EKF
SYSTEM

Technical Information

CompactPCI® • CP5-GLAM

New Technologies Carrier Board

ExpressCard™ Slot 54mm/34mm
Dual PCI Express® Mini Card Sockets

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Contents

About this Manual

This manual is a short form description of the technical aspects of the CP5-GLAM, required for installation and system integration. It is intended for the advanced user only.

Edition History

EKF Document	Ed.	Contents/*Changes*	Author	Date
Text # 5050 cp5_tie.wpd	1	Technical Information CP5-GLAM English, Preliminary Edition	jj	04 Feb 2008
	2	Added information ExpressCard mechanical adapter kit 811.8.010000.1	jj	18 April 2008
	3	Added photos CP5 populated / non-populated	jj	2 July 2008
	4	Added images of sample GSM/GPS and WLAN PCIe Mini Cards	jj	3 March 2009
	5	Added image of 6-fold antenna front panel	jj	22 September 2009
	6	Added image of coated board	jj	9 October 2009
	7	Added photos of top/bottom view	jj	22 October 2009
	8	Added maximum power consumption	jj	15 August 2011
	9	Added photos of 6-fold antenna front panel	jj	26 February 2014
	10	Amended applicability within PXI® systems	jj	19 May 2014

Related Documents

The CP5-GLAM can be operated in any CompactPCI environment. However, if combined with a CPU board from EKF, some properties of the CP5-GLAM may be configurable via BIOS setup. For a description of the particular EKF CPU card in use, please refer to the correspondent CPU user guide, available by download from www.ekf.com/c/ccpu/ccpu.html.

The CP5-GLAM acts as a carrier for third party hardware. Regarding the ExpressCard, PCI Express Mini Cards and/or USB SSD modules in use, please refer to the particular manufacturers website.

Nomenclature

Signal names used herein with an attached '#' designate active low lines.

Trade Marks

Some terms used herein are property of their respective owners, e.g.

- ▸ ExpressCard™: Trademark PCMCIA
- ▸ PCI Express: ® PCI-SIG
- ▸ Intel, Core i*: ® Intel
- ▸ CompactPCI: ® PICMG
- ▸ Windows 7, Windows 8: ® Microsoft
- ▸ EKF, ekf system: ® EKF

EKF does not claim this list to be complete.

Legal Disclaimer - Liability Exclusion

This manual has been edited as carefully as possible. We apologize for any potential mistake. Information provided herein is designated exclusively to the proficient user (system integrator, engineer). EKF can accept no responsibility for any damage caused by the use of this manual.

Standards

Specifications/Standards	
PCIe Mini Card	PCI Express™ Mini Card Electromechanical Specification Revision 1.2 October 26, 2006 (PCI SIG www.pcisig.com)
ExpressCard	ExpressCard Standard Release 1.0 (www.expresscard.org & www.pcmcia.org)
CompactPCI	PICMG 2.0 (www.picmg.org)
PCI Local Bus	PCI 2.2/2.3/3.0 Standards (PC-SIG www.pcisig.com)
USB	Universal Serial Bus Revision 2.0 specification (www.usb.org/developers)
PCI Express	PCIe Base Spec. 1.1 (PCI-SIG www.pcisig.com)

CP5-GLAM Populated with PCIe Mini Cards & USB SSDs

CP5-GLAM Features

Feature Summary		
Form Factor	▸ ▸	Single size Eurocard (160x100mm^2) Front panel width 4HP (20.3mm)
CompactPCI	▸ ▸ ▸ ▸	32-bit 33MHz Suitable for CPCI backplanes with +5V or +3.3V VIO (J1 w/o key) Ready for usage within PXI® systems
PCIe Mini Card	▸ ▸ ▸ ▸	2 x PCI Express Mini Card sockets UIM ports wired to on-board SIM connectors (hinge style) Suitable for WLAN, GSM, WiMax, Turbo Memory and other PCIe Mini Cards Suitable for USB and PCI Express Mini Cards
Antenna Connectors	▸ ▸	2 x SMA/RP connectors available from the front panel, wired to on-board U.FL receptacles, suitable for double ended U.FL plug cable assemblies from Mini Card to CP5-GLAM board up to 6 x SMA/RP front panel connectors optionally available when ExpressCard slot is not populated (MIMO solutions)
USB Solid State Drive	▸	2 x 2.00mm Pin header provided for low profile industrial USB SSD module, e.g. Intel, M-Systems, STEC (8GB as of current)
ExpressCard Slot	▸ ▸ ▸ ▸ ▸ ▸	Front panel access, push-push mechanics Suitable for 54mm and 34mm cards Suitable for USB and PCI Express cards Electronic power switch Individual card retention solution for ruggedized systems available from EKF Extended ExpressCards limited to 54mm width
Main Components	▸ ▸ ▸ ▸	PCI to PCI bridge (CompactPCI frontend to local PCI) PCI to PCI Express bridge PCI to USB 2.0 host controller, 5 port PCI Express packet switch, 4-lane
Thermal Conditions Environmental Conditions	▸ ▸ ▸ ▸ ▸ ▸	Operating temperature: 0°C ... +70°C Storage temperature: -40°C ... +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
EC Regulations	▸ ▸	EN55022, EN55024, EN60950-1 (UL60950-1/IEC60950-1) 2002/95/EC (RoHS)
MTBF	tbd	
Power Requirements	▸ ▸	+5.0V 700mA max. (varies with module assembly) +3.3V 1.6A max. (varies with module assembly)

Short Description

Based on the PCI Express and USB standards, ExpressCards and PCI Express Mini Cards became very popular also for industrial applications. The CP5-GLAM is a carrier board for a single 54/34mm ExpressCard and two PCI Express Mini Cards, and can in addition be equipped with two USB Silicon State Drive (SSD) modules.

The CP5-GLAM is a 3U/4HP CompactPCI peripheral board. In addition to an USB controller it provides PCI Express based circuitry, as required for attachment of both, PCI Express Mini Cards, and the ExpressCard.

The front panel ExpressCard slot stands for flexible system configuration. The push-push mechanics accommodates either an ExpressCard/54 (54mm x 75mm) or an ExpressCard/34 (34mm x 75mm) module. ExpressCard technology is designed to allow users to install and remove modules from the CP5-GLAM at any time, without having to switch off their systems.

The on-board PCI Express Mini Card sockets on the CP5-GLAM are especially useful for wireless applications such as WiFi (WLAN), GSM, WiMAX, GPS, and in addition for the Intel® Turbo Memory modules. Up to 6 antenna connectors (SMA/RP style) in the front panel allow for MIMO (RF multiple-input multiple-output) card employment. Typically, wireless Mini Cards provide U.FL style antenna receptacles. A double ended U.FL plug coaxial cable assembly will be required for each Mini Card receptacle as interconnection to its associated front panel SMA connector.

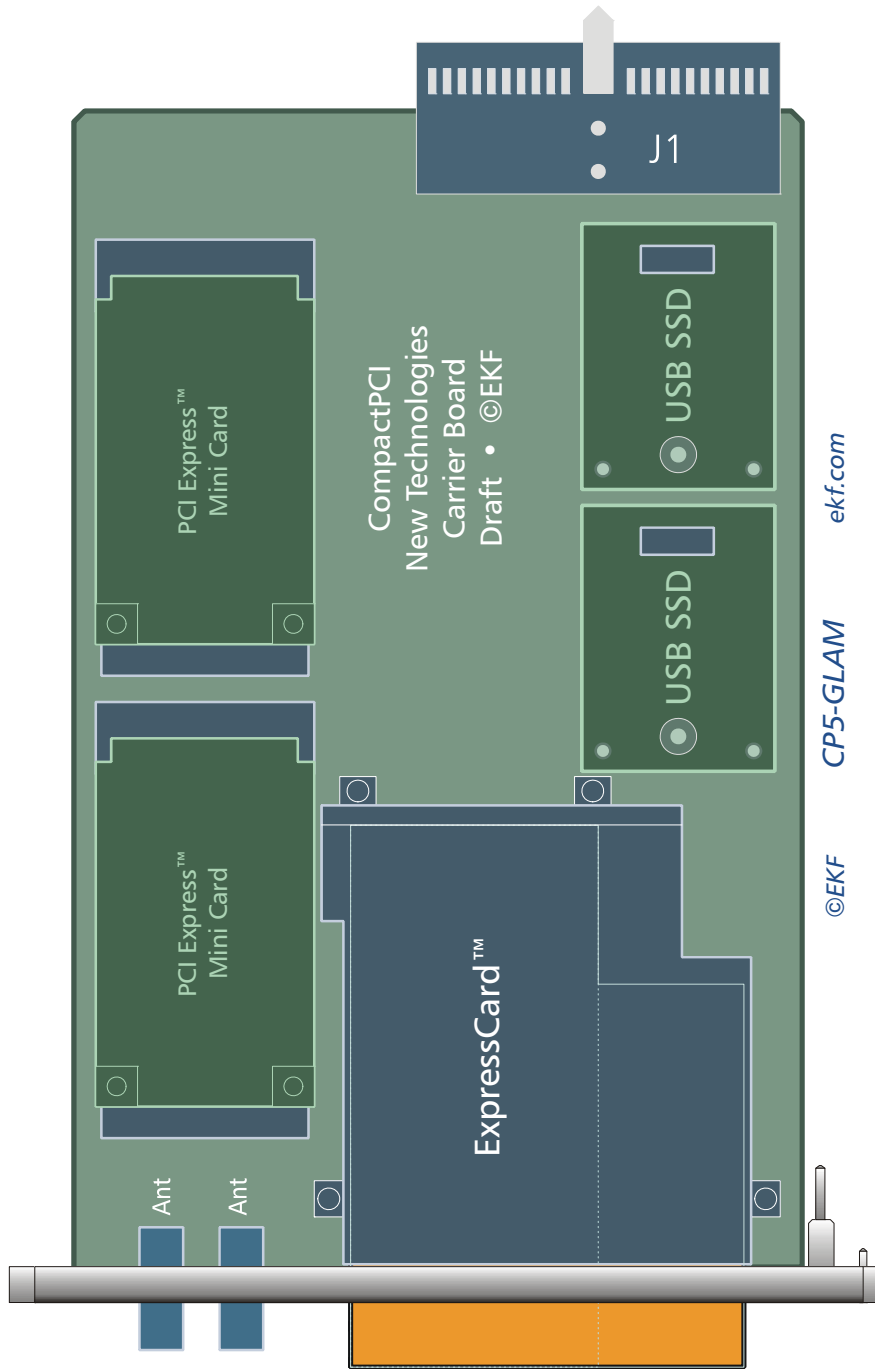In addition, the CP5-GLAM is equipped with two on-board sockets for USB Flash disk modules such as the Intel® Z-U130. Similar to an USB stick, Solid State Drive (SSD) modules are mass storage devices based on NAND flash memory, while providing error correction management, performance and endurance parameters suitable for rugged industrial applications.

Sample GSM/GPS
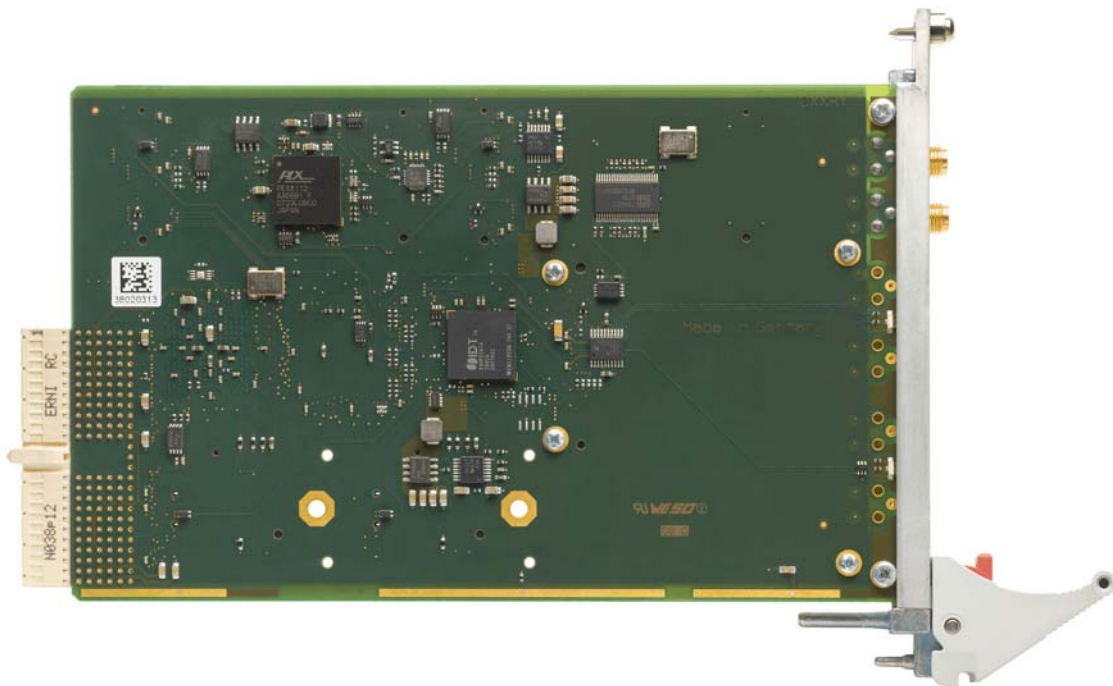PCIe Mini Card

Sample WLAN (WiFi)
PCIe Mini Card

J1

PCI Express™ Mini Card

CompactPCI
New Technologies
Carrier Board
Draft • ©EKF

USB SSD

USB SSD

ekf.com

CP5-GLAM

©EKF

PCI Express™ Mini Card

ExpressCard™

Ant

Ant

CP5-GLAM Concept Drawing

Front Panel Variations

CP5-GLAM
ExpressCard
PCIe Mini Card
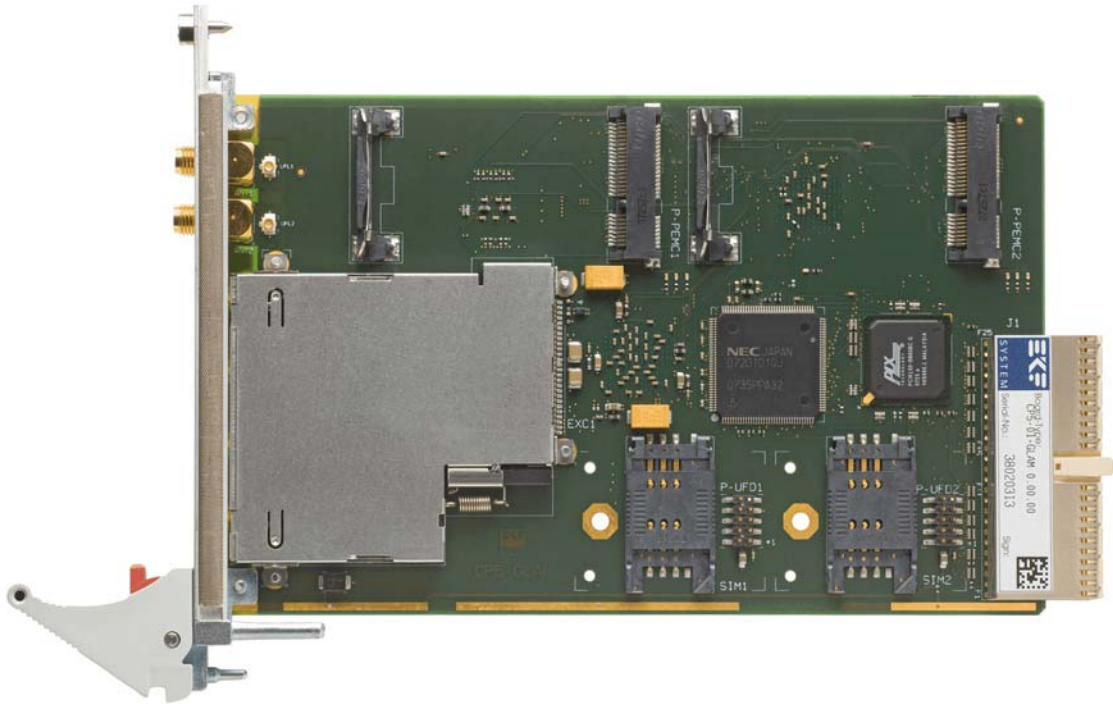
CP5-GLAM
PCIe Mini Card
w/o ExpressCard
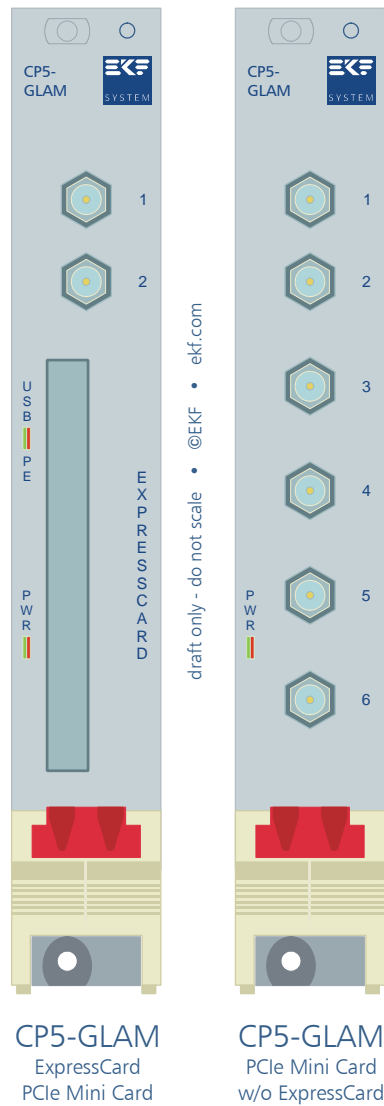
The CP5-GLAM is available in two flavours, either with an ExpressCard slot in the front panel, or with additional SMA RF connectors (as may be required for some MIMO technology based PCI Express Mini Cards), which then replace the ExpressCard slot.

EKF offers in addition custom specific design, for board electronics and also for front panel layout. An 8HP front panel solution e.g. could accommodate both, the ExpressCard slot as well as additional SMA antenna connectors.

CP5-GLAM Six Antenna Front Panel Version

Block Diagram CP5-GLAM

Simplified Block Diagram **CP5-GLAM**

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CompactPCI J1

PCI to PCIe Bridge
PEX 8112

PCI 6150

μPD 720101

PCIe Packet Switch
PES 4T4

USB Controller

Silicon State Drive
M-Systems uDOC MD1665
SimpleTech SLUFDM
Intel Z-U130 SSDUSMS

SSD
4GB/8GB USB Flash Drive Option

Mini PCI Express

PCI Express™ Mini Card
PCIe Mini Card Slots
WiFi - WiMax - GSM - TV
- Turbo Memory (Robson)

SIM Card

Mini PCI Express

PCI Express™ Mini Card

SIM Card

ExpressCard

ExpressCard™ 34/54mm

up to 6 x U.FL to SMA

MIMO

Front Panel I/O

SMA 1 2 3-6 ANT

Theory of Operation

The CompactPCI backplane is based on the (parallel) PCI bus. The ExpressCard however, as well as its pendant PCI Express Mini Card, requires a (serial) PCI Express I/F. In addition, both card types may use an USB channel, as I/F alternative. Hence, the CP5-GLAM as a carrier for up to three cards (2 x PCI Express Mini Card, 1 x ExpressCard) must provide three PCIe lanes, and three USB ports. Another two USB ports are required for the USB SSD (Solid State Drive) modules.

The PCI Express circuitry on the CP5-GLAM is comprised of two main components, a PCI to PCI Express reverse bridge, and a PCI Express packet switch to expand a single PCIe lane to the required three PCIe lanes, completed by a PCIe clock generator.

The on-board PCI to USB 2.0 host controller (root hub) provides five downstream facing USB ports, which are shared by two OHCI and one EHCI controller cores.

The CompactPCI interface of the CP5-GLAM J1 connector is wired to a PCI to PCI bridge, in order to separate the local PCI bus, with its two local PCI devices, from the external CPCI backplane, which specifies only a single PCI load for any CompactPCI card.

In addition to the CompactPCI supply voltages +5V and +3.3V, the CP5-GLAM is equipped with switching regulators for 1.5V and 1.0V. A power sequencing controller is in charge of ramping up/down the power rails to the particular ICs. A front panel bicolor LED indicator reflects the current status (red = ramp up/down, green = power up finished). Another power controller IC is dedicated solely to the ExpressCard slot, for hot plug support.

The CP5-GLAM operates as a 32-bit PCI device at 33MHz on the CompactPCI backplane, resulting in a maximum (theoretic) data transfer rate of 132MByte/s. Obviously this throughput cannot be sufficient to establish simultaneously a PCI Express link (2 x 2.5GBit/s), and an USB high speed controller (480Mbit/s), at full data rate. For ExpressCards or Mini Cards with high throughput such as an SATA or Gigabit Ethernet controller, or Turbo Memory, some degradation in speed must be accepted, especially if all card sockets are in use. However, most data transfers are block or package transfers, with a short burst, and longer intervals w/o data, so that many applications will not suffer noticeable from the PCI bottleneck.

The CP5-GLAM is provided with an EEPROM attached to the local PCI to PCI bridge, which may contain EKF proprietary data, for utilization by the BIOS (EKF CPU boards only - needless to say). The local SMBus e.g. is separated into different segments by switches controlled through GPIOs, with their status stored into the EEPROM.

Front Panel Connectors

ANT1, ANT2	SMA/RP (reverse polarity) antenna connectors, each routed to an on-board U.FL receptacle. Each of ANT1/2 replicates the respective antenna I/O connector of a wireless PCI Express Mini Card. Small external swivel/angle type SMA/RP plug antennas can be attached directly to the front panel ANT1/2 (if there are no conflicts with connectors from neighboured CPCI cards) , whereas systems in a closed cabinet would require remote external antennas, connected to ANT1/2 by means of suitable coaxial cables.
ANT3 - ANT6	SMA/RP (reverse polarity) antenna connectors, each routed to its own on-board U.FL receptacle. Available only w/o ExpressCard slot mechanics, due to lack of space on the front panel. Each of ANT3 - ANT6 replicates a particular antenna I/O connector of a wireless PCI Express Mini Card. Popular MIMO based Mini Cards such as the Intel 4965AGN Wireless WiFi Link are provided with 3 antenna receptacles, so 6 front panel antenna connectors in total distributed over 2 Mini Cards should enough even for demanding applications.
EXC	Push-push mechanics ExpressCard slot, suitable for 34mm and 54mm cards. For ruggedized applications, EKF can offer individual card retention solutions.

On-Board Connectors

P-PEMC1	PCI Express Mini Card socket & latch, for wireless applications and Turbo Memory, SIM card socket SIM1 corresponds to P-PEMC1
P-PEMC2	PCI Express Mini Card socket & latch, for wireless applications and Turbo Memory, optional SIM card socket SIM2 is assigned to P-PEMC2
P-UFD1 P-UFD2	Socket 10-lead 2.00mm pitch, for low profile USB SSD (Solid State Drive), suitable eg. for Intel Z-U130, STEC SLUFDM, SanDisk (M-Systems) SDUS5EB
SIM1	SIM card holder, hinge style, 6 contacts, GSM 11.11 Europe, corresponds with P-PEMC1
SIM2	SIM card holder, hinge style, 6 contacts, GSM 11.11 Europe, corresponds with P-PEMC2
UFL1/2	U.FL style coaxial RF receptacles, each wired to its associated ANT1/2 SMA front panel connector, usage together with a U.FL/MHF style plug cable harness (available from e.g. Hirose, I-Pex, Wieson), which has to be strapped from the particular Mini Card antenna receptacle to the on-board receptacle.
UFL3 - UFL6	U.FL style coaxial RF receptacles, each wired to its associated ANT3 - ANT6 SMA front panel connector, for high end MIMO applications. Due to insufficient space on the front panel, UFL3-6 (as well as ANT3-6) are available only if the ExpressCard slot is not populated.

CompactPCI Connector

J1	2.00mm unkeyed Hard Metric female connector, according to CompactPCI standards

Please note:

Not all of the connectors or other elements listed above may be present or functional on your actual CP5-GLAM board. Assembly of these connectors is highly custom specific. Discuss your needs (target application) with EKF before ordering, for an optimum board configuration.

Installing and Replacing Components

Before You Begin

Warnings

The procedures in this chapter assume familiarity with the general terminology associated with industrial electronics and with safety practices and regulatory compliance required for using and modifying electronic equipment. Disconnect the system from its power source and from any telecommunication links, networks or modems before performing any of the procedures described in this chapter. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage. Some parts of the system can continue to operate even though the power switch is in its off state.

Caution

Electrostatic discharge (ESD) can damage components. Perform the procedures described in this chapter only at an ESD workstation. If such a station is not available, you can provide some ESD protection by wearing an antistatic wrist strap and attaching it to a metal part of the system chassis or board front panel. Store the board only in its original ESD protected packaging. Retain the original packaging (antistatic bag and antistatic box) in case of returning the board to EKF for repair.

Installing the Board

Warning

This procedure should be done only by qualified technical personnel. Disconnect the system from its power source before doing the procedures described here. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage.

Typically you will perform the following steps:

• Switch off the system, remove the AC power cord

• Attach your antistatic wrist strap to a metallic part of the system

• Remove the board packaging, be sure to touch the board only at the front panel

• Identify the related CompactPCI slot (peripheral slot for I/O boards, system slot for CPU boards, with the system slot typically most right or most left to the backplane)

• Insert card carefully (be sure not to damage components mounted on the bottom side of the board by scratching neighboured front panels)

• A card with onboard connectors requires attachment of associated cabling now

• Lock the ejector lever, fix screws at the front panel (top/bottom)

• Retain original packaging in case of return

Removing the Board

Warning

This procedure should be done only by qualified technical personnel. Disconnect the system from its power source before doing the procedures described here. Failure to disconnect power, or telecommunication links before you open the system or perform any procedures can result in personal injury or equipment damage.

Typically you will perform the following steps:

- Switch off the system, remove the AC power cord

- Attach your antistatic wrist strap to a metallic part of the system

- Identify the board, be sure to touch the board only at the front panel

- unfasten both front panel screws (top/bottom), unlock the ejector lever

- Remove any onboard cabling assembly

- Activate the ejector lever

- Remove the card carefully (be sure not to damage components mounted on the bottom side of the board by scratching neighboured front panels)

- Store board in the original packaging, do not touch any components, hold the board at the front panel only

Warning

Do not expose the card to fire. Battery cells and other components could explode and cause personal injury.

EMC Recommendations

In order to comply with the CE regulations for EMC, it is mandatory to observe the following rules:

- The chassis or rack including other boards in use must comply entirely with CE

- Close all board slots not in use with a blind front panel

- Front panels must be fastened by built-in screws

- Cover any unused front panel mounted connector with a shielding cap

- External communications cable assemblies must be shielded (shield connected only at one end of the cable)

- Use ferrite beads for cabling wherever appropriate

- Some connectors may require additional isolating parts

Reccomended Accessories

Blind CPCI Front Panels	EKF Elektronik	Widths currently available (1HP=5.08mm): with handle 4HP/8HP without handle 2HP/4HP/8HP/10HP/12HP
Ferrit Bead Filters	ARP Datacom, 63115 Dietzenbach	Ordering No. 102 820 (cable diameter 6.5mm) 102 821 (cable diameter 10.0mm) 102 822 (cable diameter 13.0mm)
Metal Shielding Caps	Conec-Polytronic, 59557 Lippstadt	Ordering No. CDFA 09 165 X 13129 X (DB9) CDSFA 15 165 X 12979 X (DB15) CDSFA 25 165 X 12989 X (DB25)

Technical Reference - Connectors

Caution

Some of the connectors may provide operating voltage (e.g. +12V, +5V and +3.3V) to devices inside the system chassis, such as internal peripherals. Not all of these connectors are overcurrent protected. Do not use these connectors for powering devices external to the computer chassis. A fault in the load presented by the external devices could cause damage to the board, the interconnecting cable and the external devices themselves.

Please Note

The CP5-GLAM mezzanine module may be equipped with several on-board connectors for system internal usage. Not all of these connectors may be present on a particular board. Be sure to specify your individual needs when ordering the CP5-GLAM board. Characteristic features and the pin assignments of each connector are described on the following pages (connector designation in alphabetical order within the groups 'front panel connectors', 'on-board connectors', and 'rear I/O connectors').

Front Panel Connectors

Antenna Connectors

Wireless PCI Express Mini Cards (WLAN, WiMAX, GSM) require an *external* antenna, due to the metal (shielding) CompactPCI encasement. Popular WLAN antennas are available with a reverse polarity (RP) SMA plug (FCC part 15 compliant). The CP5-GLAM therefore is equipped with the mating SMA RP 50 Ohm front panel jacks (PCB mount style, isolated from F/P). Hence an external angled/swivel antenna may be attached directly to the front panel SMA connectors. Suitable antennas are available e.g. from Linx (www.linxtechnologies.com), or Pulse (www.pulseeng.com), for a variety of applications.

Typically, wireless PCI Express Mini Cards are provided with one ore more Hirose U.FL-R-SMT radio frequency connectors as antenna I/O. Therefore one or more double-ended U.FL-2LP cable harnesses (plug) are needed in addition, strapped from each particular Mini Card RF input/output, to the corresponding U.FL receptacle near each CP5-GLAM antenna connector position. Suitable cable assemblies are available from Hirose (www.hirose.com) and several other manufacturers, and can also be supplied by EKF as an accessory.

Versions of the CP5-GLAM which are equipped with an ExpressCard slot, provide two SMA front panel antenna connectors. This would be sufficient e.g. for a single MIMO (Multiple Input, Multiple Output) based PCI Express Mini Card configured for 2 x 2 MIMO mode, or for two wireless Mini Cards with a single antenna I/O each.

For optimum results, Mini Cards such as the Intel 4965AGN WiFi Link operated in 2 x 3 MIMO mode would require three antennas, resulting in up to six front panel antenna connectors needed in total, for both Mini Card sockets together. Due to limited front panel space, versions of the CP5-GLAM which provide 6 SMA antenna connectors are not populated with the ExpressCard slot.

As an alternative, a custom specific 8HP front panel layout can be discussed with EKF (sales@ekf.de), providing both an ExpressCard slot and as well more than two antenna connectors. Single-ended U.FL-LP cable assemblies, replenished with a suitable bulkhead front panel SMA connector, would be required as straps from the Mini Cards to the 8HP front panel. Such cable assemblies are available e.g. from ES&S (www.esskabel.de). The antenna connectors then have to be fixed to the CP5-GLAM front panel by a nut (F/P cut-out must be suitable dimensioned). Thus, without using additional isolation parts, the antenna ground and the CompactPCI chassis (shield/earth) would be tied together. This may be tolerable for most applications, however EKF recommends utilization of the isolated on-board SMA connector whenever possible.

CP5-GLAM w. 6-Fold Antenna Front Panel

Coax Connector Removing Tool

ExpressCard Slot

The CP5-GLAM is provided with a 54/34mm ExpressCard push-push mechanics. An extended ExpressCard is tolerable, if its height does not exceed 15mm (otherwise the front panel of the next CompactPCI board to the right would be partially covered). The allowable ExpressCard width must not exceed 54mm, due to the CompactPCI card ejector lever below the ExpressCard slot. Both types, USB as well as PCI Express based ExpressCards are supported. A LED indicator beneath the ExpressCard slot shows the status of the inserted and powered up card (green = USB type ExpressCard, red = PCI Express type, LED off = card power down). A TPS2231 electronic switch is provided as power fault protection and card reset control circuitry.

By intention, an ExpressCard is a removable device. For ruggedized applications however with the ExpressCard permanently attached, the user should consider an additional **card retention bracket** (Z-profile element, fixed to the front panel e.g. by screws). Unfortunately, ExpressCards with an extension, such as required for front connector I/O or antenna, provide individual shape and dimensions. Hence, any card retention solution must match the particular ExpressCard in use. Please discuss your needs with EKF (sales@ekf.de).

As of current, the CP5-GLAM is equipped with an connector slot assembly from FCI. The ExpressCard has been developed for mobility purposes, i.e. easy removing a device, which is absolutely contrary to rugged industrial applications. EKF has also considered Molex and Tyco as ExpressCard slot, with no advantage with respect to the card retention mechanics.

Whenever possible, for permanent usage EKF recommends to replace an ExpressCard by its PCI Express Mini Card pendant.

For usage of a 34mm ExpressCard, EKF recommends in addition a mechanical expander from 34mm to 54mm card width in order to improve the stability of the ExpressCard when inserted.

EKF Part No. 811.8.010000.1
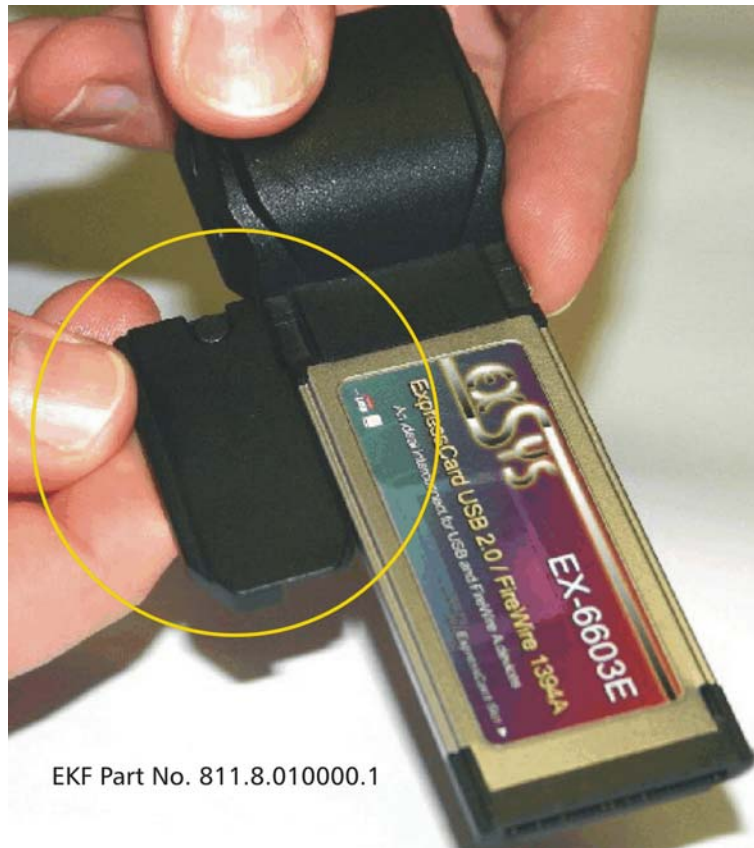
With the above ExpressCard kit (EKF part no. 811.8.010000.1) the ExpressCard has improved lateral stability, thus the risk of losing the contact to the connector can be considerably reduced. The installation is easy, and the kit can be used for any ExpressCard with a width of 34mm.

EXC1 ExpressCard Connector & Mechanics 54/34mm
Connector 255.6.1.026.10 & Card Cage 255.6.1.026.90
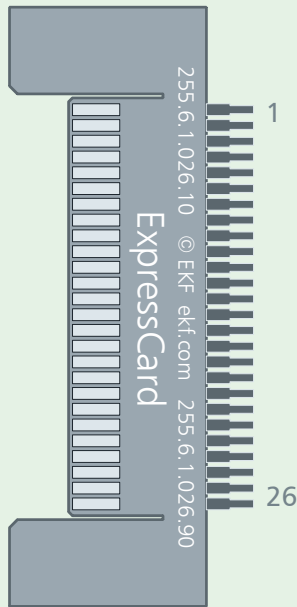
Signal	Pin
GND	1
USB1_D-	2
USB1_D+	3
CPUSB#	4
NC	5
NC	6
SMB_CLK 4)	7
SMB_DAT 4)	8
+1.5V_EXC 1)	9
+1.5V_EXC 1)	10
CARD_WAKE#	11
+3.3VAUX_EXC 1) 2)	12
PERST#_EXC 3)	13
+3.3V_EXC 1)	14
+3.3V_EXC 1)	15
CLKREQ#_EXC	16
CPPE#	17
PCIE_CLK5-	18
PCIE_CLK5+	19
GND	20
PCIE_RN2	21
PCIE_RP2	22
GND	23
PCIE_TN2	24
PCIE_TP2	25
GND	26

1) Power fused by electronic switch TPS2231: +3.3V_EXC @ 1.3A max., +1.5V_EXC @ 0.65A max., +3.3VAUX_EXC @ 275mA max.

2) +3.3VAUX_EXC and +3.3V_EXC are both derived from the CompactPCI +3.3V main supply voltage - no auxiliary voltage +3.3VAUX_EXC is present when the power supply is switched off

3) PERST#_EXC is generated by the power switch TPS2231, and is released after a time delay when all ExpressCard voltage rails are within their tolerances. On an undervoltage condition on any power rail, or if a PCIE_RST# occurs, PERST#_EXC is active (low).

4) SMBus is an option only, requires analog switches 74CBTD3306 to be stuffed, controlled by GPIO1_6150

On-Board Connectors

The CP5-GLAM can be equipped with several on-board connectors. Some of these connectors are available as an option only or exclusive to each other, and therefore may not be functional or even present on your actual board.

Assembly of these connectors is highly custom specific. Discuss your needs with EKF before ordering, so that the optimum board configuration for your application will be chosen.

P-PEMC1 P-PEMC2

As an option, two sockets are provided for PCI Express Mini Cards (e.g. such as wireless cards or Turbo Memory). For GSM telephone modules, on-board SIM card holders are associated with P-PEMC1 and P-PEMC2, in addition.

By specification[*], the PCIe Mini Card sockets do not provide pins for the RF input/output of a wireless module, thus a double-ended U.FL-2LP cable assembly is required in addition, running from any Mini Cards U.FL style antenna input/output connector, to the corresponding U.FL receptacle on the CP5-GLAM printed circuit board, which is in turn assigned to a front panel SMA/RP antenna connector (for details refer to chapter Front Panel Connectors / Antenna). Due to space limitations in the standard front panel, only two antenna connectors are available for board versions with ExpressCard slot populated (six front panel antenna connectors w/o ExpressCard slot).

Both sockets P-PEMC1 and P-PEMC2 are equally suited for the so called Turbo Memory cache module Mini Card. Based on NAND Flash technology, employment of the Intel® Turbo Memory can improve system boot time and will deliver up to 2x faster performance when loading frequently used applications. Drivers can be downloaded from the Intel website (as of current Windows® Vista only).

Some on-board LEDs are provided as status indicator for wireless Mini Cards:

LEDM11	LED_WWAN_MC1
LEDM12	LED_WLAN_MC1
LEDM13	LED_WPAN_MC1
LEDM21	LED_WWAN_MC2
LEDM22	LED_WLAN_MC2
LEDM23	LED_WPAN_MC2

[*]   PCI-SIG PCI Express Mini Card Electromechanical Specification, Rev.1.1

P-PEMC1 P-PEMC2
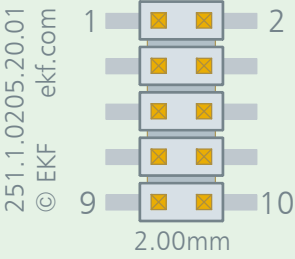### PCI Express Mini Card Socket (255.4.1.052.10) & Latch (255.4.1.052.90)
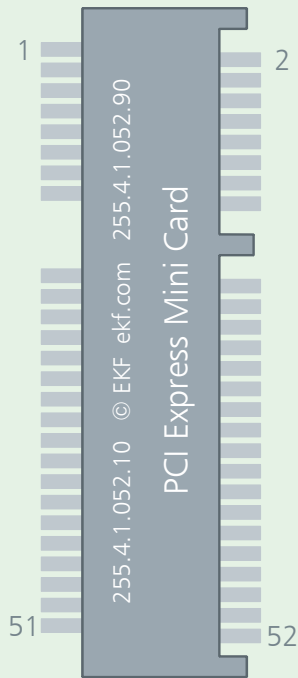
PCIE_WAKE#	1	2	+3.3V
NC BT_DATA	3	4	GND
NC BT_CHCLK	5	6	+1.5V
CLKREQ_MC*#	7	8	PEMC*_UIM_C1
GND	9	10	PEMC*_UIM_C7
PCIE_CLK6- (PCIE_CLK7-)	11	12	PEMC*_UIM_C3
PCIE_CLK6+ (PCIE_CLK7+)	13	14	PEMC*_UIM_C2
GND	15	16	PEMC*_UIM_C6
NC	17	18	GND
NC	19	20	WDIS_MC*# 1)
GND	21	22	MC*_RST# 2)
PCIE_RN3 (PCIE_RN4)	23	24	+3.3V
PCIE_RP3 (PCIE_RP4)	25	26	GND
GND	27	28	+1.5V
GND	29	30	SMB_CLK 3)
PCIE_TN3 (PCIE_TN4)	31	32	SMB_DAT 3)
PCIE_TP3 (PCIE_TP4)	33	34	GND
GND	35	36	USB2_D- (USB3_D-)
NC	37	38	USB2_D+ (USB3_D+)
NC	39	40	GND
NC	41	42	LED_WWAN_MC*
NC	43	44	LED_WLAN_MC*
NC Intel WiFi Link CLK	45	46	LED_WPAN_MC*
NC Intel WiFi Link DAT	47	48	+1.5V
NC Intel WiFi Link RST#	49	50	GND
NC	51	52	+3.3V

Notes: Replace occurrences of * by either 1 (P-PEMC1) or 2 (P-PEMC2).

1)   WDIS_MC1# can be optionally controlled by 8112 GPIO1 if RM5 is stuffed (not stuffed by default). WDIS_MC2# can be optionally controlled by 8112 GPIO3 if RM10 is stuffed (not stuffed by default).

2)   MC*_RST# can be derived either from the PCIe reset output of the 8112 PCI to PCIe bridge (default, RM12 and RM15 stuffed, RM13 and RM16 not stuffed), or from the dedicated reset outputs GPIO09 and GPIO01 of the PES4T4 PCIe switch (option, RM13 and RM16 stuffed, RM12 and RM15 not stuffed).

3)   SMBus is an option only, requires analog switches 74CBTD3306 to be stuffed, controlled by GPIO2_6150 and GPIO3_6150

P-UFD1 P-UFD2

As an option, the CP5-GLAM can be equipped with two connectors for industrial style USB Flash disk mezzanine modules. The connector is a 2.0mm pitch pin header, suitable for a low profile SSD (Solid-State Drive) 37mm x 26mm. As of current, such modules are available e.g. from STEC, Intel, SanDisk (M-Systems) and other manufacturers, up to 8GByte.

| P-UFD1/2 2.00mm Pin Header 2x5 (251.1.0205.20.01) USB Solid-State Drive (Low Profile) 562.20.0004.00 (4GB) SanDisk SDUS5EB • STEC SLUFDM • Intel Z-U130				
	+5V	1	2	NC
	USB4(5)_D+	3	4	NC
	USB4(5)_D-	5	6	NC
	GND	7	8	NC
	Mech. Key	9	10	NC

USB Solid State Drive

SIM1 SIM2

Optional SIM card sockets SIM1/SIM2 on the CP5-GLAM are wired to the P-PEMC1/2 Mini Card connectors, for applications which require subscriber identification such as GSM cellular telephone.

SIM1 SIM2 SIM card socket hinge (top load) 219.51.006.00	
c1	UIM Power
c2	UIM Reset
c3	UIM Clk
c4	nc
c5	GND
c6	UIM Vpp
c7	UIM Data
c8	nc

Both SIM card holders are hinge style sockets. The frame which holds the SIM card must be unlocked by (carefully) moving it sideways, before it can be lifted. Due to limited space on the CP5-GLAM PCB, SIM1 and SIM2 may be partly covered by the USB SSD mezzanine modules, which would have to be removed prior to insertion of a SIM card.

CompactPCI Connector J1
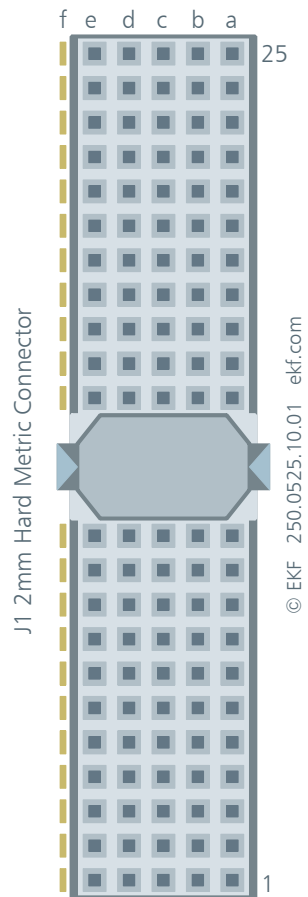
#J1	A	B	C	D	E
25	+5V	*REQ64#*	*ENUM#*	+3.3V	+5V
24	AD1	+5V	VI/O	AD0	*ACK64#*
23	+3.3V	AD4	AD3	+5V	AD2
22	AD7	GND	+3.3V	AD6	AD5
21	+3.3V	AD9	AD8	M66EN	C/BE0#
20	AD12	GND	VI/O	AD11	AD10
19	+3.3V	AD15	AD14	GND	AD13
18	SERR#	GND	+3.3V	PAR	C/BE1#
17	+3.3V	IPMB SCL	IPMB SDA	GND	PERR#
16	DEVSEL#	GND	VI/O	STOP#	LOCK#
15	+3.3V	FRAME#	IRDY#	*BD_SEL#*	TRDY#
14					
13			Not Keyed		
12					
11	AD18	AD17	AD16	GND	C/BE2#
10	AD21	GND	+3.3V	AD20	AD19
9	C/BE3#	IDSEL	AD23	GND	AD22
8	AD26	GND	VI/O	AD25	AD24
7	AD30	AD29	AD28	GND	AD27
6	REQ#	GND	+3.3V	CLK	AD31
5	*BRSVP1A5*	*BRSVP1B5*	RST#	GND	GNT#
4	*IPMB PWR*	*HEALTHY#*	VI/O	*INTP*	*INTS*
3	INTA#	INTB#	INTC#	+5V	INTD#
2	*TCK*	+5V	*TMS*	TDO [1]	TDI [1]
1	+5V	-12V [2]	*TRST#*	+12V [2]	+5V

1   TDO - TDI internally connected

2   +12V -12V not in use

Ruggedized Versions

On special request, the PCB can be coated/sealed/underfilled to withstand harmful environment conditions. Please notice the transparent acrylic coating (nearly invisible) in the photo below. In addition, a rugged locking mechanism was installed over the SIM card sockets, for superior immunity against vibration and shock.

Coated PCB

Schematics

Complete circuit diagrams for this product are available for customers on request. Signing of a non-disclosure agreement would be needed. Please contact sales@ekf.de for details.

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