COM-HPC Mezzanine Card

congatec Ethernet LAN Enabling Kits

Short Description

Revision 1.00

Revision History

Revision	Date (yyyy-mm-dd)	Author	Changes
1.00	2023-08-29	AEM	• Official release

Preface

This short description provides information about the components, feature and connectors available on congatec LEKs.

Disclaimer

The information contained within this short description, including but not limited to any product specification, is subject to change without notice.

congatec GmbH provides no warranty with regard to this short description or any other information contained herein and hereby expressly disclaims any implied warranties of merchantability or fitness for any particular purpose with regard to any of the foregoing. congatec GmbH assumes no liability for any damages incurred directly or indirectly from any technical or typographical errors or omissions contained herein or for discrepancies between the product and the short description. In no event shall congatec GmbH be liable for any incidental, consequential, special, or exemplary damages, whether based on tort, contract or otherwise, arising out of or in connection with this short description or any other information contained herein or the use thereof.

Intended Audience

This short description is intended for technically qualified personnel. It is not intended for general audiences.

ROHS Directive

All congatec GmbH designs comply with EU RoHS Directive 2011/65/EU and Delegated Directive 2015/863.

Electrostatic Sensitive Device

All congatec GmbH products are electrostatic sensitive devices. They are enclosed in static shielding bags, and shipped enclosed in secondary packaging (protective packaging). The secondary packaging does not provide electrostatic protection.

Do not remove the device from the static shielding bag or handle it, except at an electrostatic-free workstation. Also, do not ship or store electronic devices near strong electrostatic, electromagnetic, magnetic, or radioactive fields unless the device is contained within its original packaging. Be aware that failure to comply with these guidelines will void the congatec GmbH Limited Warranty.

Symbols

The following symbols are used in this short description:

⚠ Caution

Cautions warn the user about how to prevent damage to hardware or loss of data.

▷ Note

Notes call attention to important information that should be observed.

Copyright Notice

Copyright © 2023, congatec GmbH. All rights reserved. All text, pictures and graphics are protected by copyrights. No copying is permitted without written permission from congatec GmbH.

congatec GmbH has made every attempt to ensure that the information in this document is accurate yet the information contained within is supplied "as-is".

Trademarks

Product names, logos, brands, and other trademarks featured or referred to within this short description, or the congatec website, are the property of their respective trademark holders. These trademark holders are not affiliated with congatec GmbH, our products, or our website.

Warranty

congatec GmbH makes no representation, warranty or guaranty, express or implied regarding the products except its standard form of limited warranty ("Limited Warranty") per the terms and conditions of the congatec entity, which the product is delivered from. These terms and conditions can be downloaded from www.congatec.com. congatec GmbH may in its sole discretion modify its Limited Warranty at any time and from time to time.

The products may include software. Use of the software is subject to the terms and conditions set out in the respective owner's license agreements, which are available at www.congatec.com and/or upon request.

Beginning on the date of shipment to its direct customer and continuing for the published warranty period, congatec GmbH represents that the products are new and warrants that each product failing to function properly under normal use, due to a defect in materials or workmanship or due to non conformance to the agreed upon specifications, will be repaired or exchanged, at congatec's option and expense.

Customer will obtain a Return Material Authorization ("RMA") number from congatec GmbH prior to returning the non conforming product freight prepaid. congatec GmbH will pay for transporting the repaired or exchanged product to the customer.

Repaired, replaced or exchanged product will be warranted for the repair warranty period in effect as of the date the repaired, exchanged or replaced product is shipped by congatec, or the remainder of the original warranty, whichever is longer. This Limited Warranty extends to congatec's direct customer only and is not assignable or transferable.

Except as set forth in writing in the Limited Warranty, congatec makes no performance representations, warranties, or guarantees, either express or implied, oral or written, with respect to the products, including without limitation any implied warranty (a) of merchantability, (b) of fitness for a particular purpose, or (c) arising from course of performance, course of dealing, or usage of trade.

congatec GmbH shall in no event be liable to the end user for collateral or consequential damages of any kind. congatec shall not otherwise be liable for loss, damage or expense directly or indirectly arising from the use of the product or from any other cause. The sole and exclusive remedy against congatec, whether a claim sound in contract, warranty, tort or any other legal theory, shall be repair or replacement of the product only.

Certification

congatec GmbH is certified to DIN EN ISO 9001 standard.

Technical Support

congatec GmbH technicians and engineers are committed to providing the best possible technical support for our customers so that our products can be easily used and implemented. We request that you first visit our website at www.congatec.com for the latest documentation, utilities and drivers, which have been made available to assist you. If you still require assistance after visiting our website then contact our technical support department by email at support@congatec.com

Terminology

Term	Description
CEI	Common Electrical Interface
CFG	Configuration
COM	Computer on Module
CTN	congatec Technical Note
EEPROM	Electrically Erasable Programmable Memory
FAE	Field Application Engineer
FW	Firmware
Gbps	Gigabits per second
HPC	High Performance Computing
LAN	Local Area Network
LED	Light Emitting Diode
LEK	LAN Enabling Kit
LOM	LAN on Motherboard
NVM	Non Volatile Memory
PCB	Printed Circuit Board
PHY	Physical Layer Device
PSU	Power Supply Unit
QSFP+	Enhanced Quad Small Form Factor Pluggable
SDP	Software Definable Pins
SFI	Serdes Frame Interface
SFP+	Enhanced Small Form-factor Pluggable

Contents

List of Tables

1 Introduction

1.1 LEK Concept

The congatec LAN Enabling Kit (LEK) card is an add-on Mezzanine card that can be plugged into the congatec HPC Server carrier board. The LEK cards feature high-speed, high-density connector. The connector has a total of 160 pins and is located near the edge of the PCB to reduce the keepout area required on Mezzanine card and the carrier board. The mounting holes on the LEK and on the carrier board provide mechanical support to the cards when attached to the carrier board.

The LEK cards extend the feature set of congatec carrier board by providing high-speed Ethernet interfaces. Each LEK variant supports different Ethernet configurations. The LEKs provide manufacturers and developers with a card to jump-start the development of systems and applications. These add-on cards provide simple and easy integration of SFP+, SFP28, QSFP+ or QSFP28 interfaces with up to 100 Gigabit Ethernet throughput.

With the LEK cards, customers can seamlessly evaluate different Ethernet configuration options, thereby reducing development cycle and time to market.

LEK1 (version 1)	LEK1 (version 2)	LEK2	LEK3
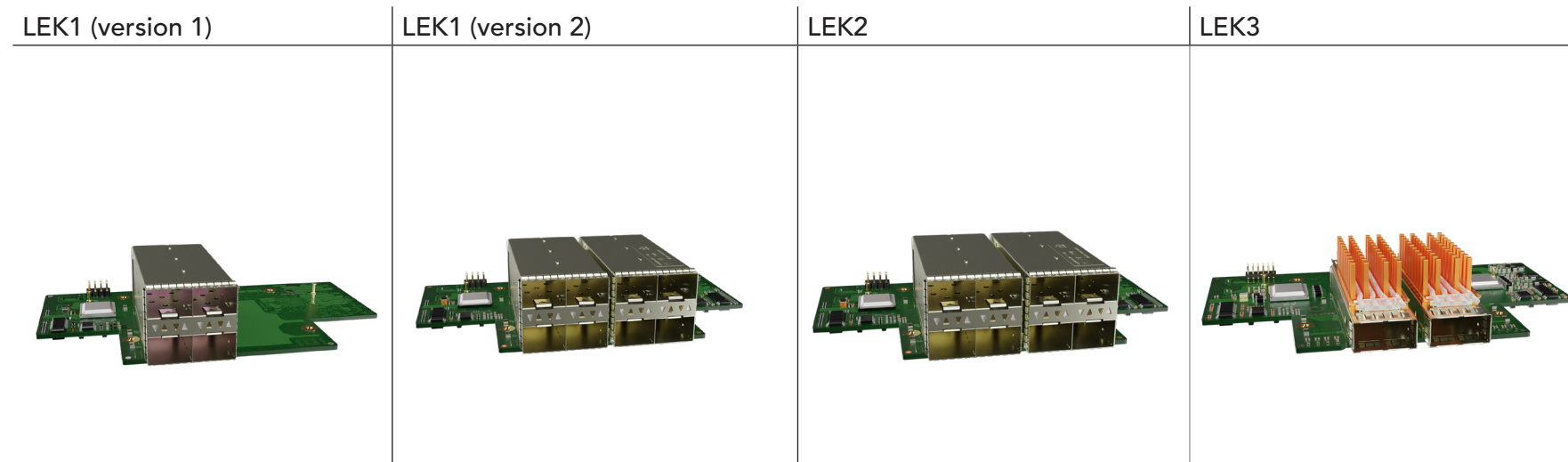
1.2   Intel CEI Concept

The Common Electrical Interface (CEI) concept is an initiative from Intel. The CEI is an interface that provides high bandwidth interconnect with fewer pins or traces via serialization for chip to chip, chip to module and board to board applications. With CEI, customers can use a single NVM firmware for multiple Ethernet configurations.

The CEI concept groups the SoC into two sites—Quad0 and Quad1 CEI sites. The Quad0 site supports Ethernet KR0–3 and its control signals while Quad1 site supports Ethernet KR4–7 and its control signals as shown below.
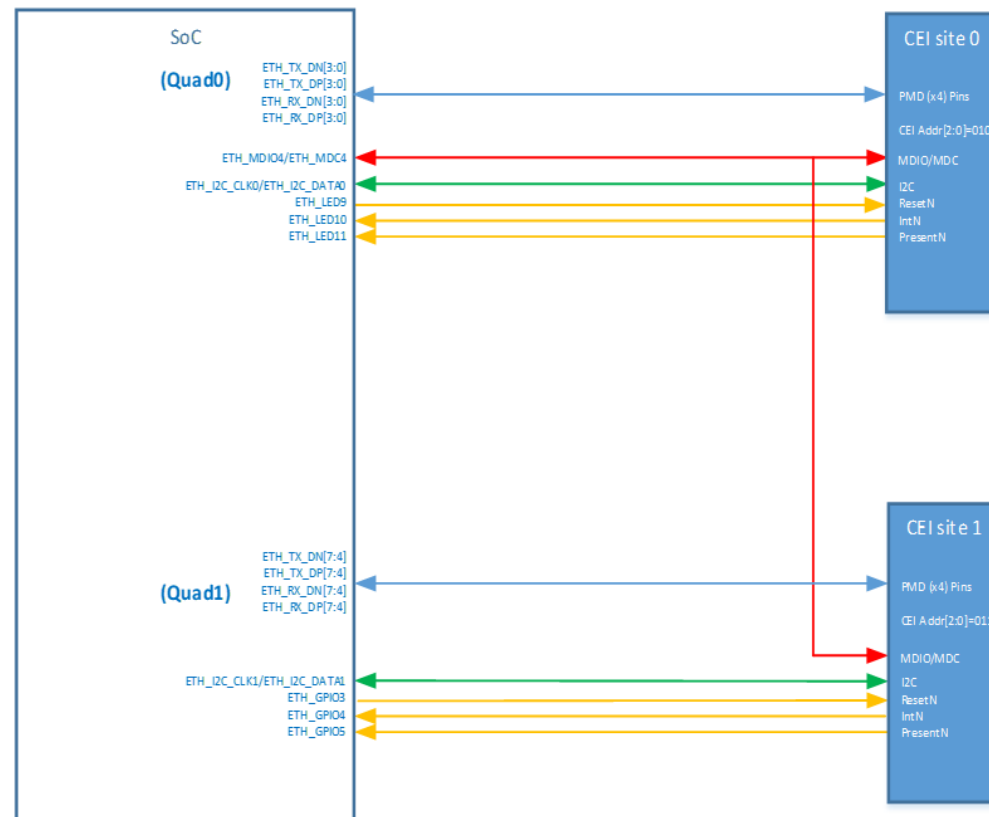
1.3　Hardware Installation

1. Turn off the power to the system.

2. Unplug the power cord and remove your system's cover if available.

3. Locate the board to board connector on the carrier board.

4. To install the card, carefully align the card's connector with the board to board connector on the carrier board. Push the board down firmly.

5. Attach four screws to the mounting holes to secure the board to the carrier board.

6. Secure the system's cover and reconnect the power cord

1.4　Options Information

The LEKs are available in three variants. The table below shows the different configurations available.

Table 1   Variants

Part-No		065505	065506	065507	065508
Product		conga-HPC/LEK-C827	conga-HPC/LEK-C827-IM 8SFP+	conga-HPC/LEK-8SFP28	conga-HPC/LEK-C827-IM 2QSFP28
Name		LEK1 version 1	LEK1 version 2	LEK2	LEK3
PHY		1x Intel C827 PHY	2x Intel C827 PHY	N.A	2x Intel C827 PHY
Connectors		1x Board to Board connector 1x SFP28 cage 1x Ethernet pin header (X10)	1x Board to Board connector 2x SFP+ cages 1x Ethernet pin header (X10)	1x Board to Board connector 2x SFP28 cages 1x Ethernet pin header (X6)	1x Board to Board connector 2x QSFP28 cages 1x Ethernet pin header (X10)
Configuration	50G image (default)	4x 10G (4x SFP+)	4x 10G (4x SFP+)	4x 10G (4x SFP+)	4x 10G (4x SFP+)
	100G image	4x 25G (4x SFP28; SFP+ compatible)	8x 10G (8x SFP+)	8x 10G (8x SFP28; SFP+ compatible)	2x 100G [1] (2x QSFP28)
Memory (EEPROM)		One 128 KB PHY EEPROM Two 4 KB ID EEPROM	Two 128 KB PHY EEPROM Four 4 KB ID EEPROM	N.A	Two 128 KB PHY EEPROM Two 4 KB ID EEPROM
Short description		Intel C827-IM, CEI	Intel C827-IM, CEI	LOM with expander (direct connection)	C827-IM, CEI
Operating temperature		-40°C to 85°C (Industrial temperature)	-40°C to 85°C (Industrial temperature)	-40°C to 85°C (Industrial temperature)	-40°C to 85°C (Industrial temperature)
Remark		Server	Server	For congatec internal use only	Currently not available

▱ **Note**

[1]   *Two ports capable of 100 Gbps; however, the maximum aggregate bandwidth is 100 Gbps (for load-balancing or failover use case)*

1.5   Accessories

The congatec LEKs support the following I/O Shields.

Table 2   I/O Shields

Item	PN	Description
HEVA-LEK1v1_IO	065550	I/O shield standard size for COM-HPC server carrier board with 40 mm height for LEK1v1
HEVA-LEK1v2_IO	065551	I/O shield standard size for COM-HPC server carrier board with 40 mm height for LEK1v2
HEVA-LEK2_IO	065552	I/O shield standard size for COM-HPC server carrier board with 40 mm height for LEK2
HEVA-LEK3_IO	065553	I/O shield standard size for COM-HPC server carrier board with 40 mm height for LEK3
GEVA-LEK1v1	56100021	I/O shield for conga-GEVA board with a cutout for LEK1v1 card
GEVA-LEK1v2	56100022	I/O shield for conga-GEVA board with a cutout for LEK1v2 card
Heatsink	56200055	Heatsink for LEK series products
LEKx-fan-holder	53500032	Mechanical mounting adapter to mount 80 x 80 fan on LEK cards
EVAL-Client LEK1v1_IO	15000101	I/O shield standard size for COM-HPC client carrier board with 40 mm height for LEK1v1
EVAL-Client LEK1v2_IO	15000102	I/O shield standard size for COM-HPC client carrier board with 40 mm height for LEK1v2
EVAL-Client LEK2_IO	15000103	I/O shield standard size for COM-HPC client carrier board with 40 mm height for LEK2

2 Specifications

2.1 Environmental Specifications

The congatec LEKs support the following environmental specifications.

Table 3   Environmental Specifications

Characterics		Specifications
Power requirements		No external power supply is required. The carrier board PSU shall supply the power rating defined in the product's manual.
Operating temperature	LEK1	0°C to 85°C
	LEK2	-40°C to 85°C
	LEK3	-40°C to 85°C
Storage temperature		-40°C to 85°C
Relative humidity (operation)		10% to 90%

⚠ Caution

The above operating temperatures must be strictly adhered to at all times. When using a congatec heatspreader, the maximum operating temperature refers to any measurable spot on the heatspreader's surface.

Humidity specifications are for non-condensing conditions.

2.2 Mechanical Specifications

2.2.1 Dimensions and Connectors

Table 4   Mechanical Specifications

Characterics	Specifications
Dimensions	lenght of 77 ± 0.1 mm; width of 134 ± 0.1 mm and height of 33.36 mm (LEK1)
	lenght of 77 ± 0.1 mm; width of 134 ± 0.1 mm and height of 33.36 mm (LEK2)
	lenght of 77 ± 0.1 mm; width of 134 ± 0.1 mm and height of 30.20 mm (LEK1)

Characterics	Specifications
Connectors	One board to board connector for interfacing with the carrier board.
	Up to two SFP28 cages (2x 2 stacked) for LEK1 and LEK2. Each cage supports up to four SFP28 ports for connecting SFP28 DAC cables or optical transceivers.
	Two QSFP28 cages for LEK3. Each cage supports breakout modes.
	One Ethernet pin header (LEK-variant dependent)

LEK1/LEK2 Dimension
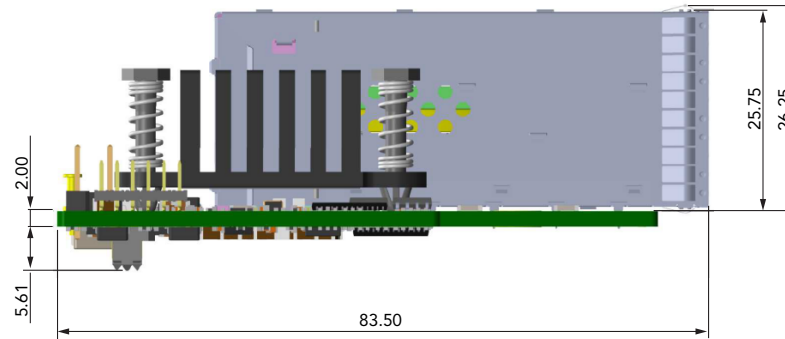
LEK3 Dimension
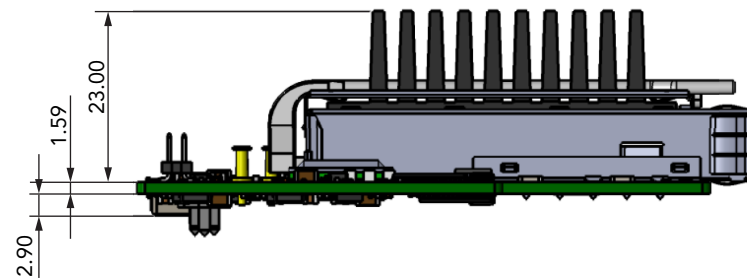
2.2.2 Heat Sink

The LEKs support heat sink for the Intel® Ethernet PHY. For more information, contact your sales representative.
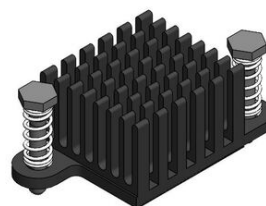
2.3 Cabling Requirements

2.3.1 Direct Interconnection (Link Modes)

The table lists the direct interconnection supported by the congatec LEKs.

Table 5   Direct Interconnection

Topology	Speed	Interface
SFP+	1G	1000BASE-SX/LX
	10G	10G-SFI-ACC/AOC
		10GBASE-SR/LR
SFP28	25G	10G-SFI-ACC/AOC
		10GBASE-SR/LR
		25G-AUI-ACC/AOC
		25GBASE-CR/CR1
		25GBASE-SR/LR
QSFP28	10G	10G-SFI-ACC/AOC
		10GBASE-SR/LR
	25G	25G-AUI-ACC/AOC
		25GBASE-CR/CR1
		25GBASE-SR/LR
	100G	100GBASE-SR4/LR4
		100GBASE-CR4
		100GBASE-CAUI4-AOC/ACC

2.3.2 Supported QSFP28 Breakout Modes

Table 6   QSFP28 Breakout Modes

Breakout	Speed Per Port	Interface
4x 10G (one Quad)	10 G	10G-SFI-ACC/AOC
		10GBASE-SR/LR
8x 10G (two Quads)	10G	10G-SFI-ACC/AOC
		10GBASE-SR/LR
4x 25G	25G	25G-AUI-ACC/AOC
		25GBASE-CR/CR1
		25GBASE-SR/LR

2.4   Firmware and EEPROMs

The congatec LEKs support the following EEPROMs:

- PHY Firmware EEPROM

- PHY ID EEPROM

The images for these EEPROMs are preprogrammed with default configuration before shipment. If you require a different configuration, the EEPROMs must be reprogrammed. For more information on how to reprogram the firmware and ID EEPROMs for the congatec LEKs, see the congatec CTN 20230523 001.pdf on the congatec website.

Table 7   LEK Default Images

The default images on the congatec LEKs are listed in the table below.

LEK	Module	Default LAN FW Image on Module	CFG	Default PHY FW Image	Default PHY ID Image	Default Interface [2]
LEK1v1	conga-HPC/sILL	ICXD_LCC_CFG7p0_50G_4P_CEI_NCSI_SEC_v3p26_8001B78C_s.bin	7.0	C827_rs-fec_master.0x101C_1064_0245_serdes.0x1064_0245_read_write_header_and_z80.raw	icxd_lcc_cei_4x10g_pkvl_sfp_vmc_id_eeprom_rev2p3.bin	4x 10G (50G) [2]
	conga-HPC/sILH	ICXD_HCC_CFG7p0_50G_4P_CEI_NCSI_SEC_v3p26_8001B731_s.bin	7.0		icxd_hcc_cei_4x10g_pkvl_sfp_vmc_id_eeprom_rev2p3.bin	
LEK1v2	conga-HPC/sILL	ICXD_LCC_CFG7p0_50G_4P_CEI_NCSI_SEC_v3p26_8001B78C_s.bin	7.0		icxd_lcc_cei_4x10g_pkvl_sfp_vmc_id_eeprom_rev2p3.bin	4x 10G (50G) [2]
	conga-HPC/sILH	ICXD_HCC_CFG7p0_50G_4P_CEI_NCSI_SEC_v3p26_8001B731_s.bin	7.0		icxd_hcc_cei_4x10g_pkvl_sfp_vmc_id_eeprom_rev2p3.bin	
LEK2	conga-HPC/sILL	ICXD_LCC_CFG7p0_50G_4P_CEI_NCSI_SEC_v3p26_8001B78C_s.bin [1]	7.0	N.A	N.A	Requires image reprogramming [1, 2]
	conga-HPC/sILH	ICXD_HCC_CFG7p0_50G_4P_CEI_NCSI_SEC_v3p26_8001B731_s.bin [1]		N.A	N.A	
LEK3	conga-HPC/sILH	ICXD_HCC_CFG7p0_50G_4P_CEI_NCSI_SEC_v3p26_8001B731_s.bin	7.0	C827_rs-fec_master.0x101C_1064_0245_serdes.0x1064_0245_read_write_header_and_z80.raw	icxd_hcc_cei_pkvl_qsfp_vmc_id_eeprom_rev2p4.bin	4x 10G (50G) [2, 3]

Note

[1]   *The preinstalled LAN FW image on conga-HPC/sILL and conga-HPC/sILH supports configuration CFG7.0. With this preinstalled image, the LEK2 does not work out of the box. You need to reprogram the LAN FW image on conga-HPC/sILL and conga-HPC/sILH with corresponding CFG 7.6, 7.7 or 7.9 image.*

[2]   *The LEKs support different configurations. In this table, the default interface is the links the preinstalled LAN FW image supports on the module.*

[3]   *Only the conga-HPC/sILH supports the congatec LEK3.*

2.5 Supported Modules and Configurations

Table 8   Supported Modules and Configurations

Item	PN	Default Configuration	Short Description	Configuration	Ethernet Configurations	Supported Modules	Remark [3]
LEK1	065505	4x 25G, SFP28, SFP+ compatible	C827, CEI	7.0	4x 25G (100G) 2x 25G (50G) [1] 4x 10G (50G)	conga-HPC/sILH confga-HPC/sILL	
	065506	8x 10G, SFP28, SFP+ compatible	C827, CEI	7.0	4x 25G (100G) [1] 8x 10G (100G) 2x 25G (50G) [1] 4x 10G (50G) [1] 4x 10G + 4x 1G (50G)	conga-HPC/sILH confga-HPC/sILL	
LEK2	065507	8x SFP28, SFP+ compatible	LOM with Expander	7.6	4x 25G (100G) [1] 2x 25G + 4x 10G (100G) 2x 25G (50G) [1] 4x 10G (50G) [1] 8x 10G (100G) 4x 10G + 1x10G (50G) 4x 10G + 4x2.5G (50G)	conga-HPC/sILH conga-HPC/sILL	For congatec internal use only
				7.7	4x 25G (100G) [1] 2x 25G + 4x 10G (100G) 8x 10G (100G) 2x 25G (50G) [1] 4x 10G (50G) [1] 4x 10G + 1x 10G (50G) 4x 10G + 4x 1G (50G)	conga-HPC/sILH conga-HPC/sILL	For congatec internal use only. The LEK2 redesign will support these configurations.
				7.9	8x 10G (100G) 2x 25G + 4x 10G (100G) 4x 10G + 4x1G (50G)	conga-HPC/sILH conga-HPC/sILL	For congatec internal use only. This configuration supports LED indicator for only Quad1.
LEK3	065508	2x QSFP28, QSFP+ compatible	C827, CEI	7.0	2x 100G (100G) 4x 25G (100G) [1,2] 8x 10G (100G) [2] 2x 25G (50G) [1,2] 4x 10G (50G) [1,2]	conga-HPC/sILH	Supports only conga-HPC/sILH. Variant is currently not available.

⬡ **Note**

[1]   *Not all ports are used. LED indicators of uninitialized Quad0 and Quad1 ports may remain permanently on.*

[2]   *Breakout mode*

[3]   *The LEK2 is for test purposes only. Do not use the card for production-line purposes.*

2.6   I2C I/O Expanders

The I/O Expanders listed in the table below are used on the congatec LEK cards.

Table 9   I2C I/O Expanders

Device	LEK	I2C Address	Usage
PCA9575	LEK1	0x40 (Read)/ 0x41 (Write)	MOD_PRES#, RX_LOS, RS from each SFP port RESET# from retimer if present INT# from retimer if present WP#, write protect control on EEPROM
	LEK2		
	LEK3		
AT24C02C	LEK1	0xA8 (Read)/ 0xA9 (Write)	Non-volatile configuration information
	LEK2		
	LEK3		
PCA9685	LEK1	0x80 (Read)/ 0x81 (Write)	LED control
	LEK2		
	LEK3		
PCA9545A	LEK1	0xE0 (Read)/ 0xE1 (Write)	I2C muxing for each SFP port
	LEK2		

2.7   LED Description

The LED indicators on the SFP28 and QSFP28 cages differ depending on the ID EEPROM image programmed on the LEK. For default ID EEPROMs with 4x 25G configuration (e.g LEK1v1) or 4x 10G configuration (e.g LEK1v2), the LED indicators are described below:

Table 10   LED Description

Configuration	LAN Firmware	Speed	Color
4x 10G	50G	10G	Green
		1G	Orange
4x 25G	100G	25G	Green
		10G	Orange
Link/Activity	Link without activity		Steady orange
	Link with activity		Blinking orange

▭▷ **Note**

Currently, LEK3 shows only activity LED (green) per breakout port. The link LED is shown on the device attached via the break-out cable. In the future, the LEK3 will feature both activity and link LEDs.

3   Block Diagram

LEK1v1
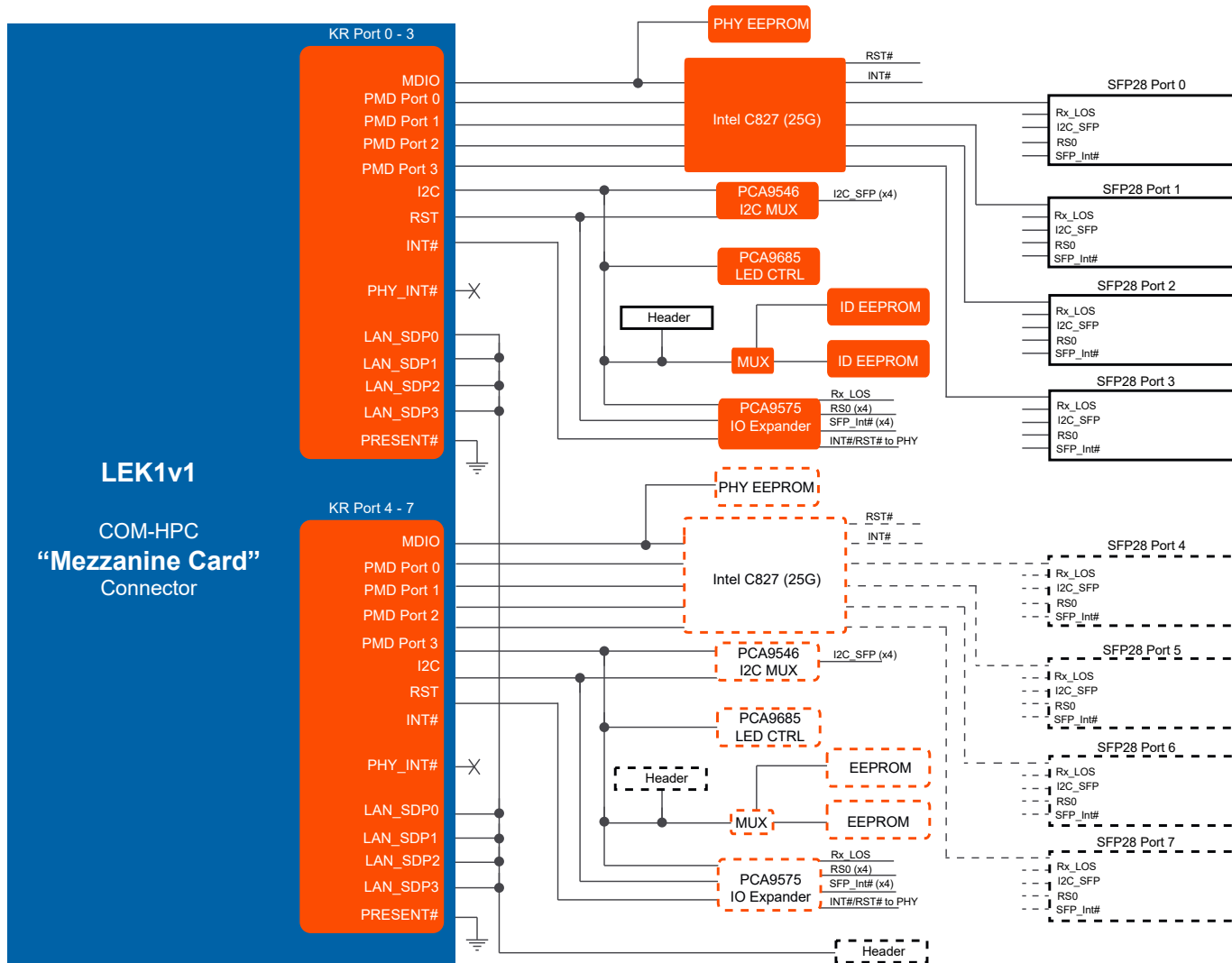
Not available by default (BOM option)

LEK2

COM-HPC
"Mezzanine Card"
Connector

KR Port 0 - 3

KR Port 0
KR Port 1
KR Port 2
KR Port 3
I2C
RST#
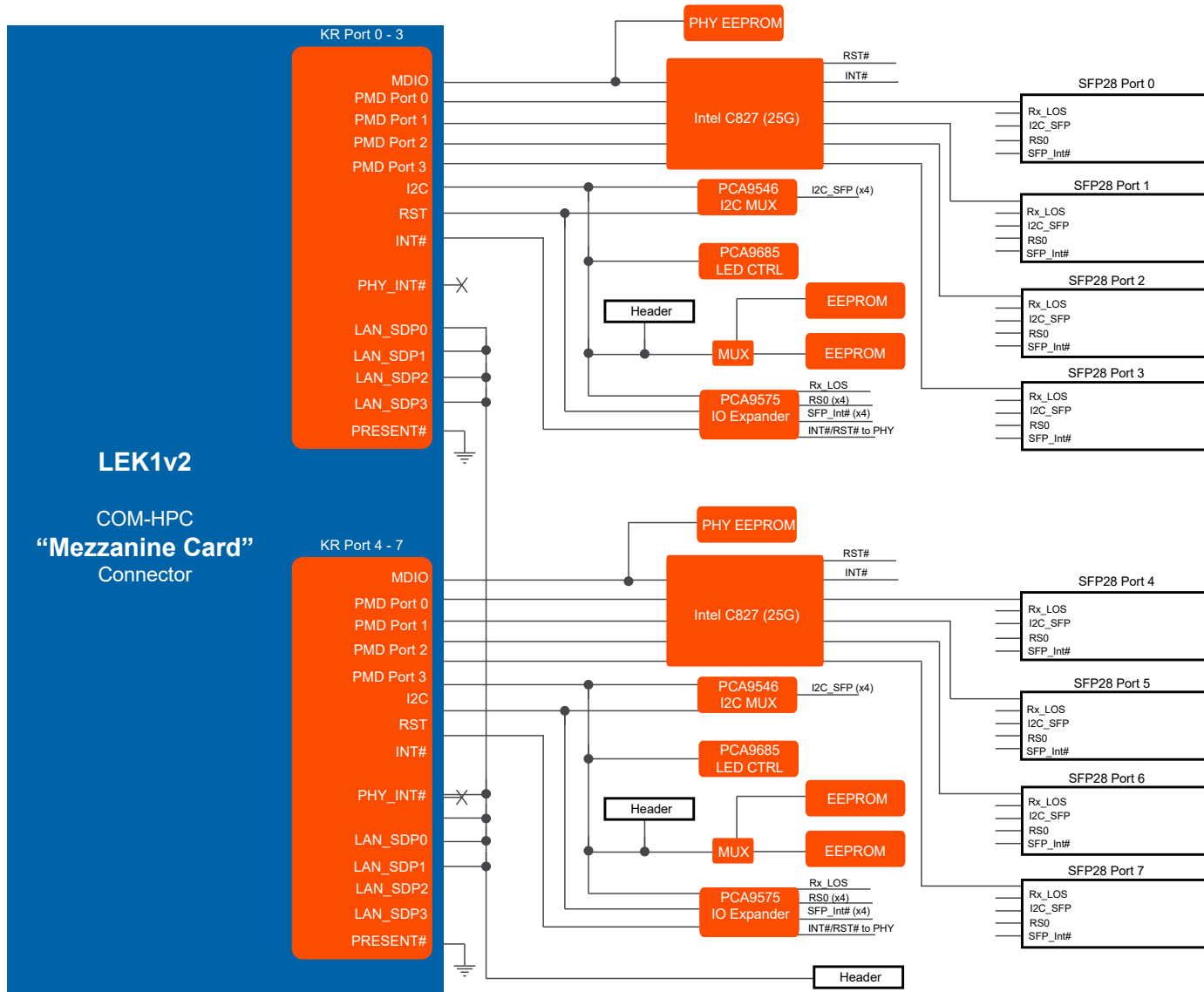INT#
MDIO
PHY_INT#
LAN_SDP0
LAN_SDP1
LAN_SDP2
LAN_SDP3
PRESENT#

KR Port 4 - 7

KR Port 0
KR Port 1
KR Port 2
KR Port 3
I2C
RST#
INT#
MDIO
PHY_INT#
LAN_SDP0
LAN_SDP1
LAN_SDP2
LAN_SDP3
PRESENT#

PCA9546
I2C MUX
I2C_SFP (x4)

PCA9685
LED CTRL

PCA9575
IO Expander
Rx_LOS (X4)
RS0 (x4)
SFP_Int# (x4)

SFP+ Port 0
Rx_LOS
I2C_SFP
RS
SFP_Int#

SFP+ Port 1
Rx_LOS
I2C_SFP
RS
SFP_Int#

SFP+ Port 2
Rx_LOS
I2C_SFP
RS
SFP_Int#

SFP+ Port 3
Rx_LOS
I2C_SFP
RS
SFP_Int#

SFP+ Port 4
Rx_LOS
I2C_SFP
RS
SFP_Int#

SFP+ Port 5
Rx_LOS
I2C_SFP
RS
SFP_Int#

SFP+ Port 6
Rx_LOS
I2C_SFP
RS
SFP_Int#

SFP+ Port 7
Rx_LOS
I2C_SFP
RS
SFP_Int#

SMPM Connector

Header

LEK3

COM-HPC
"Mezzanine Card"
Connector

4 Connector Pinout

4.1 LEK Board to Board Connector

Table 11   Board to Board Pinout

Pin	Signal	Pin	Signal	Pin	Signal	Pin	Signal
A1	GND	B1	ETH0_RX+	C1	GND	D1	GND
A2	GND	B2	ETH0_RX-	C2	GND	D2	ETH0_SDP
A3	ETH0_TX+	B3	GND	C3	NC	D3	GND
A4	ETH0_TX-	B4	GND	C4	NC	D4	ETH0-3_INT#
A5	GND	B5	ETH1_RX+	C5	GND	D5	GND
A6	GND	B6	ETH1_RX-	C6	GND	D6	ETH1_SDP
A7	ETH1_TX+	B7	GND	C7	NC	D7	GND
A8	ETH1_TX-	B8	GND	C8	NC	D8	ETH0-3_I2C_DAT
A9	GND	B9	ETH2_RX+	C9	GND	D9	ETH0-3_I2C_CLK
A10	GND	B10	ETH2_RX-	C10	GND	D10	ETH2_SDP
A11	ETH2_TX+	B11	GND	C11	NC	D11	GND
A12	ETH2_TX-	B12	GND	C12	NC	D12	ETH0-3_MDIO_DAT [2]
A13	GND	B13	ETH3_RX+	C13	GND	D13	ETH0-3_MDIO_CLK [2]
A14	GND	B14	ETH3_RX-	C14	GND	D14	ETH3_SDP
A15	ETH3_TX+	B15	GND	C15	NC	D15	ETH0-3_PHY_INT# [1, 2, 3, 4]
A16	ETH3_TX-	B16	GND	C16	NC	D16	ETH0-3_PHY_RST#
A17	GND	B17	ETH4_RX+ [1]	C17	GND	D17	ETH0-3_PRSNT#
A18	GND	B18	ETH4_RX- [1]	C18	GND	D18	ETH4_SDP
A19	ETH4_TX+ [1]	B19	GND	C19	NC	D19	GND
A20	ETH4_TX- [1]	B20	GND	C20	NC	D20	ETH4-7_INT# [1]
A21	GND	B21	ETH5_RX+ [1]	C21	GND	D21	GND
A22	GND	B22	ETH5_RX- [1]	C22	GND	D22	ETH5_SDP
A23	ETH5_TX+ [1]	B23	GND	C23	NC	D23	GND
A24	ETH5_TX- [1]	B24	GND	C24	NC	D24	ETH4-7_I2C_DAT [1]
A25	GND	B25	ETH6_RX+ [1]	C25	GND	D25	ETH4-7_I2C_CLK [1]
A26	GND	B26	ETH6_RX- [1]	C26	GND	D26	ETH6_SDP
A27	ETH6_TX+ [1]	B27	GND	C27	NC	D27	GND

A28	ETH6_TX- [1]	B28	GND	C28	NC	D28	ETH4-7_MDIO_DAT [1, 3]
A29	GND	B29	ETH7_RX+ [1]	C29	GND	D29	ETH4-7_MDIO_CLK [1, 3]
A30	GND	B30	ETH7_RX- [1]	C30	GND	D30	ETH7_SDP
A31	ETH7_TX+ [1]	B31	GND	C31	NC	D31	ETH4-7_PHY_INT# [1, 3]
A32	ETH7_TX- [1]	B32	GND	C32	NC	D32	ETH4-7_PHY_RST# [1]
A33	GND	B33	NC	C33	NC	D33	GND
A34	GND	B34	NC	C34	NC	D34	ETH4-7_PRSNT# [1, 3]
A35	GND	B35	GND	C35	GND	D35	GND
A36	GND	B36	GND	C36	GND	D36	GND
A37	GND	B37	GND	C37	GND	D37	GND
A38	+V12S	B38	+V12S	C38	+V12S	D38	+V12S
A39	+V12S	B39	+V12S	C39	+V12S	D39	+V12S
A40	+V12S	B40	+V12S	C40	+V12S	D40	+V12S

![Note icon] **Note**

[1]   *Not supported on LEK1v1*

[2]   *Not supported on LEK1v2*

[3]   *Not supported on LEK2*

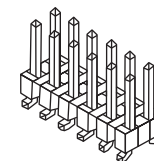[4]   *Not suppported on LEK3*

4.2   SDP Pin headers

The LEK1v1, LEK1v2 and LEK3 offer SDP signals on connector X10 while LEK2 offers the SDP signals on connector X6.

Table 12   SDP Pin header (X6/X10)

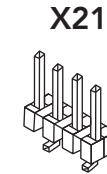| Pin	Description	Pin	Description
1	ETH0_SDP	2	ETH4_SDP
3	ETH1_SDP	4	ETH5_SDP
5	ETH2_SDP	6	ETH6_SDP
7	ETH3_SDP	8	ETH7_SDP
9	+V3.3S	10	GND
11	+V12S	12	GND

X6/X10

4.3 Jumper X21

With jumper X21 on the LEK2, you can change the configuration of the interface on LEK2 as described in the table below.

Table 13   Jumper X21

| Jumper	Configuration	Description
1 - 2	CFG7.7	Native SFI (with IO expander, leveraging CEI without a PHY)
2 - 3	CFG7.9	Backplane on Quad0 and native SFI on Quad1
N.C	CFG7.6	Backplane on both Quad0 and Quad1

X21

4.4 DIP Switch SW1

The LEK1 (v1 and v2) feature DIP switch SW1 for configuring the CEI sites on conga-sILL and conga-sILH.

Table 14   DIP Switch SW1

Switch	Configuration	Description
SW1.1	OFF	CEI0 support for conga-sILH
	ON (default)	CEI0 support for conga-sILL
SW1.2	OFF	Disable CEI0 site
	ON (default)	Enable CEI0 site
SW1.3	OFF	CEI1 support for conga-sILH
	ON (default)	CEI1 support for conga-sILL
SW1.4	OFF	Disable CEI1 site
	ON (default)	Enable CEI1 site

SW1
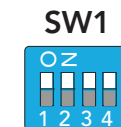
5 Firmware Images

The firmware images on the congatec LEKs are programmed with default configurations. For alternate configuration, you must reprogram the files.

For the firmware files required for reprogramming:

1. Contact either Intel or your congatec FAE to receive the LAN enabling kit for Windows or Linux

2. Contact either Intel or your congatec FAE to receive the LAN NVM image. Ensure the size of the image is not larger than the available SPI flash memory.

3. Contact the PHY device manufacturer to receive the PHY FW NVM and PHY ID NVM image. Ensure the size of the images is not larger than the available I2C flash memory.

Note

For instructions on how to deploy the images, see the congatec CTN 20230523 001.pdf document in the restricted area of the congatec website