GEB Enterprise S.r.l.

General Electronics Business

Via Rocca di Papa, 21 –00179 Roma, Italy
Email: **info@geb-enterprise.com** - Web: **www.geb-enterprise.com**

SOPC
System On Programmable Chip

PCI Express Mini: PCIEM-15-IO

GEB High Performance PCIe System On Card (Sopc-Card) board make easy to add in **Your SBC or MINI-ITX a powerfull I/O capability**. It make able your sbc to interface lots of applications where customized interfaces are needed, such as:

High-Perf. Computing — Medical Imaging — Military Radar — Communications — Broadcast Systems — Video Surveillance — Wireless Basestations

Your PCIe design can be supported by basic PCI express fpga systems that can include be target (I/O registers), or master, with SGDMA, able to reach the PC memory in its virtual space.

Features

- Mini-PCIe size
- Single 3.3V power supply voltage.
- Two I/O connectors, 34+26 pins, dual rows, 50 mills header connectors (Samtech FTS series).
- 53 user digital I/O channels, 3.3V LVTTL compliant, each one having independent sense, drive, bi-directional, and tri-state capabilities.
- 2 user output clock signals, 3.3V LVTTL compliant, with dedicated PLLs.
- 1 user input clock signal, 3.3V LVTTL compliant, with dedicated PLL
- User available FPGA resources in EP4CGX30 version [*1]:
    - Logic Element: 29440LE (1440LE)
    - Ram: 1080 Kbits (540Kbits)
    - PLLs: 4 (3)
    - 18x18 bit multipliers: 80 (none)
- Boot device with ISP (In System Programming) using Altera USB Blaster
- Power on monitor and reset circuitry.
- Test Access Ports (TAPs) allows on board programming
- On board crystal oscillator provides accurate clock reference.
- Fully-compatible with JTAG/IEEE 1149.1 boundary-scan standard.
- Compliant to PCI Express Mini Card Electromechanical Specifications revision 1.2 (30mm x 51mm x 4,85mm, Double-sided).
- Peripheral to host wake-up support

Note[*1] Number in parentheses are referred to low cost version equipped with EP4CGX15BF14C7N FPGA
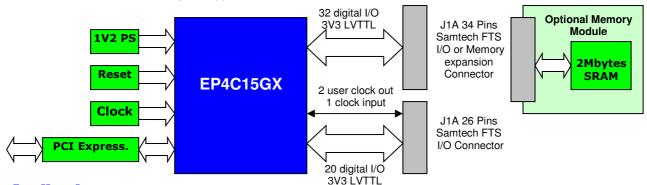

Description

MiniCard standard is also known as Mini PCI Express standard. The Minicard pcb is a small form factor board used to implement the PCI Express interface to a remote PCIe peripheral. The card size is 30mm wide by 50.95mm long by 5mm high. The Minicard standard defines a 52-pin card edge connector, the card pins are fingers at the edge of the pcb board

The GEB High Performance System On Card (Sopc-Card) package includes whatever needed for using the advanced features of Altera CycloneIV-GX family and features a socketed board with an **EP4CGX15**/**EP4CGX30** device in a BGA169 package.

All FPGA power management, distribution and decoupling, fine pitch BGA package connection, multilayer PCB manufacturing, double side PCB mounting and testing requirements are met by Sopc-Card board.
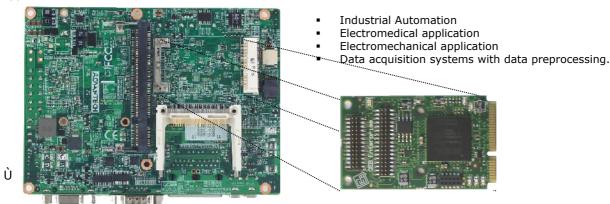
One programming interface port, on the board support in-system programming (ISP), and using Altera Byte Blaster and JTAG programming and testing, is available as well.

The hardware design can be easily implemented using QSYS Altera tools, VHDL language, or a combination of them. The pre-compiled FPGA Systems offer you an admirable advantage to use the PCIe I/O, starting from a simple parallel I/O up to high speed data transfer in both directions. Linux and Windows drivers make immediately possible the access to FPGA resources writing the application at user level.

Application

The product typical application is the control of a remote I/O controller with Industrial Motherboard SBC (Mini-Itx, 3.5"SBC…). The embedded FPGA allows the user to interface all types of actuators and sensors implementing optional hardware in the configurable FPGA and running the dedicated firmware on the NIOSII processor that can be optionally included in the SOPC. Additionally, the DSP preprocessing, with or without DMA data transfer support, can be easily implemented. The NIOSII soft core also allows the user to define their own custom instructions. This, together with the NIOSII fast interrupt response (about 1-2us), supports the product user for high-end, processing on time critical, applications.

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- Industrial Automation
- Electromedical application
- Electromechanical application
- Data acquisition systems with data preprocessing.

Specifications and Operating Conditions

Digital I/O	Vol=0.4V max., Voh=2.4V min., Vil=0.8V max., Vih=2.0V min.
Power supply voltage (current)	3.3V+/- 5% (0.25A Typical, 0.6A Max) (*2)
Operative temperature range	0+70°C Commercial Temp. Range
Storage temperature range	-40/+150°C

(*1) The operative temperatures assumes an FPGA Tja=15℃. Tja depends from FPGA power dissipation. Boards in Industrial Temperature Range aren't in stock, please contact GEB Enterprise for their availability

(*2) The current values depends from the configuration file loaded inside FPGA. The typical values were measured on typical application (100MHz system clock, 50% resource usage, 20% I/O switching at 10MHz). Maximum value was estimated using Altera tolls in many large and fast designs. The maximum current values allowed depends also from the thermal resistance of the package and from the operating temperature

Ordering Information

Product Name	GEB Code	Description
PCIEM-15-IO	100801A1	Fpga EP4CGX15BF14C7N. J1 Connector FTS-113-01 match with Samtech FFSD Cable. J2 FTS-117-03 match with Samtech CLP Connectors.
PCIEM-15-IO	100801A2	Fpga EP4CGX15BF14C7N. J1 FTS-113-01 and J2 FTS-117-01 Connectors match with Samtech FFSD Cable.
PCIEM-15-IO	100801A3	Fpga EP4CGX30BF14C6N. J1 Connector FTS-113-01 match with Samtech FFSD Cable. J2 FTS-117-03 match with Samtech CLP Connectors.
PCIEM-15-IO	100801A4	Fpga EP4CGX30BF14C6N. J1 FTS-113-01 and J2 FTS-117-01 Connectors match with Samtech FFSD Cable.
PCIE-RAM	100996A1	2MBytes Memory module