X Flush-type socket 1+10 Gigabit Ethernet			
271.12.008.00 © EKF • ekf.com Draft - Do Not Scale 1 8 F/P LEDs yellow=1Gbit/s green=100Mbit/s off=10Mbit/s on=link established blinking=activity (data)	Ports 1-4	1	MDX0+
		2	MDX0-
		3	MDX1+
		4	MDX1-
		5	MDX3+
		6	MDX3-
		7	MDX2-
		8	MDX2+

The pin numbers of an M12 X-coded connector do not reflect the RJ45 Gigabit Ethernet signal assignment. For cross-over patch cables M12 to RJ45 please refer to the table below.

M12 X	Signal Colors T568B	RJ45
1	MDX0+ white/orange	1
2	MDX0- orange	2
3	MDX1+ white/green	3
4	MDX1- green	6
5	MDX3+ white/brown	7
6	MDX3- brown	8
7	MDX2- white/blue	5
8	MDX2+ blue	4

Suitable industrial Gigabit Ethernet M12 cable assemblies can be ordered from EKF, or directly from well-known cable and connector manufacturers e.g. Metz, Phoenix, Escha and many others.

X-Coded M12 Cable Assemblies Available

M12 to M12 Cable
Phoenix Contact

M12 Cable Connector
Phoenix Contact

M12 to RJ45 Cable
Phoenix Contact

M12 Gigabit Ethernet Cable Assembly

Ordering Information Cable Assemblies

Gigabit Ethernet cable M12 to M12: #271.14.008.xx (xx=length/meter)
Gigabit Ethernet cable M12 to RJ-45: #271.15.008.xx (xx=length/meter)

Backplane Connector P1

P1	A	B	C	D	E	F	G	H	I	J	K	L
P1 CompactPCI® Serial Peripheral Slot Backplane Connector EKF Part #250.3.1206.20.02 • 72 pos. 12x6, 14mm Width												
6	GND	*PE TX 02+*	*PE TX 02-*	GND	*PE RX 02+*	*PE RX 02-*	GND	*PE TX 03+*	*PE TX 03-*	GND	*PE RX03 +*	*PE RX03-*
5	PE TX 00+	PE TX 00-	GND	PE RX 00+	PE RX 00-	GND	*PE TX 01+*	*PE TX 01-*	GND	*PE RX 01+*	*PE RX 01-*	GND
4	GND	*USB2+*	*USB2 -*	GND	PE CLK+	PE CLK-	GND	*SATA TX+*	*SATA TX-*	GND	*SATA RX+*	*SATA RX-*
3	*USB3 TX+*	*USB3 TX-*	GA0	*USB3 RX+*	*USB3 RX-*	GA1	*SATA SDI*	*SATA SDO*	GA2	*SATA SCL*	*SATA SL*	GA3
2	GND	I2C SCL	I2C SDA	GND	*RSV*	*RSV*	GND	RST#	WAKE #	GND	PE EN#	*SYS EN#*
1	+12V	*STBY*	GND	+12V	+12V	GND	+12V	+12V	GND	+12V	+12V	GND

pin positions printed white/italic: not connected

Backplane Connector P6

P6	A	B	C	D	E	F	G	H	I	J	K	L
	P6 CompactPCI® Serial Peripheral Slot Backplane Connector EKF Part #250.3.1208.20.02 • 96 pos. 12x8, 18mm width											
8	GND	*8 ETH A+*	*8 ETH A-*	GND	*8 ETH B+*	*8 ETH B-*	GND	*8 ETH C+*	*8 ETH C-*	GND	*8 ETH D+*	*8 ETH D-*
7	*7 ETH A+*	*7 ETH A-*	GND	*7 ETH B+*	*7 ETH B-*	GND	*7 ETH C+*	*7 ETH C-*	GND	*7 ETH D+*	*7 ETH D-*	GND
6	GND	*6 ETH A+*	*6 ETH A-*	GND	*6 ETH B+*	*6 ETH B-*	GND	*6 ETH C+*	*6 ETH C-*	GND	*6 ETH D+*	*6 ETH D-*
5	*5 ETH A+*	*5 ETH A-*	GND	*5 ETH B+*	*5 ETH B-*	GND	*5 ETH C+*	*5 ETH C-*	GND	*5 ETH D+*	*5 ETH D-*	GND
4	GND	4 ETH A+	4 ETH A-	GND	4 ETH B+	4 ETH B-	GND	4 ETH C+	4 ETH C-	GND	4 ETH D+	4 ETH D-
3	3 ETH A+	3 ETH A-	GND	3 ETH B+	3 ETH B-	GND	3 ETH C+	3 ETH C-	GND	3 ETH D+	3 ETH D-	GND
2	GND	2 ETH A+	2 ETH A-	GND	2 ETH B+	2 ETH B-	GND	2 ETH C+	2 ETH C-	GND	2 ETH D+	2 ETH D-
1	1 ETH A+	1 ETH A-	GND	1 ETH B+	1 ETH B-	GND	1 ETH C+	1 ETH C-	GND	1 ETH D+	1 ETH D-	GND

pin positions printed white/italic: not connected

## SMI Switch Management (Option)

The SL2-BRASS may be optionally provided with an RJ11 jack for attachment of the Marvell® USB-2-SMI adapter module. The Windows® based Marvell® SOHO-GUI is an engineering (diagnostic) tool for experienced users which allows access to the GbE switch internal registers and tables. The USB-2-SMI is connected to the SL2-BRASS by means of a four lead cable (only pins 2 - 5 from the table below in use). The USB-2-SMI adapter module must be ordered directly from Marvell®. Signing of a Marvell® non-disclosure agreement (NDA) may be required. Please contact your nearest Marvell® sales office or distributor in your area, which can be located at http://extranet.marvell.com/sales/.

| Option Serial Management Interface SMI/MDIO • 270.10.06.00 • RJ-11 Modular Jack		
	1	NC
	2	SMI DATA (MDIO)
270.10.06.00 © EKF • ekf.com	3	GND
	4	GND
	5	SMI CLOCK (MDC)
	6	NC

The SL2-BRASS can be configured also for remote in-band management across either the GbE NIC or P6 backplane connector. The chosen configuration will be stored in an EEPROM. If neither of two selectable EEPROMs present on the board had been configured for remote management enabled, the RJ11 SMI connector would be the only method of access to the switch management capabilities.

By default, the SL2-BRASS will be delivered as in-band management disabled (configuration EEPROM 1 selected). The user can override this configuration when selecting the EEPROM 2 by means of a DIP-switch. For SL2-BRASS boards with an I210 NIC populated, the SerDes port would be chosen for remote management; on boards w/o NIC the P6 ETH1 is in-band capable instead.

Component Assembly
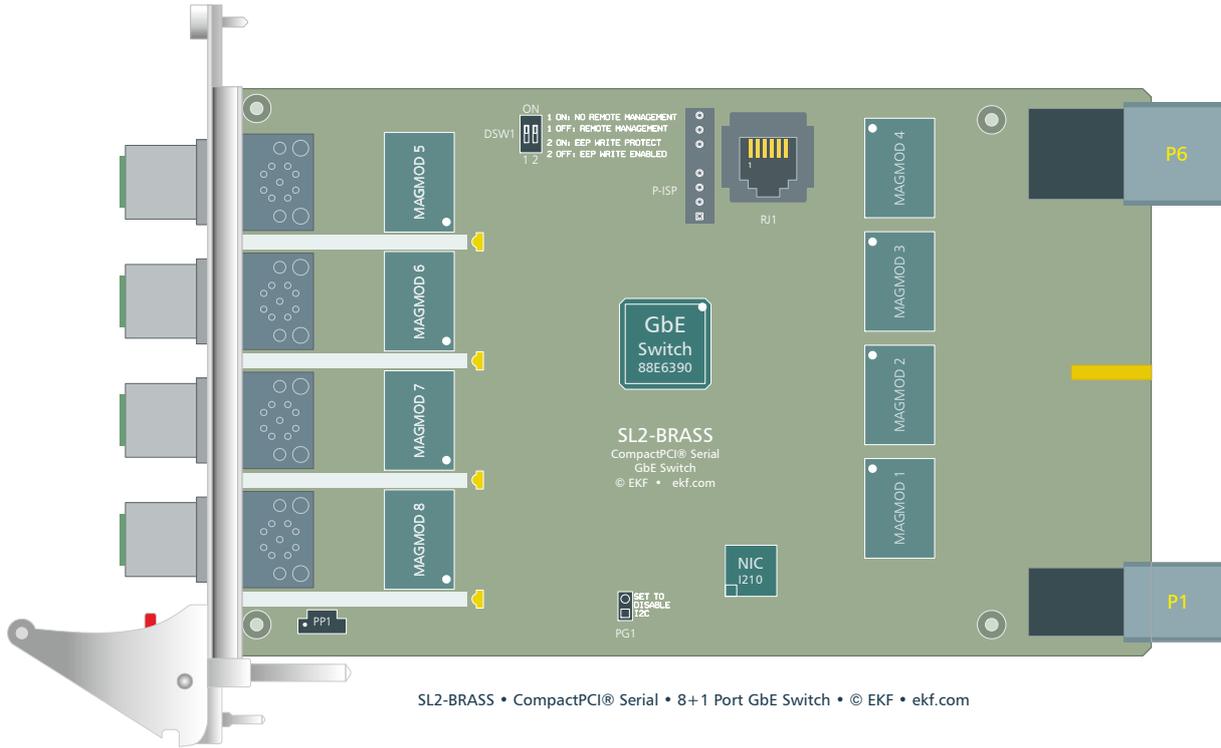
Please note: Some components are optional - actual assembly may vary
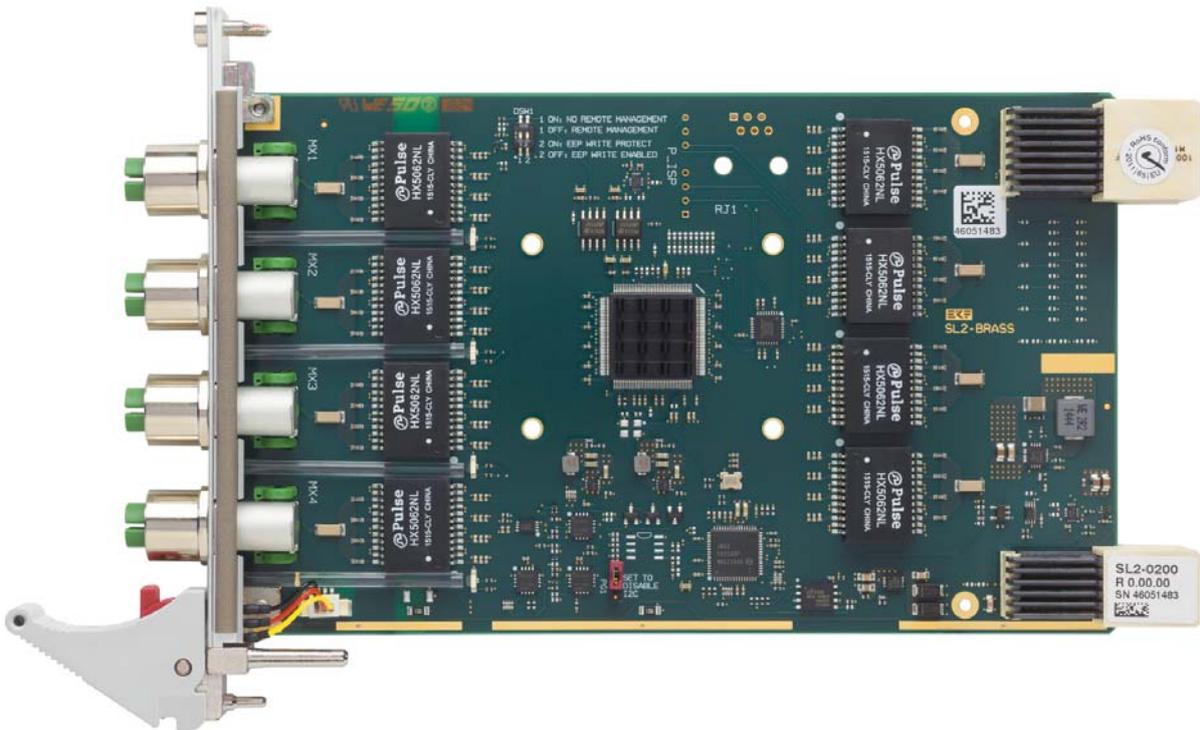
SL2-0200-BRASS

SL2-BRASS Links	
SL2-BRASS Home	www.ekf.com/s/sl2/sl2.html
Intel® I210 Driver Download	www.ekf.com/s/sl2/sl2.html
CompactPCI® Serial Technology Overview	www.ekf.com/s/smart_solution.pdf

Ordering Information
For popular SL2-BRASS SKUs please refer to www.ekf.com/liste/liste_21.html#SL2

Recommended Marvell® Documentation (Under NDA)
IMP GUI User Guide
Link Street® Integrated Micro Processor User Guide
SMI Register Access GUI User Guide

Beyond All Limits:

EKF High Performance Embedded

Industrial Computers Made in Germany

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