SYSTEM

Product Information

# PCS-BALLET

## Mezzanine I/O Expansion Board
## Multifunction Side Card

Document No. 6475 • 6 September 2017

## *General*

*Available as a mezzanine add-on expansion board (aka side board) to the PC1-GROOVE, SC1-ALLEGRO and successor CompactPCI® PlusIO and CompactPCI® Serial CPU cards, the **PCS-BALLET** provides a number of frequently required I/O functions. In addition, the user can choose between several SATA based on-board mass storage solutions.*

For dual- or triple-screen applications (in addition to the primary DP video connector(s) on the CPU carrier board), the PCS-BALLET front panel is equipped with a DisplayPort connector. The on-board USB 3.0 SuperSpeed controller allows for attachment of high speed external devices. Audio and legacy signal support is provided in addition.

| Related Information | |
|---|---|
| PCS-BALLET Home | www.ekf.com/p/pcs/pcs.html |
| PCS-BALLET Technical Information | www.ekf.com/p/pcs/pcs_ti.pdf |

| Related Documents CompactPCI® PlusIO & CompactPCI® Serial | |
|---|---|
| CompactPCI® PlusIO & Serial Overview | www.ekf.com/s/smart_solution.pdf |
| CompactPCI® PlusIO Home | www.ekf.com/p/plus.html |
| CompactPCI® Serial Home | www.ekf.com/s/serial.html |

| Ordering Information |
|---|
| For popular PCS-BALLET SKUs please refer to www.ekf.com/liste/liste_21.html#PCS |
| For popular Mezzanine Side Cards please refer to www.ekf.com/liste/liste_20.html#C20 |

## Feature Summary

- 3U/4HP Mezzanine Side Card for EKF CompactPCI® PlusIO & CompactPCI® Serial CPU boards

- 2 x USB 3.0 xHCI SuperSpeed F/P connectors
- DisplayPort F/P connector
- Analog Audio F/P jacks
- Either RS-232 F/P D-Sub (male) or Digital Audio (stuffing option) D-Sub (female)
- Option C32-FIO legacy front panel I/O (RS-232, KB/MS, Audio - additional 4HP F/P width)
- Integrated front panel CPU card and PCS-BALLET (8HP in total, 12HP when C32-FIO third floor mezzanine is installed in addition)

- Option on-Board SATA SSD/HDD 2.5-inch or Half-Slim SATA module
- Option C20-SATA - single/dual 2.5-inch SSD/HDD mezzanine card
- Option C41-CFAST - CFast™ SSD socket mezzanine card
- Option C42-SATA - 1.8-Inch Solid State Drive mezzanine card
- Option C47-MSATA - dual mSATA module mezzanine card
- Option C48-M2 - dual M.2 SATA module mezzanine card
- Up to three SATA connectors for system internal devices

- Rear I/O option J1/J2 (SATA, USB, KB/MS, UART, GPIO, for CompactPCI® PlusIO CPU cards and CompactPCI® backplanes only)

- Designed & manufactured in Germany
- ISO 9001 certified quality management
- Long term availability
- Rugged solution (coating, sealing, underfilling on request)
- RoHS compliant
- Operating temperature: -40°C to +85°C (industrial temperature range)
- 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 75.1 years
- EC Regulations EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1)

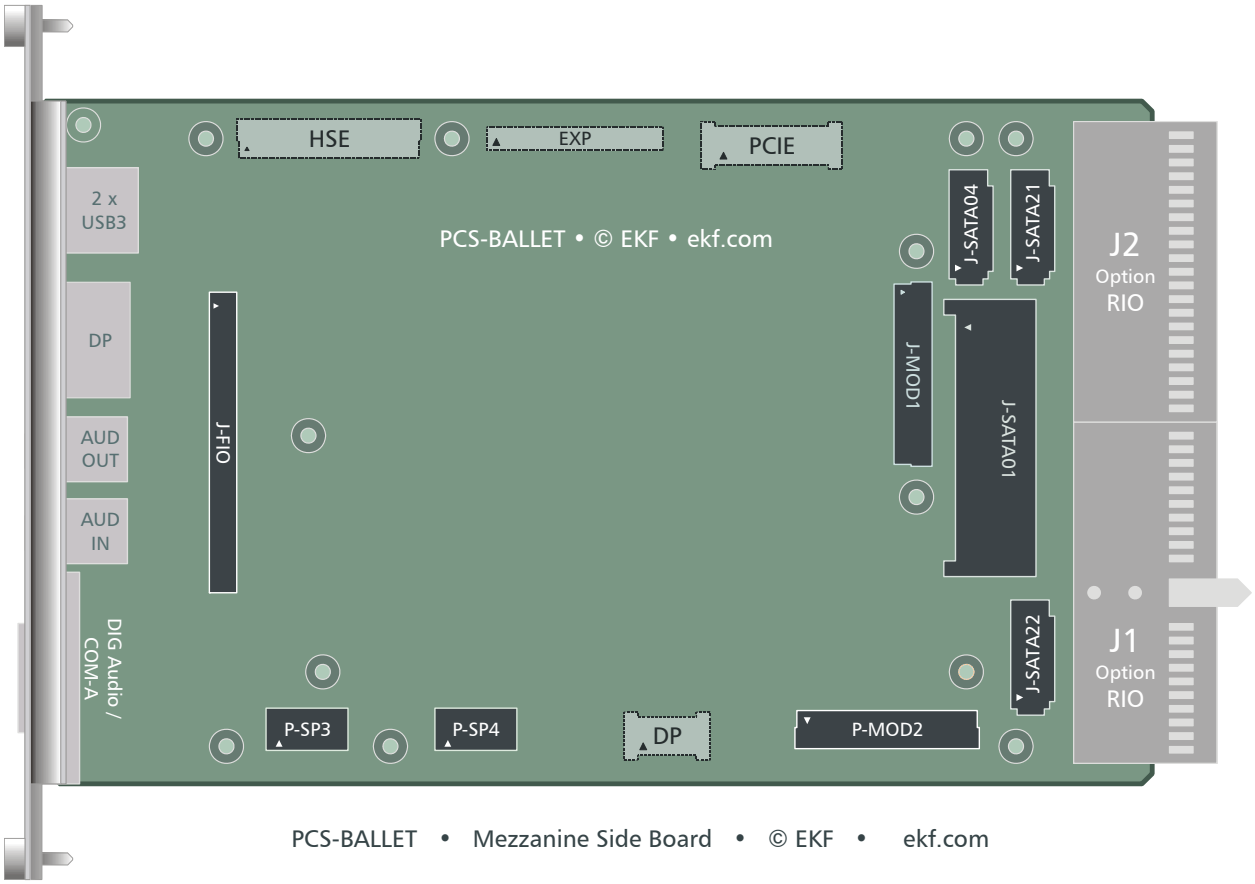
## *System Requirements*

The PCS-BALLET is a mezzanine side card, to be fixed on top of a suitable CPU carrier board. The pitch between carrier PCB and mezzanine PCB is 4HP, resulting in a 8HP common front panel for the entire assembly. Up to four mezzanine inter-board connectors are in use, for distribution of legacy and high speed I/O signals from the CPU carrier to the side board. These are referred to as *HSE* (SATA & USB 2.0 High Speed Expansion), *EXP* (Legacy Expansion), *PCIE* (PCI Express® x 4), and *DP* (DisplayPort). The mezzanine connectors are situated on the bottom side of the PCS-BALLET, facing towards their mating CPU card connectors.

The PCS-BALLET also is a carrier board itself, which can accommodate a low profile storage module or SATA drive, and a front panel I/O expansion card as an option.

With respect to the system backplane, it is recommended to have the CPU card system slot on the right edge, in order to prevent loss of a peripheral slot (the PCS-BALLET is then positioned out of backplane shape). For rear I/O, a single slot P1/P2 RIO backplane would be required in addition. With the PCS-BALLET aligned to a CompactPCI® or CompactPCI® Serial backplane slot however, rear I/O is not available (J1/J2 not populated).

Mezzanine Connectors (HSE, EXP, PCIE, DP)




PCS-BALLET • Mezzanine Side Board • © EKF • ekf.com


CPU Carrier to Mezzanine Side Card Connector Suite

## *Storage Options*

The PCS-BALLET can accommodate a 2.5-inch SATA drive (SATA01 docking connector), which is also suitable for a Half-Slim SATA module.

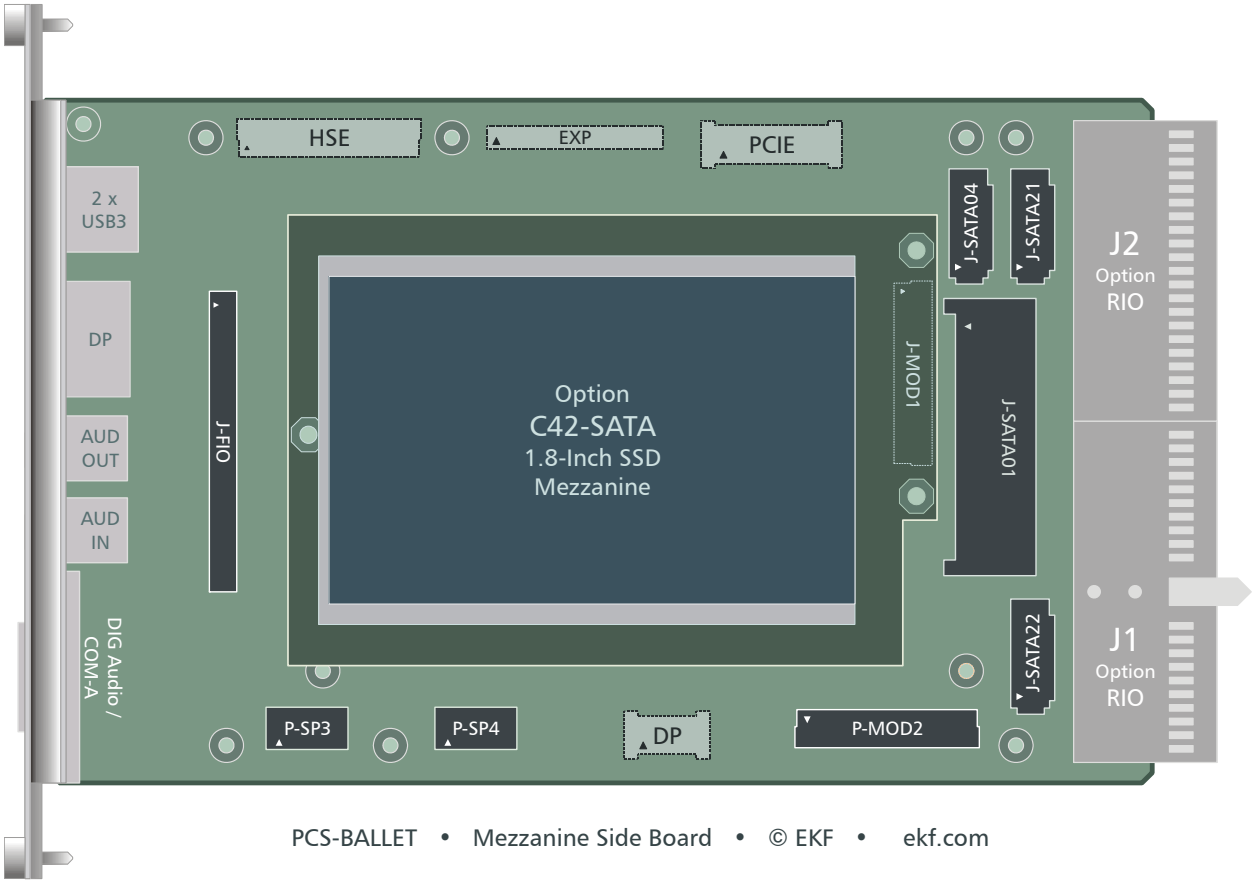
As an alternate, low profile Flash based mezzanine storage modules are available that fit on the PCS-BALLET (MOD1 mezzanine connector).

The C42-SATA module e.g. is equipped with a 1.8-inch SATA Solid State Drive (SSD). The C47-MSATA module can hold two mSATA Mini Cards. The SATA channels related to these storage options are derived from the CPU carrier card via the mezzanine connector HSE. The PCS-BALLET is equipped with on-board SATA redrivers for optimum signal integrity.

PCS-BALLET • Option 2.5-Inch on-Board SSD


PCS-BALLET • Mezzanine Side Board • © EKF • ekf.com

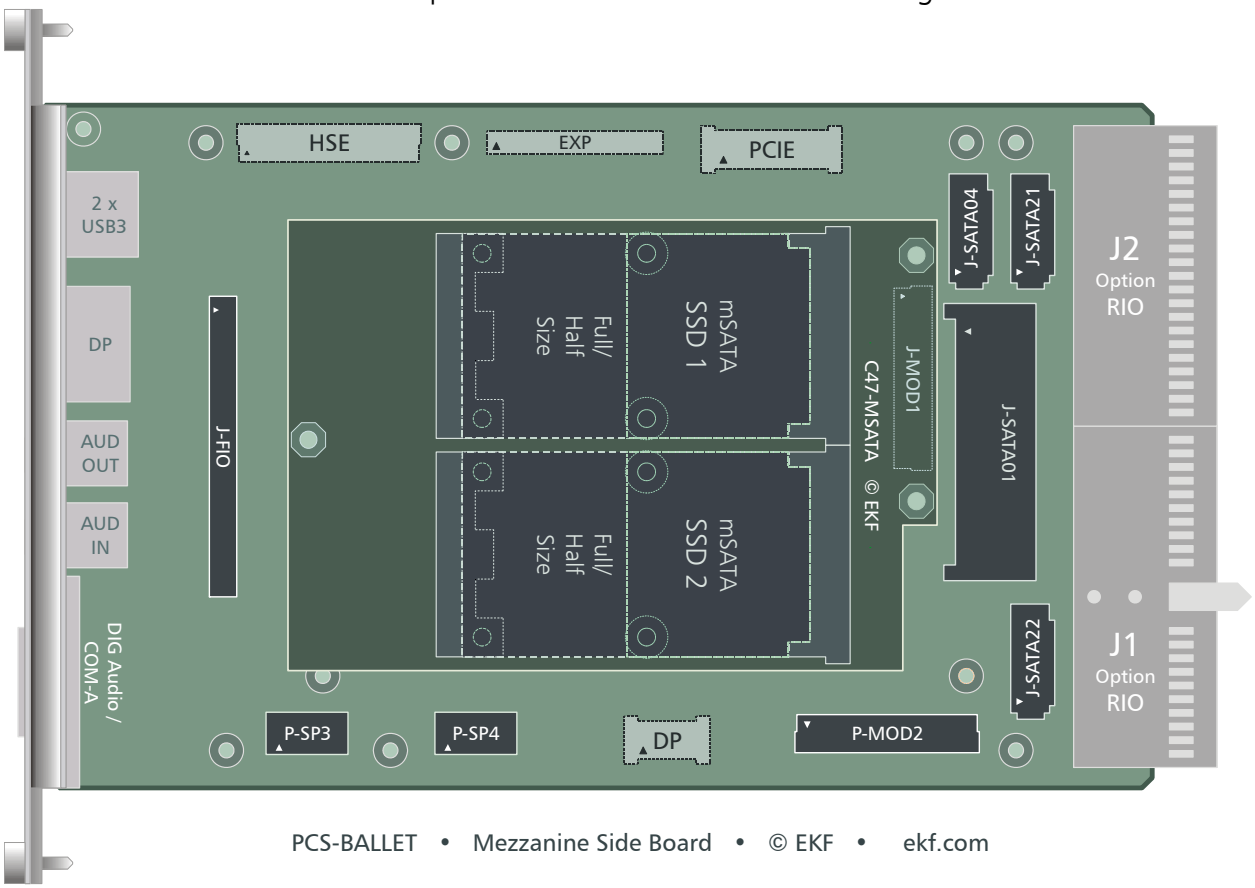
PCS-BALLET • Option C42-SATA Low Profile Storage Module




PCS-BALLET • Mezzanine Side Board • © EKF • ekf.com


C42-SATA • Solid State Drive Mezzanine Module

PCS-BALLET • Option C47-MSATA Low Profile Storage Module




PCS-BALLET • Mezzanine Side Board • © EKF • ekf.com

C47-MSATA • mSATA Mini Card Mezzanine Module


C48-M2 • M.2 SATA Mezzanine Module

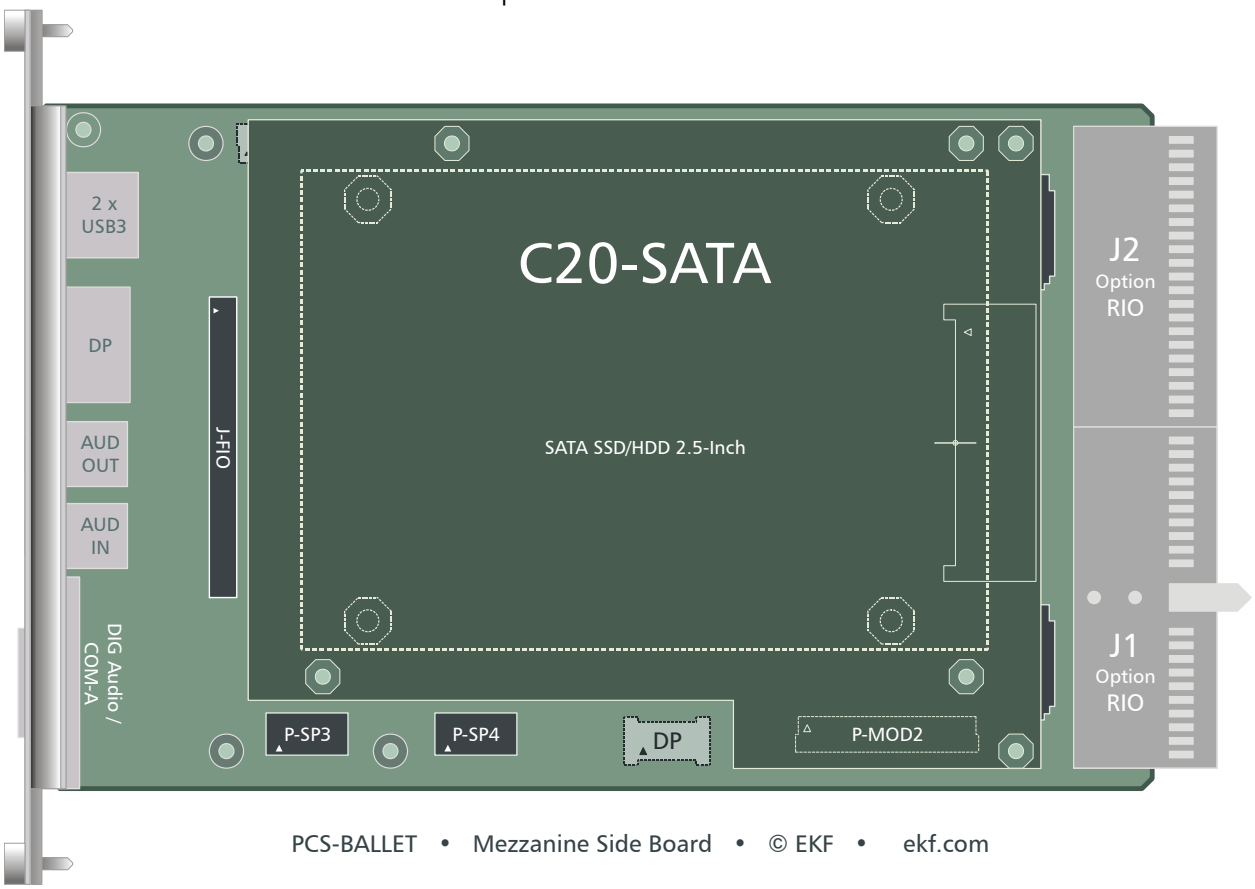
| Related Documents Mezzanine Modules and Side Cards | |
|---|---|
| C40 ... C48 Series<br>Mezzanine Storage Modules | www.ekf.com/c/ccpu/c4x_mezz_ovw.pdf |
| C20-SATA Mezzanine Storage Module | www.ekf.com/c/ccpu/c20/c20_tie.pdf |
| Mezzanine Side Cards Overview | www.ekf.com/c/ccpu/mezz_ovw.pdf |
| The EKF Mezzanine Module Concept | www.ekf.com/c/ccpu/cpci_mezzanine_evolution.pdf |

## *Advanced Storage Options*

The maximum optional data storage capacity can be achieved when employing the C20-SATA dual drive 2.5-inch SSD/HDD module on the PCS-BALLET (mezzanine connector MOD2). If this ordering option was chosen, the PCS-BALLET comes with an on-board PCIe to SATA dual-channel 6Gbps controller assigned to MOD2.

When populated with two drives, top and bottom mount, the C20-SATA is not a low profile mezzanine module. Additional front panel width would be required for the entire assembly comprised of CPU carrier card, PCS-BALLET and C20-SATA (12HP typically in total).

PCS-BALLET • Option C20-SATA Dual-2.5-Inch Drive




PCS-BALLET • Mezzanine Side Board • © EKF • ekf.com


C20-SATA

C20-SATA Side View (Dual Drive)

C20-SATA (Dual Drive)

PCS-BALLET w. 2.5-Inch SSD (8HP Assembly)

PCS-BALLET w. C20-SATA Dual SSD Storage Module (12HP Assembly)


PCS-BALLET w. C41-CFAST

PCS-BALLET w. C43-SATA Internal Cable Connector Module

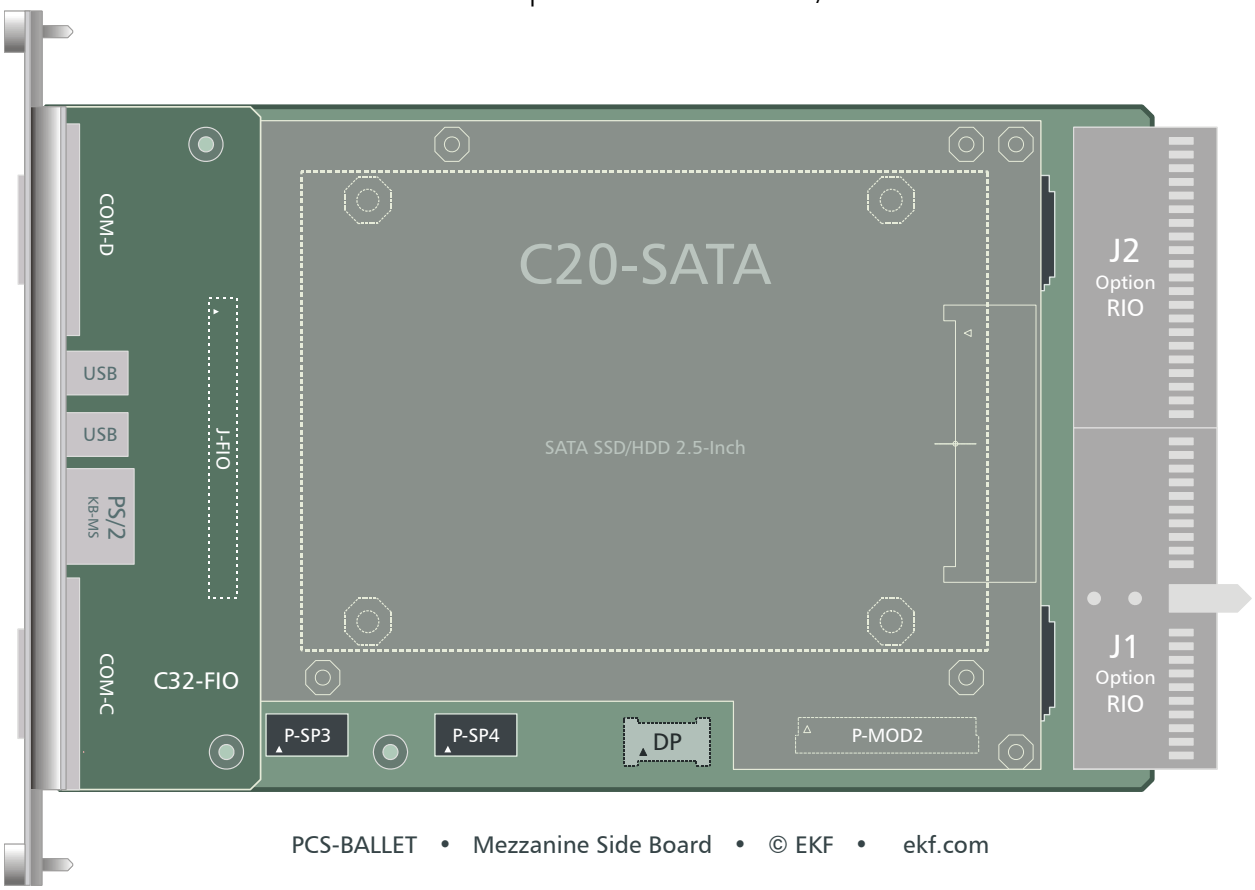
PC5-LARGO • PCS-BALLET w. Half-Slim SATA SSD

## *Front Panel I/O*

The PCS-BALLET expands the suite of front panel connectors of a particular CPU carrier board by two USB 3.0 receptacles, a DisplayPort video output, 3.5mm Audio In/Out jacks, and a D-Sub connector with either Digital Audio or EIA-232 COM port pin assignment.

In addition, the PCS-BALLET can accommodate the C32-FIO front panel I/O mezzanine module, for a total front panel width of 12HP. The C32-FIO provides another two RS-232 COM ports, two USB 2.0 receptacles, and *optionally* a PS/2 style keyboard/mouse Mini-DIN connector.

PCS-BALLET • Option C32-FIO Front I/O Module



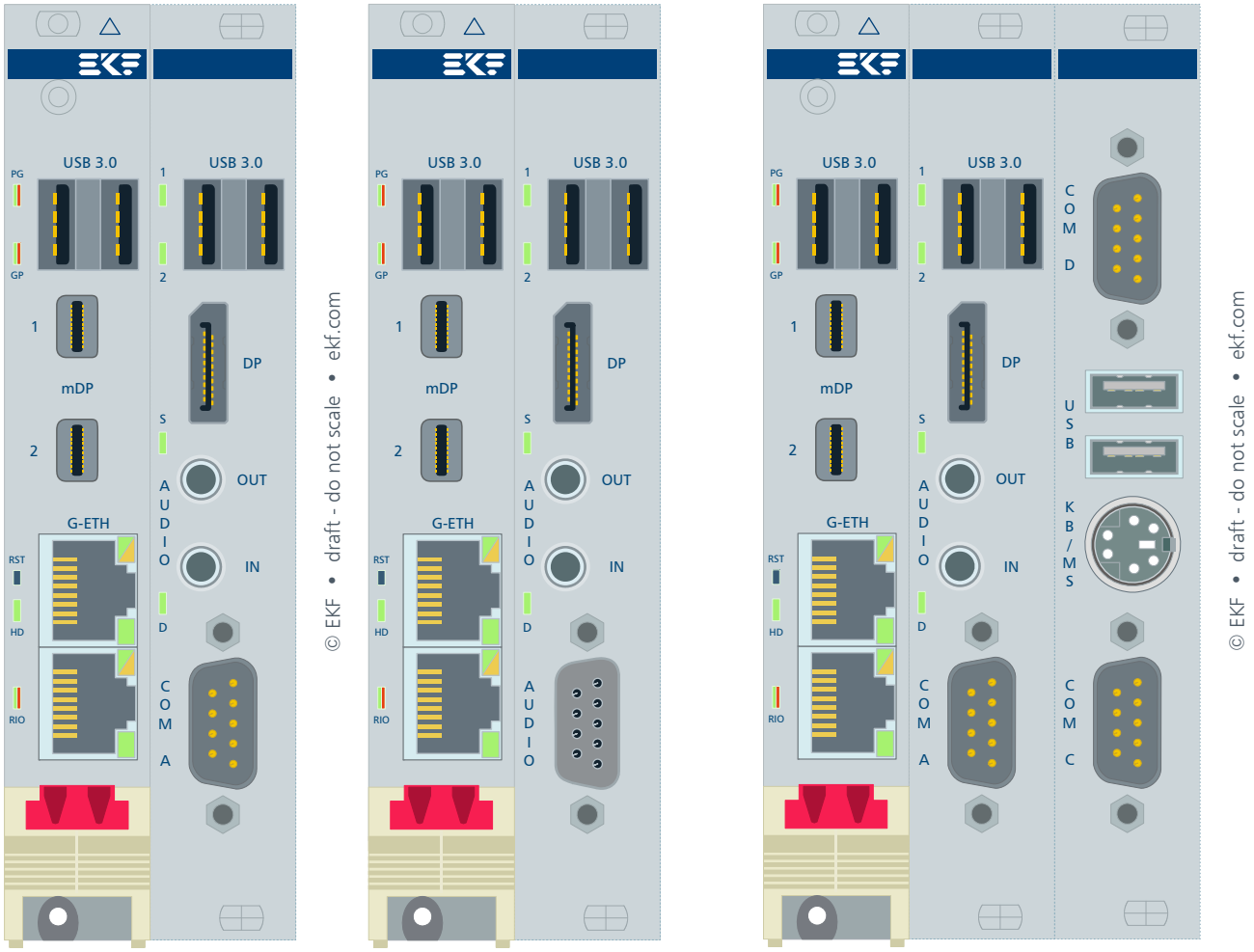

PCS-BALLET • Mezzanine Side Board • © EKF • ekf.com

| Related Document | |
|---|---|
| C32-FIO Mezzanine Front I/O Module | www.ekf.com/c/ccpu/c32/c32_tie.pdf |

12HP Assembly Unit (PC1-GROOVE CPU Carrier Card)


12HP Assembly w. 2.5-Inch SATA SSD

## Sample Front Panel Options 8HP/12HP

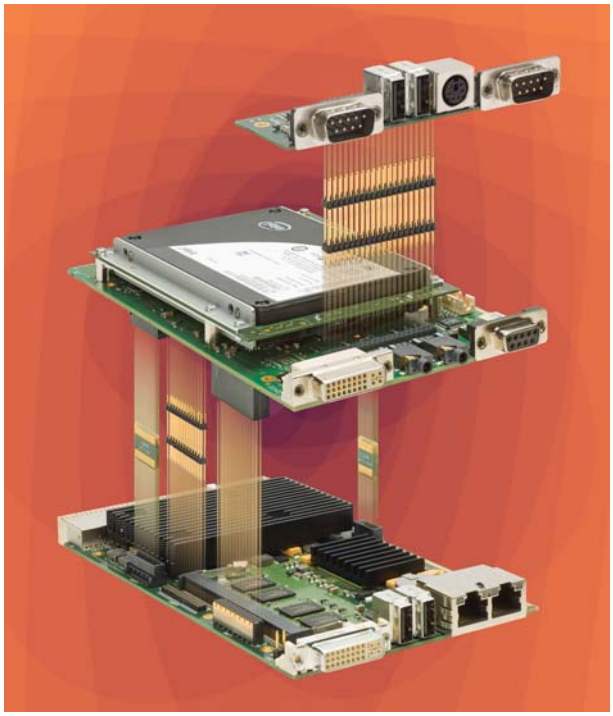



SC1-ALLEGRO Dual - mDP | PCS-BALLET RS-232 | SC1-ALLEGRO Dual - mDP | PCS-BALLET Dig. Audio | SC1-ALLEGRO Dual - mDP | PCS-BALLET RS-232 | C32-FIO

Legacy PS/2 Mini-DIN connector (Keyboard/Mouse) available on request


PCS-BALLET (8HP Assembly Stack w. PC4-PRESTO CPU Carrier Card)

C32-FIO (on Top)



C32-FIO (on Top)

## *On-Board I/O & RIO*

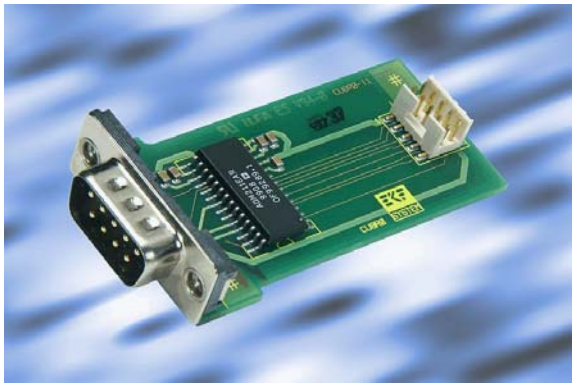
As an option, the PCS-BALLET can be populated with up to three on-board SATA latching receptacles, for attachment of system internal drives via SATA cable assemblies. These connectors are SATA04, and SATA21/SATA22. SATA04 is fed by the CPU carrier card, the optional SATA21/22 connectors are assigned to an on-board dual-channel SATA 6Gbps controller. Two more SATA channels (SATA31/SATA32) are wired to the rear I/O connector J2, derived from another optional on-board dual-port SATA 6Gbps controller.

Two pin-headers SP3 and SP4 are provided as an option, for attachment of RS-232/RS-485 UART PHY modules.

In addition, legacy I/O would be available trough the J1/J2 rear I/O connector suite, such as USB 2.0, UART, KB/MS.

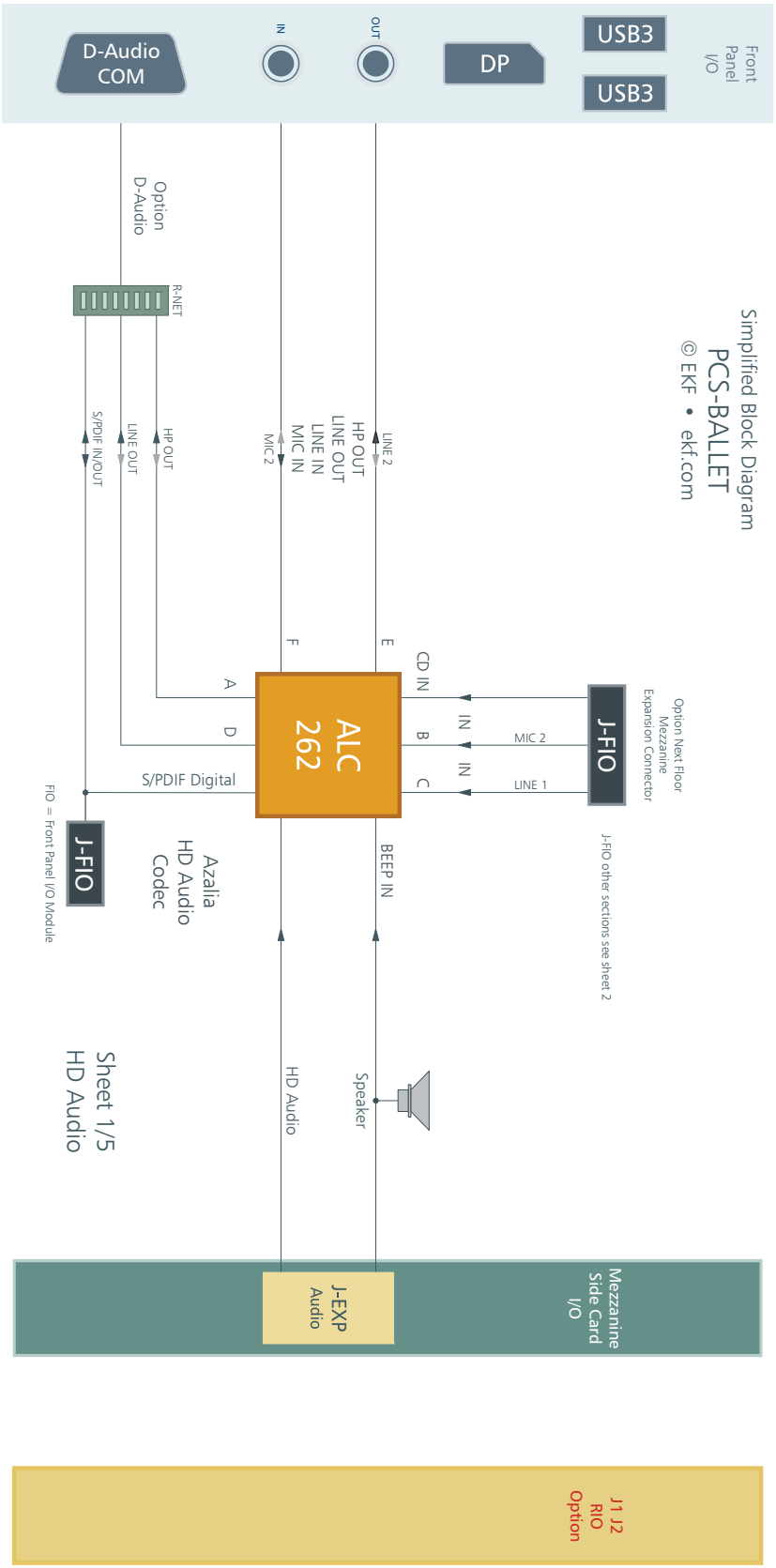
Rear I/O usage would require a suitable single slot backplane which mates the PCS-BALLET, and in addition a custom specific rear I/O module.

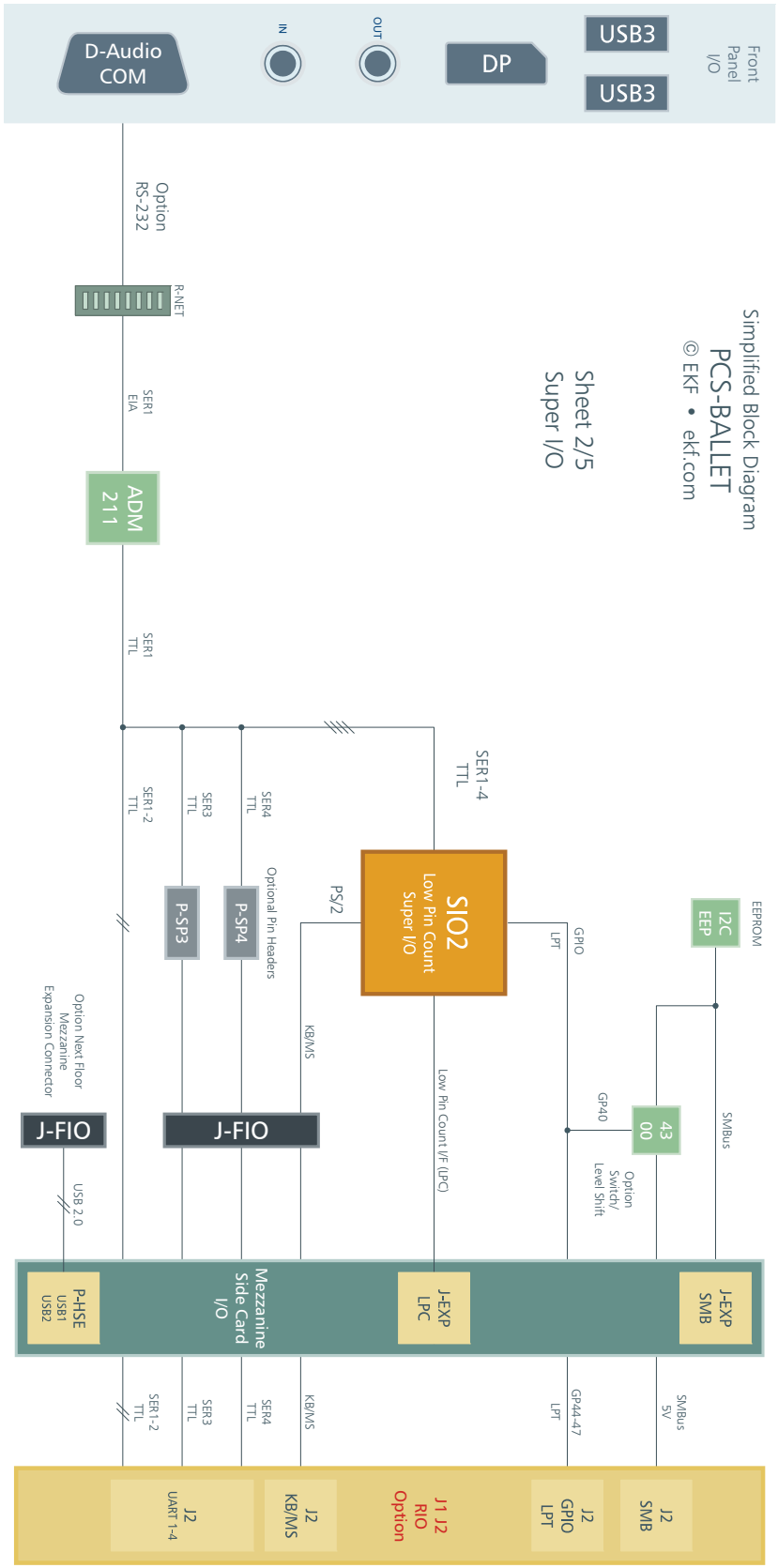
| Related Documents | |
|---|---|
| CU7-RS485 UART Module | www.ekf.com/c/ccom/cu7/cu7.html |
| CU8-RS232 UART Module | www.ekf.com/c/ccom/cu8/cu8.html |



CU-Series PHY Module

# Block Diagram




Front Panel I/O
USB3
USB3
DP
OUT
IN
D-Audio COM
Option RS-232
R-NET
SER1 EIA
ADM 211
SER1 TTL
SER1-4 TTL
SER1-2 TTL
SER3 TTL
SER4 TTL
P-SP3
P-SP4
Optional Pin Headers
PS/2
KB/MS
SIO2 Low Pin Count Super I/O
LPT
GPIO
Low Pin Count I/F (LPC)
EEPROM
I2C EEP
SMBus
GP40
43 00
Option Switch/ Level Shift
Option Next Floor Mezzanine Expansion Connector
J-FIO
J-FIO
USB 2.0
P-HSE USB1 USB2
Mezzanine Side Card I/O
J-EXP LPC
J-EXP SMB
SER1-2 TTL
SER3 TTL
SER4 TTL
KB/MS
GP44-47 LPT
SMBus 5V
J2 UART 1-4
J2 KB/MS
J1 J2 RIO Option
J2 GPIO LPT
J2 SMB
Simplified Block Diagram
PCS-BALLET
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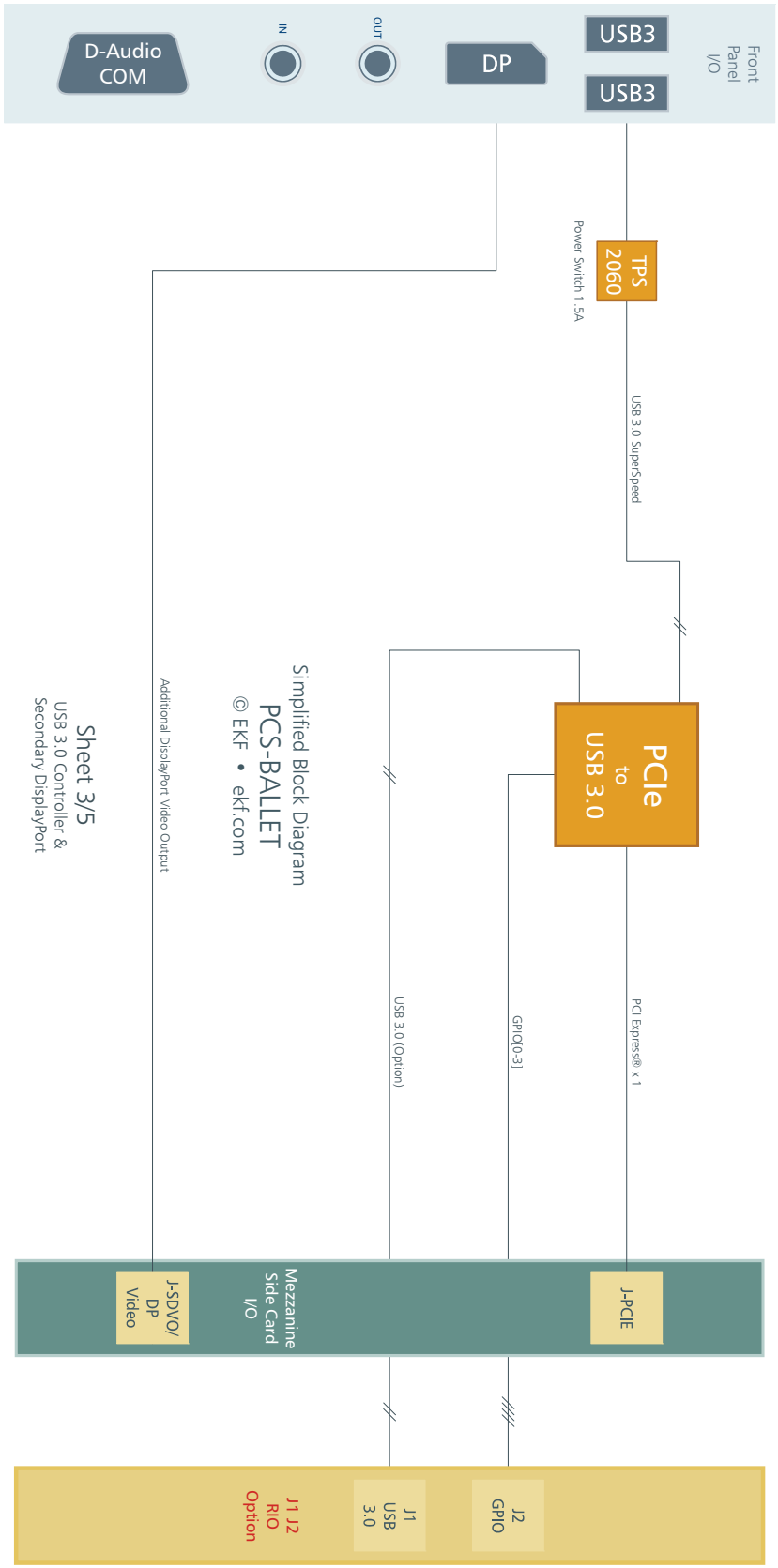
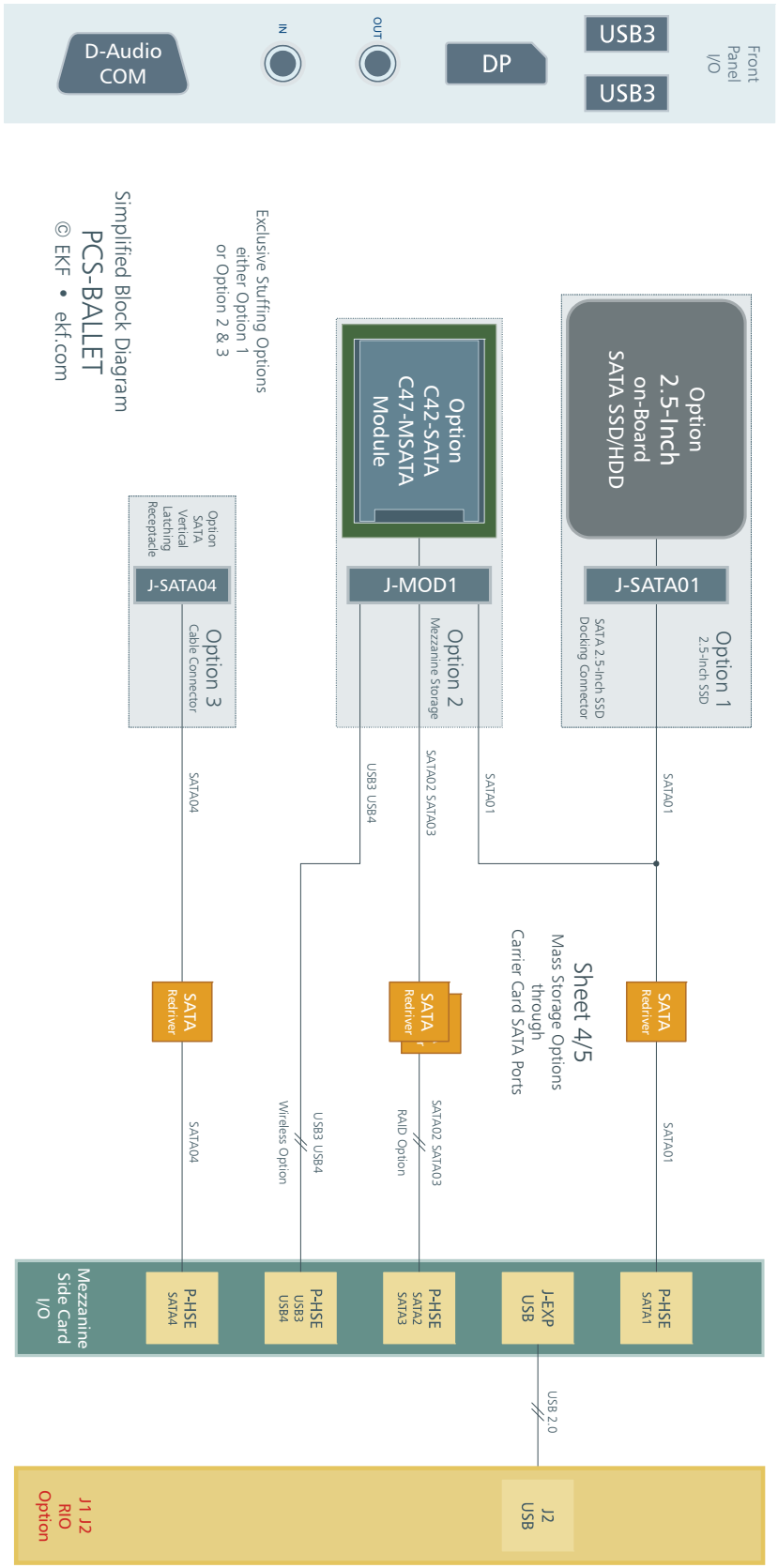
Sheet 2/5
Super I/O


Front Panel I/O
D-Audio COM
IN
OUT
DP
USB3
USB3
TPS 2060
Power Switch 1.5A
USB 3.0 SuperSpeed
PCIe to USB 3.0
PCI Express® x 1
GPIO[0-3]
USB 3.0 (Option)
Additional DisplayPort Video Output
J-PCIE
Mezzanine Side Card I/O
J-SDVO/ DP Video
J2 GPIO
J1 USB 3.0
J1 J2 RIO Option
Simplified Block Diagram
PCS-BALLET
© EKF • ekf.com
Sheet 3/5
USB 3.0 Controller & Secondary DisplayPort


Front Panel I/O
USB3
USB3
DP
OUT
IN
D-Audio COM
Option 2.5-Inch on-Board SATA SSD/HDD
Option C42-SATA C47-MSATA Module
Option SATA Vertical Latching Receptacle
J-SATA01
J-MOD1
J-SATA04
Option 1 2.5-Inch SSD
Option 2 Mezzanine Storage
Option 3 Cable Connector
SATA 2.5-Inch SSD Docking Connector
SATA01
SATA02 SATA03
SATA01
USB3 USB4
SATA04
SATA Redriver
SATA Redriver
SATA Redriver
Sheet 4/5
Mass Storage Options through Carrier Card SATA Ports
SATA01
SATA02 SATA03
RAID Option
USB3 USB4
Wireless Option
SATA04
Mezzanine Side Card I/O
P-HSE SATA1
J-EXP USB
P-HSE SATA2 SATA3
P-HSE USB3 USB4
P-HSE SATA4
USB 2.0
J2 USB
J1 J2 RIO Option
Simplified Block Diagram
PCS-BALLET
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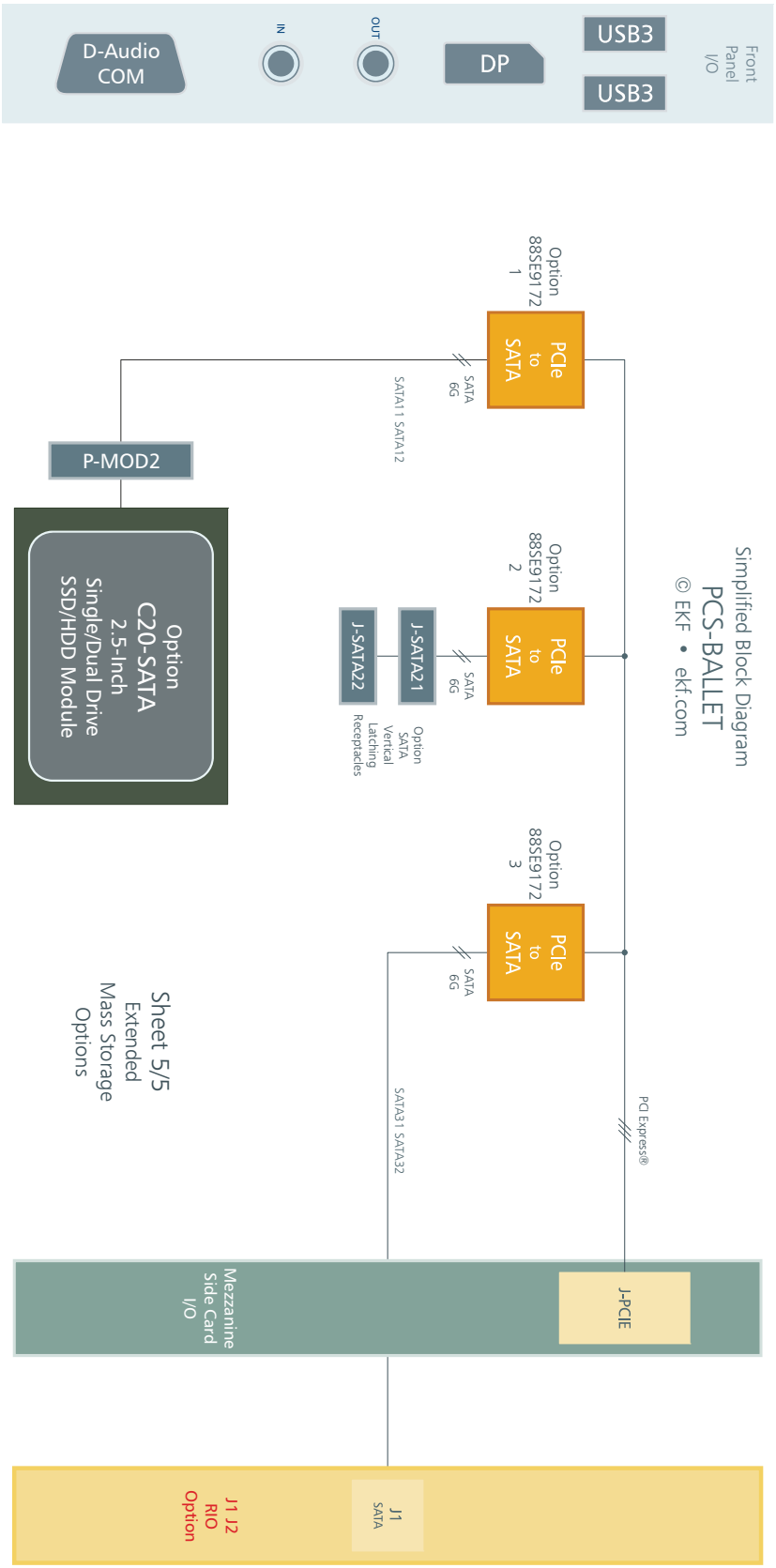
Exclusive Stuffing Options either Option 1 or Option 2 & 3


Front Panel I/O
USB3
USB3
DP
OUT
IN
D-Audio COM
Option 88SE9172 1
PCIe to SATA
SATA 6G
SATA11 SATA12
P-MOD2
Option C20-SATA 2.5-Inch Single/Dual Drive SSD/HDD Module
Option 88SE9172 2
PCIe to SATA
J-SATA21
J-SATA22
SATA 6G
Option SATA Vertical Latching Receptacles
Option 88SE9172 3
PCIe to SATA
SATA 6G
SATA31 SATA32
PCI Express®
Simplified Block Diagram
PCS-BALLET
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Sheet 5/5
Extended Mass Storage Options
Mezzanine Side Card I/O
J-PCIE
J1 J2 RIO Option
J1 SATA

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boards. systems. solutions.

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