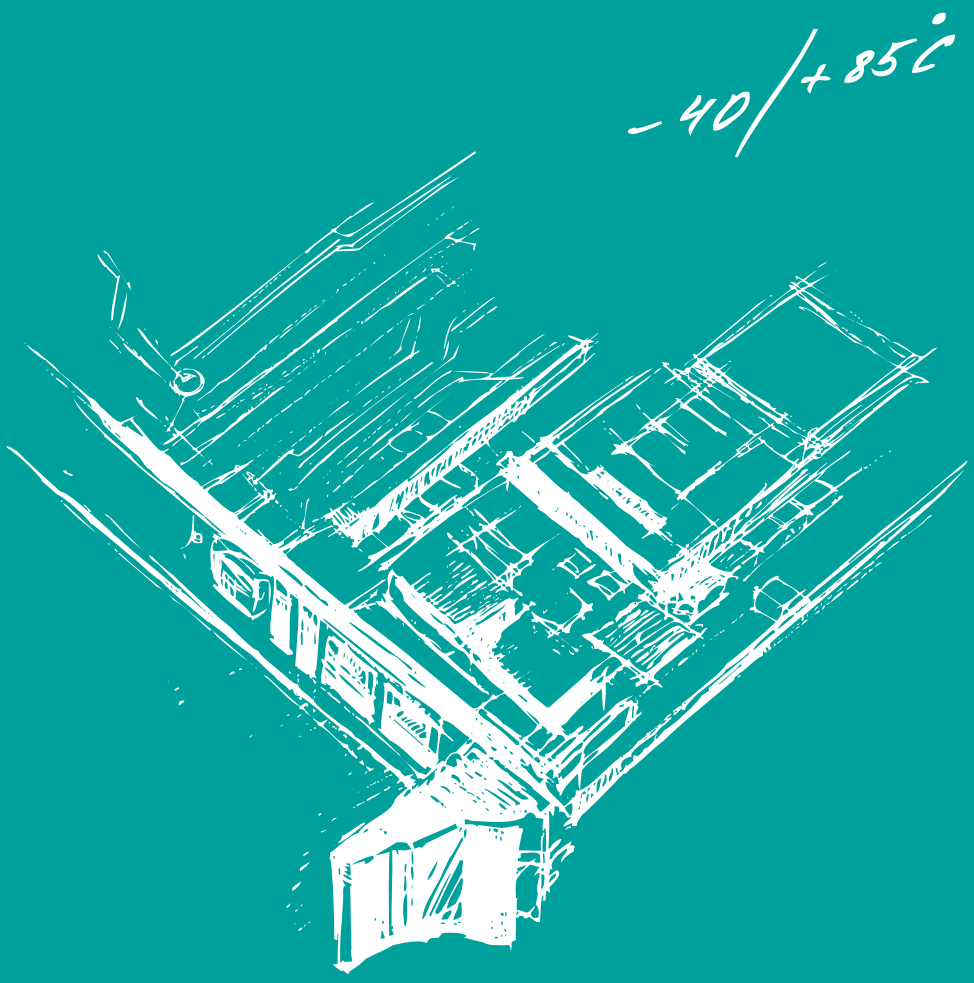
Fastwel

Embedded Electronics for Mission Critical Applications



Rugged Embedded Modules and Industrial PCs

Accessories for System Development

www.fastwel.com

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MILESTONES

1992

Russian research and development engineers formed a team that later became FASTWEL. Their activities were primarily focused on the development and manufacturing of electronic equipment for mission-critical applications. The first project in this area was the product line in MicroPC format.

1995

During the period from 1995 to 1999, with the development of the IT industry, the number and complexity of FASTWEL innovative developments increased. In 2000 the company established its own production facilities with modern surface-mounting manufacturing lines, which has become one of the most technologically advanced lines in Russia.

2002

In April 2002, the first FASTWEL CPU module – CPC103, was manufactured. Development and production of a wide range of CPU modules became the priority line of the company's activities.

2006

The company's experts developed a line of CPU modules based on the Intel Pentium M processors.

2007

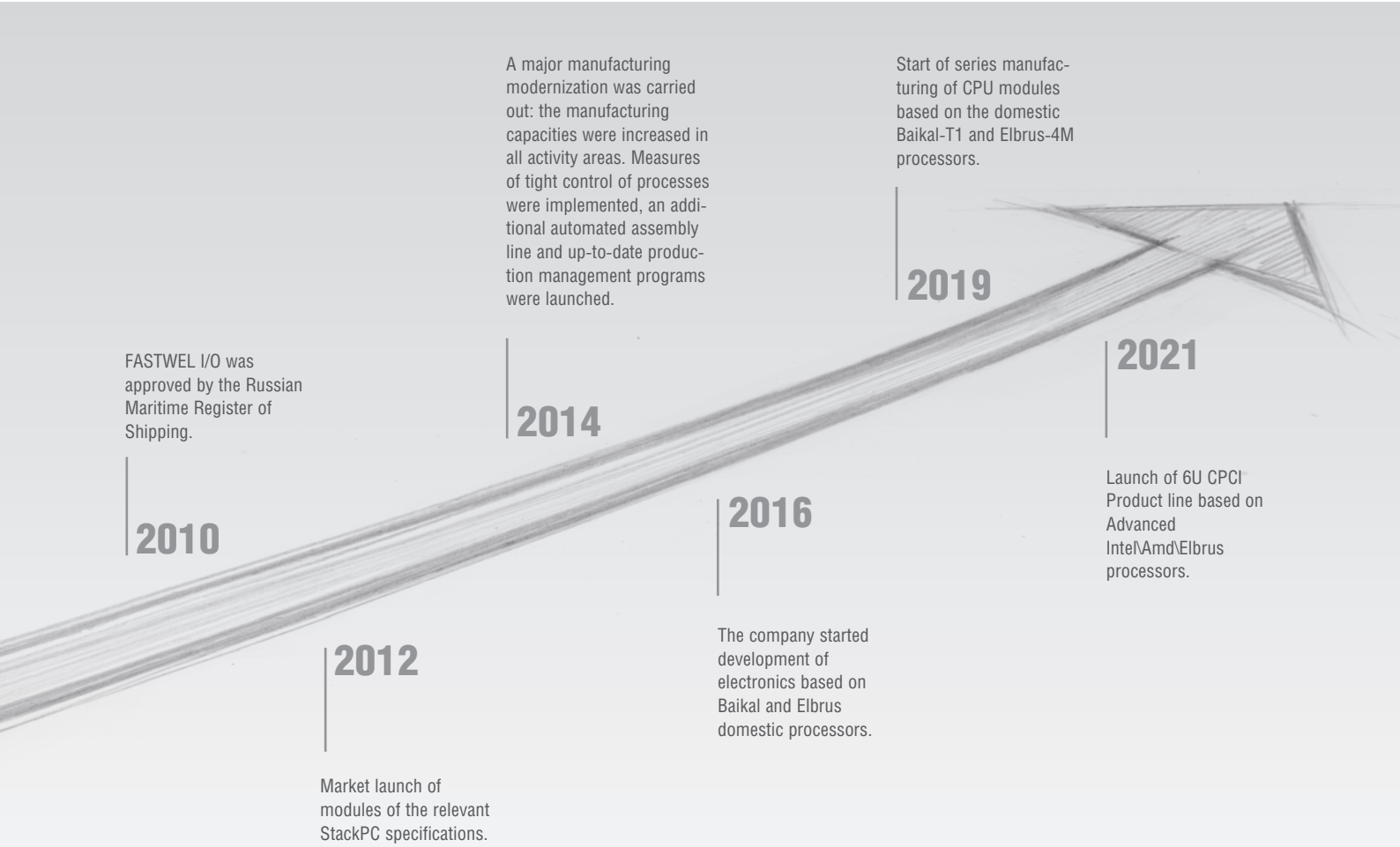
The company obtained licenses for the development and production of special-purpose and nuclear industry equipment. The development and testing of the FASTWEL I/O distributed control system was completed.

2008

The company's production facilities increased 1,5 times. The first technical seminar "The FASTWEL Solution day" was held in Saint Petersburg with a great success.

FASTWEL TODAY is one of the most recognizable Russian IT market players, the leading domestic developer and manufacturer of electronic equipment for mission critical applications.

The company's success is based on the intellectual potential of its employees and high-tech production facilities.



2010

FASTWEL I/O was approved by the Russian Maritime Register of Shipping.

2012

Market launch of modules of the relevant StackPC specifications.

2014

A major manufacturing modernization was carried out: the manufacturing capacities were increased in all activity areas. Measures of tight control of processes were implemented, an additional automated assembly line and up-to-date production management programs were launched.

2016

The company started development of electronics based on Baikal and Elbrus domestic processors.

2019

Start of series manufacturing of CPU modules based on the domestic Baikal-T1 and Elbrus-4M processors.

2021

Launch of 6U CPCI Product line based on Advanced Intel\Amd\Elbrus processors.

APPLICATION AREAS

Marine

Oil and Gas

Industrial automation

Power energy

USING FASTWEL PRODUCTS, you get a highly professional support of FASTWEL experts at all stages of the product life cycle.

Transportation

Mining

Aerospace

Telecom

DEVELOPMENT

Basic RnD Principles

FASTWEL primary focus is design and manufacturing of embedded electronics for mission critical applications.

Reliability

100% reliable and long term operation of our products is the basic principle, on which the development and production methodology is based. FASTWEL manufactures only highly reliable and proven components from the long-term manufacturing programs.

10 years products availability

Longevity of the FASTWEL products is the second core principle of the company. Products manufactured by FASTWEL have a long life cycle (from 7 to 10 years) and are designed for the long-term operation. When the components used in FASTWEL products are withdrawn from production, we offer our customers to use components from our long-term stock, which makes it possible to ensure the supply 2–3 more years.

Customer support

FASTWEL provides a long-term technical support program for the supplied hardware and software.

FASTWEL provides support for a wide range of operating systems that include proven dedicated real-time operating systems such as QNX and VxWorks, special-purpose operating systems such as the AFPS, KPDA, AstraLinux, as well as popular general-purpose operating systems such as Microsoft

Contruct Design and Customization

With a solid experience in development of complex electronic devices, FASTWEL performs custom developments in accordance with the customer's technical requirements.

Contruct design areas:

- CPU modules;
- I/O modules;
- HMIS, Box and Panel PCs;
- Special-purpose controllers for on-board applications;
- development of carrier boards for FASTWEL computer modules.

MANUFACTURING

Automated surface mounting

Selective automation soldering

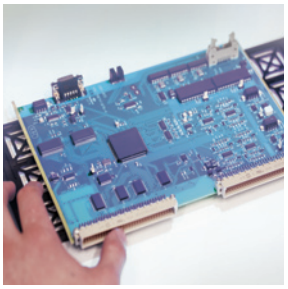
Manual installation and molding of nonstandard components

Double non-destructive inspection of the assembly: X-ray and automatic optical inspection










Industrial washing, special modes

Coating

UV inspection

Electromechanical assembly of frame works

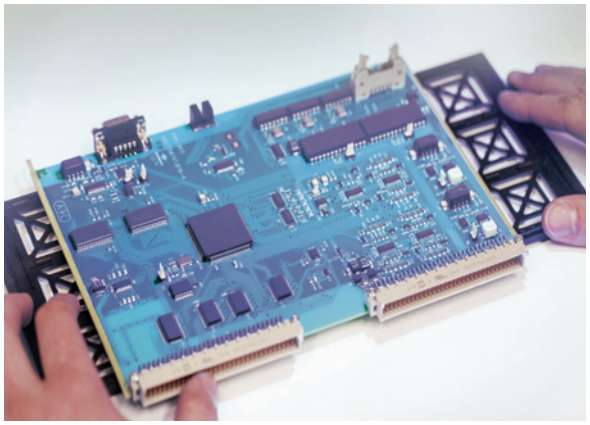
FASTWEL has its own production facilities enabling it to produce modern high-tech electronic modules promptly, with high quality and in large volumes.

The automated assembly section is equipped with 4 modern lines for surface mounting of electronic modules and an automated line of selective soldering of pluggable components, which ensures the assembly of up to 327,000 components/h.

Using lead-free technology (RoHS compliant), the lines provide the possibility of installation of the entire range of components: SMD-components at a pitch of outputs of 0.3 mm, BGA, Micro BGA and Flip Chip. All soldering operations are performed under nitrogen blanket.

The workshop is equipped with a system for automatic quality inspection of assembled electronic modules, which guarantees the production of 99.99% useful products. Production facilities are equipped with a climate control system and an autonomous system for supplying purified pressurized air.

Conformal Coating of Fastwel Products

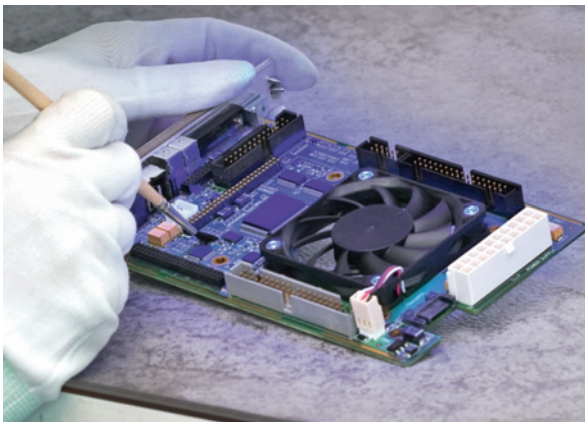


Protective coating is a thin protective polymeric film (25–75 μm thick) applied on an assembled electronic module or PCB. It is mainly intended for protection of electronics operating in rugged environments, exposed to moisture, aggressive chemicals, salt mist, vibration, and risk of fungous organics buildup.

For high quality protection of its products against various environmental impacts Fastwel employs the HumiSeal® 1A33 urethane protective coating.

Service Life:	Not less than 20 years
Coating Thickness:	25 μm to 75 μm
Dielectric Breakdown Voltage:	Not less than 7500 V
Insulation Resistance:	Not less than 200Ч1012 ohms (200T)
Continuous Use Operating Range:	–65 to +125°C

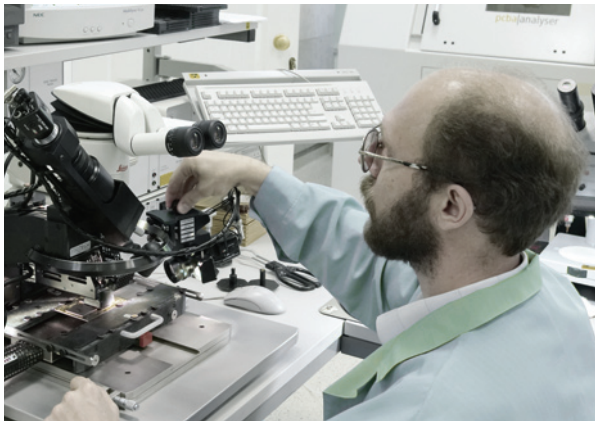
Conformal coating is a proven and efficient way to increase the resistance of electronic modules to all types of surface faults.



- Polyurethane (PU) coatings provide excellent chemical stability, good moisture protection, dielectric and temperature characteristics.
- This coating is certified to conform UL American standards. In addition, PU coatings comply with the requirements of IEC-1086 and IPC-CC-830B industry standards accepted by most aerospace companies in the United States and European Union.

Protective coating is a proven and efficient way to increase the resistance of electronic modules against all types of surface shortings caused by various environmental impacts, such as dewfall, salt mist, ingress of metallic particles. Fastwel products with protective coating have proved themselves to be a good advantage among the customers from different branches of industry, transport, and defense.

QUALITY



Quality Management System

FASTWEL products are distinguished by a high quality, reliability and longevity. To achieve those performance target FASTWEL has implemented the quality management system that meets the requirements of the ISO 9001:2000 standard.

All procedures of the quality management system are verified and monitored on a regular basis to ensure full control and quick response to the customer expectations.

All Fastwel products are thoroughly tested in accordance with the relevant standards at every stage of the development and manufacturing cycle.

Tests

During the development and releasing the products for manufacture all the required types of tests are performed in accordance with the Russian and international standards (GOST and relevant IEC standards):

- Laboratory tests;
- Commissioning tests – for 100% of the manufactured products;
- Acceptance tests – while releasing the products for manufacturing;
- Qualification tests – to assess the production facilities for mass production;
- Periodic– to assess the stability of the quality of the batch-produced goods;
- Type approval tests – in the event of any changes to the product design;
- Certification tests – in accordance with the certification requirements;
- Tests for the approval of types of measuring instruments.

All products designed for operation in the industrial temperature range are subjected to appropriate climatic tests upon their release from production.

A variety of standardized tests are performed to determine the resistance of products to various types of influences.

Environmental tests:

- Cold;
- Dry heat;
- Damp heat;
- Temperature-change test.

Mechanical tests:

- Sinusoidal vibrations;
- Single shocks;
- Multiple shocks.

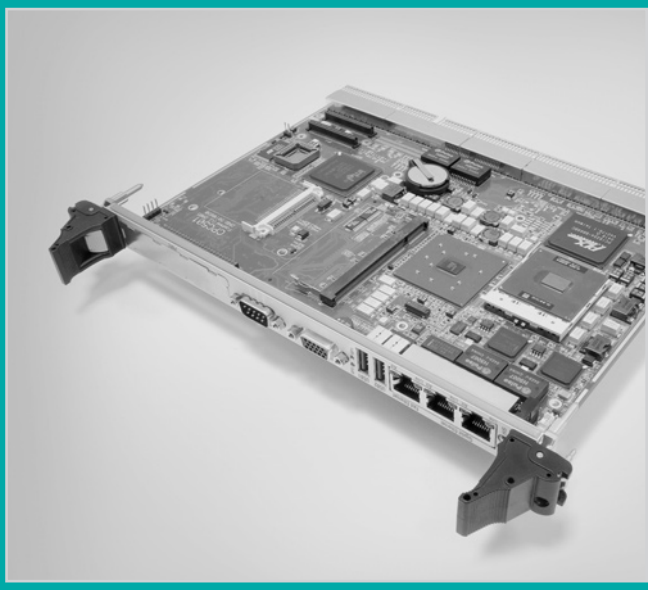
Safety, electromagnetic compatibility and immunity tests:

- Immunity to the radiated electromagnetic field;
- Immunity to electrostatic discharge;
- Immunity to electromagnetic interference induced by radio-frequency fields;
- Immunity to electrical fast transient/burst;
- Immunity to high energy microsecond interference;
- Immunity to power supply voltage dips, spikes and interruptions.

Tests for the resistance to other types of exposure including special factors (radiation resistance, reduced atmospheric pressure, etc.) are performed upon customer's request.

STANDARD PRODUCTS

FASTWEL products are designed for building highly reliable systems in a variety of industries. The products are manufactured in accordance with the widespread specifications of international consortiums: PICMG, PC/104 and others, and meet Russian and international quality standards.



Wide range of products

High quality

State-of-the-art development level

Long-term availability (from 7 to 10 years)

Technical support within the entire product life cycle

All this ensures the choice of products that best fit your requirements.

CompactPCI Systems Standard

The CompactPCI standard-based systems include a mechanical form-factor that enables installation of processor and peripheral modules into a passive backplane with standard-defined interconnects for data exchange between system modules.

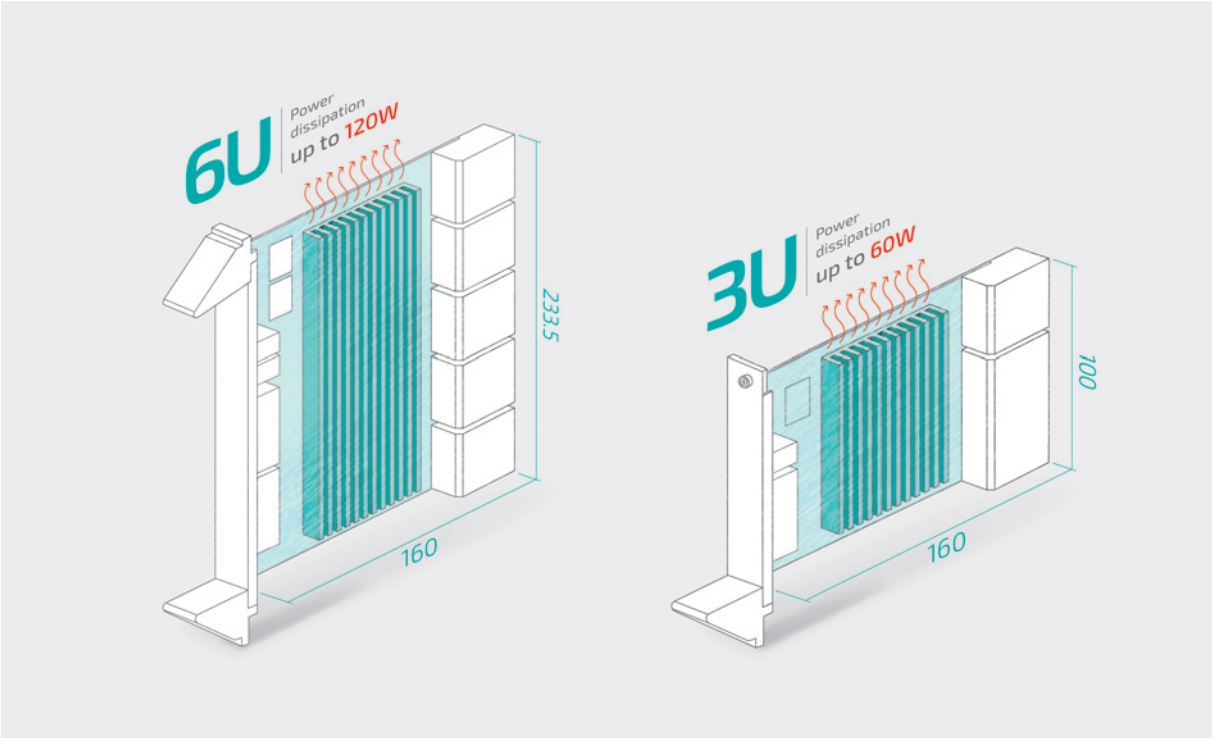
Characteristics of the form-factor, types and topologies of interconnects used are well documented in the relevant standard developed by a consortium of international companies under the authority of PICMG (www.picmg.org).

Major advantages of the CompactPCI standard:

- The capability of building multiprocessor, heterogeneous computing systems.
- High resistance to shocks and vibrations.
- Efficient cooling.
- Support of the Hot Swap mode.
- Redundancy support.

Fastwel is ready to help you and advise you on the selection of the most efficient CompactPCI-based solution.

Form-factors of CompactPCI modules and their thermal loads at air cooling



3U CompactPCI

The solutions based on the 3U CompactPCI standard are compact and have a high resistance to environmental factors such as vibration and shock. Therefore, such solutions are particularly popular with transport, special-purpose and mobile measuring systems for various application areas.

6U CompactPCI

The solutions based on the 6U CompactPCI standard are widely adopted in telecommunications, industrial automation, machine tool building and other industries.

The rectified PICMG standards, well-proven technologies of using the batch data transmission through the Ethernet (PICMG 2.16) network and Hot Swap (PICMG 2.1) along with a wide range of peripheral boards, chassis, backplanes and power supplies manufactured from a large number of manufacturers, enable to quickly and efficiently design systems for various purposes based on 6U compactPCI.

Interconnects of backplane intermodular communication in CompactPCI systems

		Interconnects for data exchange between modules in the system						
		PCI 32 bit	PCI 64 bit	Ethernet, slot of the switch (only6U)	PCI Express	Ethernet, fully connected mesh topology	USB	SATA
Standards	PICMG 2.0 (1999)	One master and up to 7 peripheral slots	One master and up to 7 peripheral slots	—	—	—	—	—
	PICMG 2.16 (2001)	—	—	2×ports, 10/100/1000Base-T Ethernet	—	—	—	—
	PICMG 2.30 (2010)	One master and up to 7 peripheral slots	—	—	4×channels x1 PCI Express 5 GHz	2×ports, 10/100/1000BaseT Etherne	4×ports USB 2.0	4×channels SATA 300
	PICMG cPCI-S (2011)	—	—	2×ports, 10/100/1000Base-T Ethernet (only for 6U)	2 channels x8 and 6 channels x4, up to PCI Express 8 GHz	8×ports 10/100/1000/10 Gigabit Ethernet	8×ports USB 2.0 or 8×ports USB 3.0	8×channels SATA 600 MB/s

Cross-compatibility of modules of various standards of the CompactPCI family

		Peripheral and coprocessor modules				
		PICMG 2.0 (32 bit)	PICMG 2.0 (64 bit)	PICMG 2.16	PICMG 2.30	PICMG cPCI-S
System controllers	PICMG 2.0 (32 bit)	Yes	—	—	Yes	No
	PICMG 2.0 (64 bit)	Yes	Yes	—	No	No
	PICMG 2.16	—	—	Yes	—	No
	PICMG 2.30	Yes	No	—	Yes	Yes, but with limitations
	PICMG cPCI-S	Possible to be implemented in customized systems	Possible to be implemented in customized systems	Yes, but only for 6U	Yes, but with limitations	Yes

6U CompactPCI CPU Modules



PN		CPC503-02	CPC505	CPC507
Compliance with standards	PICMG 2.0, PICMG 2.1	✓	✓	✓
	PICMG 2.16	✓	✓	✓
	PICMG 2.30	—	—	—
	PICMG cPCI-S.0	—	—	—
Size including mezzanines		4HP, 8HP	4HP, 8HP	4HP
CPU		Intel Core I7-3517 UE, 2C, 1,7 GHz, Intel Core I7-3555 LE, 2C, 2,5 GHz, Intel Core I7-3612 QE, 4C, 2,1 GHz	Intel Xeon E-2276ML 2.0 GHz 6C/12T 25W (Coffee Lake-H Refresh) Intel Core i3-9100HL 1.6 GHz 4C/4T 25W (Coffee Lake-H Refresh)	AMD Ryzen Embedded V1404I SoC APU 2.0 GHz, 25 W
RAM		DDR3L SDRAM 1600 MHz with ECC up to 8 GB, soldered	DDR4-2666 SDRAM up to 32 GB, with ECC support; 64-bit data bus, soldered	DDR4-2400 SDRAM up to 16 GB, with ECC support; 64-bit data bus, soldered
Graphics subsystem	Type	Integrated	Integrated	Integrated
	Interfaces	2×DisplayPort (1×on the front panel, 1×on RIO), 1×DVI-I on the front panel, 1×DVI-D is routed to RIO 1×Embedded Display Port (eDP) is routed to RIO	2×DisplayPort (1×on the front panel, 1×on RIO), 1×DVI-I on the front panel, 1×LVDS routed to RIO, simultaneous operation of three interfaces	1×DisplayPort on the front panel, 3×on RIO, simultaneous operation of all interfaces
	Number of independent displays	3	3	4
Communication interfaces on the front panel	Gigabit Ethernet	2×Gigabit Ethernet	2 × LAN 10/100/1000/2500 Mb on i225 controllers	1×LAN 10/100/1000
	USB	4×USB 2.0	4×USB 2.0	3×USB 2.0 / USB 3.0
Storage subsystem interfaces	On the board	1×SATA II for installation of the onboard 1,8" HDD; SATA NAND 8 GB, soldered	1×SATA III; supporting the drives of the M.2 2280 standard (PCIex4 Gen3); SATA NAND 32 GB, soldered	1×SATA III 6 Gb/s, CFast connector; 32GB 3D NAND Flash (Pseudo-SLC), soldered
	On mezzanines and RIO modules	2×SATA on RIO587, 1×SATA on XMC	2×SATA on RIO587, 1×SATA on XMC	—
Interconnects of inter-module communication on the backplane	PCI	64 bit/66 MHz	64 bit/66 MHz	64 bit/66 MHz
	PCI Express	—	—	PCIe Gen3 (up to 8 GT/s) routed to the P15 XMC connector with support of up to x8 devices
	Gigabit Ethernet	2×Gigabit Ethernet (PICMG 2.16)	2×Gigabit Ethernet (PICMG 2.16)	2×Gigabit Ethernet (PICMG 2.16)
	SATA	—	—	—
	USB	—	—	—
OS compatibility		Linux 2.6, QNX 6.5, Windows embedded standard 7, Astra Linux Smolensk 1.3	Linux Debian 10; Astra Linux Special Edition, Smolensk release v1.5, v1.6; Microsoft Windows 10 IoT Enterprise 64 bit	Linux Debian 10; Astra Linux Special Edition, Smolensk release v1.5, v1.6; Microsoft Windows 10 IoT Enterprise 64 bit
Estimated power consumption**		From 45 to 65 W, depending on the version	From 33 to 40 W, depending on the version	—
Resistance to vibration/ single shocks		2g/30g	2g/30g	10g/30g
MTBF (GOST standard 15150-69)		No less than 60,000 hours	No less than 50,000 hours	No less than 50,000 hours
Operating temperature range***		0…+70°C/ –40…+85°C	0…+70°C/ –40…+85°C	–40…+85°C
Mezzanine modules	Model	RIO587-01 (4HP), RIO587-02 (8HP)		—
	Front panel interfaces	RIO587-01: PS/2, 1×RS-232, 2×RS-485, DVI-D, 2×USB 2.0, 2×Gigabit Ethernet, RIO587-02: PS/2, 4×RS-232, 2×RS-485, DVI-D, 2×USB 2.0, 2×Gigabit Ethernet		—
	Board interfaces	RIO587-01: 3×RS-232, LPT, CFast, SATA-DOM, LVDS, GPIO, RIO587-02: LPT, CFast, SATA HDD 2.5", LVDS, GPIO, eDP, HD-AUDIO, 2×PCIe x1, 4×USB 2.0		—
Expansion mezzanines	Mezzanine type	Support of XMC and PMC mezzanines		XMC/PMC
	Interfaces for data exchange with the mezzanine	PCI-X 64 bit/133 MHz, PCI-E x8 Gen3 (up to 8 Gb/s)		PMC I/O P4 routed to RIO for the both mezzanines (PICMG 2.3)
	General purpose interfaces for communication with the mezzanine	1×SATA, 2×USB 3.0, LPC, HD-Audio, 2×Ethernet (switchable between the backplane and XMC-connector)		—

* Version with conduction heatsink.

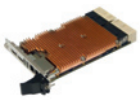
** Estimated power consumption – Power consumption for calculating the system of heat dissipation from the module. The actua l power consumption depends on the load and running application and may be less than the specified value.

*** The operating temperature range depends on the product version.

3U CompactPCI CPU Modules




Board Model		CPC508	CPC510	CPC512	CPC514
Compliance with standards	PICMG 2.0, PICMG 2.1	✓	✓	No	Via adapters KIC502+KIC504
	PICMG 2.30	✓	✓	No	No
	PICMG cPCI-S.0	—	✓	✓	✓
CPU		Intel Atom N450, 1,66 GHz Intel Atom D510, 1,66 GHz	Intel i7-3517UE 1,7 GHz Intel i7-3555LE 2,5 GHz	Intel i7-3517UE 1,7 GHz Intel i7-3612LE 2,1 GHz Intel i7-3612QE 2,1 GHz	Elbrus-4C(1891BM8Я),0,8 GHz
RAM		1 GB DDR2 SDRAM 667 MHz, soldered	4 or 8 GB DDR3L SDRAM with ECC 1600 MHz, soldered	4 or 8 GB DDR3L SDRAM with ECC 1600 MHz, soldered	8 GBDDR3 SDRAM 1600 with ECC , soldered
Communications interfaces on the front panel	Gigabit Ethernet	2×Gigabit Ethernet	2×Gigabit Ethernet	2×Gigabit Ethernet	1×Gigabit Ethernet
	USB	2×USB 2.0	2×USB 2.0	2×USB 2.0	7×USB 2.0
Interconnects of inter-module communication by backplane	PCI	32 bit/33 MHz	32-bit, 33 or 66 MHz	No	No
	PCI Express	Four channels ×1 PCI Express	Two channels ×8 PCI Express (Fat Pipe) Four channels ×4 PCI Express	Two channels×8 PCI Express Gen 3.0 (Fat Pipe) Two channels ×4 PCI Express Gen 3.0 Four channels ×1 PCI Express Gen 2.0	Two channels×4 PCI Express Gen 3.0 Six channels×2 PCI Express Gen 3.0
	Gigabit Ethernet	2×Gigabit Ethernet, software-based switching between the front panel and backplane	No	1×Gigabit Ethernet with AMT support	1×Gigabit Ethernet with AMT support
	SATA	2×SATA I	2×SATA III 3×SATA II	2×SATA III 3×SATA II	3×SATA II
	USB	4×USB 2.0	8×USB 2.0 4×USB 3.0	10×USB 2.0 4×USB 3.0	7×USB 2.0

Board Model		CPC516	CPC518	CPC520	CPC522
Compliance with standards	PICMG 2.0, PICMG 2.1	No	No	—	✓
	PICMG 2.30	No	No	✓	✓
	PICMG cPCI-S.0	VBaikal-T1, 1.2 GHz	✓	—	✓
CPU		Baikal-T1, 1.2 GHz	Intel Xeon D-1559 1.5 GHz Intel Xeon D-1539 1.6 GHz Intel Pentium D-1519 1.5 GHz	AMD Ryzen Embedded V1000 – 4 cores CPU R1000 – 2 cores CPU	Intel Xeon E-2276ME/i3-9100HL
RAM		4 GB DDR3 SDRAM 1600 with ECC, soldered	16 GB или 32 GB DDR4-2133 with ECC	DDR4 SDRAM 1600 MHz, 8 GB, x64, ECC	16 GB DDR4 SDRAM with ECC 2666 MHz, soldered
Communications interfaces on the front panel	Gigabit Ethernet	2×Gigabit Ethernet	1×Gigabit Ethernet	2×Gigabit Ethernet	2×2,5 Gigabit Ethernet
	USB	4×USB 2.0	2x USB 2.0; 2×USB 3.0	2×USB 3.0; 4×USB 2.0	2×USB 3.1
Interconnects of inter-module communication by backplane	PCI	No	No	V 2.3 32 bit 33/66 MHz Up to 8 bus master devices	64-bit, 33 or 66 MHz
	PCI Express	One chanel×4 PCI Express Gen 3.0 Five channels×1 PCI Express Gen 3.0	One channe ×8 PCI Express Gen 3.0 Four channels ×4 PCI Express Gen 3.0 Two channels ×1 PCI Express Gen 2.0	1 channel 4 PCI Express Rev. 2.0, up to 4 PCIe devices in x1 mode (5 Gb/sec)	Eight channels ×4 PCI Express
	Gigabit Ethernet	2×Gigabit Ethernet with AMT support	1×Gigabit Ethernet with AMT support	2×Gigabit Ethernet	—
	SATA	1×SATA II	5×SATA III	1×SATA I	5×SATA III
	USB	4×USB 2.0	2×USB 2.0; 2×USB 3.0	4×USB 2.0	4×USB 3.1; 8×USB 2.0

3U CompactPCI Peripheral Modules

VIM552

3U CompactPCI Graphical Processor module

- Compliance with PICMG 2.30 and PICMG S.0 standards
- Silicon Motion SM570 graphics processor
- 64 MB DDR333 SDRAM
- VGA and DVI-I up to 1920×1440, 60 Hz on the front panel, copy of DVI-D and VGA to the Rear I/O
- 1×SATA and a slot for 2,5" HDD
- USB 2.0 on the front panel
- Operating temperature range: –40…+85°c
- OS compatibility: Windows XP Embedded, Linux 2.6
- MTBF: no less than 200,000 h

KIC550

3U CompactPCI Peripheral Storage Module for Connection of 2.5" HDD

- Compliance with the CompactPCI S.0 standard
- Slot for installation of 2.5" HDD with SATA interface
- USB 3.0 is routed to the front panel
- CFast is routed to the front panel
- Support of the inter-module RAID-array (RAID 0 and RAID 1)
- Support of the operating modes of the HyperDuo drives
- Operating temperature range: –40…+85°c
- MTBF: 1,000,000 h

CNM550

3U CompactPCI GSM/UMTS Wireless Communication and GPS/GLONASS Positioning Module

- Compliance with the 3U compactPCI 2.0 standard (32 bit/33 MHz)
- GSM-modem for operation in the frequency ranges GSM 850/900/1800/1900 MHz
- Communication with CPU module – via two UART channels at the speed of up to 921,6 Kb/s and port USB 2.0
- Connection of external GSM-antennas – through SMA connectors on the front panel
- Interface to 2 SIM cards with a program selection of an active card
- GPS/GLONASS-receiver
- 24×universal reception channels for the signals of L1 GPS/GLONASS ranges;
- Connection of an external GPS/GLONASS-antenna – via SMA connector on the front panel
- OS compatibility: MS-DOS, QNX 4.25/6.4, Linux 2.4/2.6, WinXPe
- Operating temperature range: –40…+85°c
- MTBF: 35,000 h

NIM550

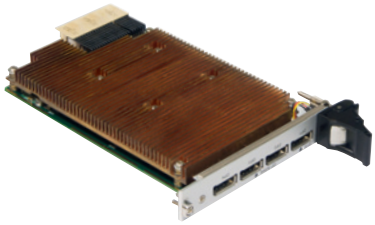
3U CompactPCI Serial Interface 2-Channel Ethernet Module

- Two 10GBASE-SR/SW channels

VIM554

3U CompactPCI Audio/Video Capture Module

- Compliance with the CPCI-S 1.0 standard
- Support of up to 8 audio and video input channels
- 2 video codecs H.264/AVC PINEA (NTT), compatible with the ISO/IEC 14496-10/ITU-T Rec.H264 specification
- Hot Swap support
- Conduction heat removal availability
- Expansion of functionalities when using the RIO591 rear I/O module (includes serial ports, digital I/O and video camera clock-pulse generator)
- Operating temperature range: –40…+85°C



VIM556

3U CompactPCI Graphics Controller Module

- Compliance with the CPCI-S 1.0 standard
- Possibility to install graphics module MXM 3.0 based on the high-performance GPUs with CUDA technology and maximum power consumption up to 60 W
- Support of graphics cards with a size of Type A (82×75 mm) and Type B (82×105 mm)
- 4×DisplayPort routed to the front panel
- 2×HDMI routed to the front panel
- Hot Swap support
- Conduction heat removal availability
- OS compatibility: Windows 7, Windows 7 Embedded, Linux 2.6
- Operating temperature range: –40…+85°c

FPU500

Reconfigurable Computing Module

The module is designed for building high-performance SDR (software defined radio) systems. It serves as a computing platform for building radars, sonars, electronic warfare and other digital signal processing applications.

- FPGA Virtex-6 computer
- RAM: DDR3 SDRAM 4 GB
- Expansion capabilities: FMC HS

DIC551

3U CompactPCI Mezzanine Carrier Module

- Compliance with the CompactPCI S.0 standard
- PCIe x1 system bus
- Support of up to 2 x single-size mezzanines or one double-size mezzanine
- Hot Swap support
- Conduction heat removal availability
- Possibility of rear output of signals from the module
- The development kit is based on M551t for developing your own mezzanines
- Operating temperature range: –40…+85°C

Plugged-in mezzanine modules:

- MIC1001 – 32×analog signal input and 16×analog signal output channels, 5 voltage measurement ranges from 0,625 to 10 V
- MIC1003 – 48×digital I/O lines
- MIC1004 – 4×Radial Serial Interface channels
- MIC1007 – 2×redundant multiplex data-exchange channels (GOST R 52070-2003)
- MIC1010 – 4×CAN 2.0B channels
- MIC1011 – 4×independent configurable RS-232 or RS-422/485 channels
- MIC1012 – 6×ARINC429 lines (GOST 18977-79) and 6×discrete commands (GOST 18977-79)

PS510

Power Supply

- Input voltages: 24, 48, 72, 110 V
- Power: 200 W
- Isolation voltage: 1000 V
- Hot redundancy
- Control over I2C bus
- Type of connector 51939-667
- Operating temperature range: –40…+85°C

KIC551

3U CompactPCI S.0 PCIe/GB Ethernet Switchboard

For switching, enables you to use all lines of the PCI Express backplane across the entire width of their contacts, namely, 2 x8 + 6 x4 lines of the PCI Express Gen3 bus.

- Support of Peer-to-Peer and Multicast operating modes
- Support of the port FailOver-operating mode of the systems with redundancy
- Support of Fiber Optic PCI Express connection at the rate up to 64 GT/s at a distance up to 50 m
- SFI 10 Gigabit interface

KIC552

PCIe Expansion Switchboard

The module is designed for interconnection of chassis with the spacing up to 50 m or data input through the PCIe.

- PCIe bus expansion (connector on the front panel)
- PCIe bus expansion over an optical channel (connector on the front panel)

NIM552

3U CompactPCI Serial 4 x Gigabit Ethernet Interface Module

- Form-factor: CompactPCI Serial 3U/4HP
- System bus: PCIe x4 Gen2
- LED indication of network connections
- Power supply: power supply voltage: 12V ± 10%
- Weight: 250 g max for NIM552-01 / NIM552-03 and 350 g max for NIM552-02 / NIM552-04
- Operating temperature range: from –40 to +85°C
- Overall dimensions: max (130.6 ± 0.4) × (212.4 ± 1.6) × (21.3 ± 0.5) mm
- Software: Windows 10, Linux Debian 10
- MTBF: at least 200,000 hours

KIC504

Interface Module

- CompactPCI: PCI Bus 32 bit 33/66 MHz
- Power supply voltage: +3.3 V ± 5%; +5 V ± 5%
- Temperature range: from –40 to +85°C
- Dimensions: no more than 131.0 mm × 214.0 mm x 21 mm
- Moisture: up to 80% at the temperature of 25 ˚C, non-condensing; up to 95% at the temperature of 25 ˚C for the /COATED option
- Weight: no more than 0.6 kg
- MTBF: no less than 500,000 hours

KIC502

CompactPCI S.0 Interface Module

- PCI Express External cable connection (for KIC502-01), PCI Express External inter-case connection (KIC502-02)
- Power supply: Power supply voltage +12 V ± 10%, current consumption – 1 A
- Operating temperature range of the module: from –40 to +85°C
- Resistance to mechanical stress: Sinusoidal vibration with acceleration of no more than 5g, single shocks with a peak acceleration of no more than 100g, multiple shocks with a peak acceleration of no more than 50g
- Weight: no more than 0.6 kg
- MTBF: No less than 500,000 hours

Carriers and Mezzanines

The products are designed for building industrial high performance systems with parallel digital processing of real-time data.

Typical application areas of the products are:

- Data Encryption / Decryption;
- Digital Signal Processing;
- Image/Stream Video / Audio information Processing;
- Analysis of broadband signals and correlation detection;
- Synthesis and processing of complex signaling-code structures (Radar/Sonar Beamforming)

FPGA-Based Carrier Modules

FPU500

Reconfigurable Computing Module

High data processing performance is ensured by the Virtex-6 FPGA and 2×parallel lines of DDR3 SDRAM memory. Integration of the product into the computing system is provided via the PCI-E bus Gen2/Gen3 x8.

- Standard: CompactPCI Serial
- Virtex-6 FPGA
- RAM: DDR3 SDRAM 16 GB
- FMC expansion capabilities

FPU502

Reconfigurable Computing Module

The module provides full support of SDAccel, which makes it possible to use the C++ language for the development of FPGA firmware.

High performance of processing the data either coming through the PCI Express Gen3 x8 interface or the FMC mezzanine module, is ensured by the Kintex UltraScale FPGA, 2×DDR3 RAM independent banks, 2×Static RAM independent banks.

The Full Mesh Ethernet backplane enables you to generate reference signals from any computational module. The input of any reference signal to the system can be performed through the P4 slot from the Rear I/O module.

- Standard: CompactPCI Serial
- Kintex UltraScale FPGA
- RAM: DDR4 SDRAM 8 GB
- 1 GB NOR SPI FLASH for user data
- FMC expansion capability
- Support of SDAccel (system of programming on OpenCL for FPGA)

FPU1500

Reconfigurable Computing Module

The module is designed for building high-performance onboard systems for acquisition and digital processing of signals including in the real time mode in the standard OpenVPX 3U ANSI/VITA 46 implementation. In order to input signals to the system provides capability of installing FMC mezzanine modules of various functional purpose, compatible with the ANSI/VITA 57.1. specifications, typical application areas of FPU1500 are digital signal processing systems, radar and sonar systems, onboard avionics, etc.

- Standard: OpenVPX
- Artix-7 FPGA
- RAM: DDR3 SDRAM up to 8 GB
- 1 GB FLASH for user data, MicroSD slot
- FMC expansion capabilities

Mezzanine Modules

MIC1801

Mezzanine Module of FMC Standard

The module is designed for data exchange with the carrier board via the Ethernet 1G interface

- Switch:
- 2×ports of the Ethernet physical layer interface
- 3×SGMII ports and 1×GMII port for information exchange via FMC connector
- FMC connector for connecting the mezzanine to the carrier module (VITA57.1-2010)
- 2×RJ-45 connectors of the physical layer interfaces on the front panel
- Up to 32×optional I/O contacts of the LVDS- or CMOS-standard
- Power consumption : < 3 W

MIC1811

4-Channel 10-bit ADC Module of FMC Standard and with a maximum sampling frequency of 5 GSa/s

- Operation mode: fs=1.25 GSa/s × 4×channels; fs=2,5 GSa/s × 2×channels, fs=5 GSa/s × 1×channel
- Output data width: 10 bit
- Rated level of output signal: 500 mV (p-p)
- Analog input impedance: 50 Ohm
- Dynamic range free of spurious components: no less than 56 dB
- Integrated clock synthesizer with ability of synchronization from an external reference signal
- Connectors for analog signals on the front panel: SMA/SSMC/type IX (GOST RV 51915-2002)
- Power consumption: < 12 W

MIC1812

16-channel 14 bit ADC mezzanine module of FMC standard and with a maximum sampling frequency of 125 GSa/s

- Maximum sampling rate: fs=125 GSa/s
- Output data width: 14 bit
- Range of input signal voltages: 1 V/2 V
- Input impedance: 50 Ohm
- Frequency bandwidth of the ingress path by level 3 dB: 360 MHz/600 MHz, depending on the version
- Connector for analog signals: Nicomatic 341D000F51-0020-140002
- Power consumption: < 16 W

MIC1901

Mezzanine Module of XMC Standard

The module is designed for expansion of basic functions of the CPU module

- 2 x ports Ethernet 10/100/1000 Mb on the front panel
- Microphone input, LineIn and LineOut channels on the front panel
- Connector for CFast drives
- OS compatibility: Windows 7, Windows 7 Embedded, Linux 2.6, QNX 6.5.0
- Operating temperature range: –40…+85°C

MIC1821

2-channel 14 bit DAC mezzanine module of FMC standard and with a maximum sampling frequency of 2.5 GSa/s

- Maximum sampling rate: fs=2,5 GSa/s
- Output data width: 14 bit
- Operating modes: Normal, Mix, NRZ
- Dynamic range free of spurious components: no less than 54 dB
- Integrated clock synthesizer with ability of synchronization from an external reference signal
- Connectors for analog signals on the front panel: SMA/SSMC/type IX (GOST RV 51915-2002)
- Power consumption: < 8 W

MIC1822

12 bit DAC mezzanine module of FMC standard and with a maximum sampling frequency of 3 GSa/s

- Maximum sampling frequency: fs=3 GSa/s
- Width of input data: 12 bit
- Operating modes: NRZ, RTZ, NRTZ, RF
- Output signal frequency range: up to 7 GHz
- Dynamic range free of spurious components: no less than 55 dB
- Rated level of output signal: 1 V
- Integrated clock synthesizer with ability of synchronization from an external reference signal
- Connectors for analog signals on the front panel: SMA/SSMC/type IX (GOST RV 51915-2002)
- Power consumption: < 5 W

MIC1831

4-channel 12 bit transceiver mezzanine module of FMC standard, maximum signal band of 56 MHz and intermediate frequency of up to 6 GHz

- band of input-output signals: 200 KHz – 56 MHz
- Input-output data width: 12 bit
- Range of intermediate frequency tuning fIF: 70–6000 MHz
- Operating modes: duplex/half-duplex
- Rated level of output signal: 0 dBmW
- Input-output impedance of analog lines: 50 Ohm
- Interpenetration of channels: no more than –50 dB
- Connector for analog signals on the front panel – SSMC (AEP 7110-1511-000)
- Power consumption: < 9 W

MIC1832

4/2-channel ADC/DAC module of FMC standard with JesD204B interface

- 4 analog inputs, 4 analog outputs;
- Sampling frequency of input signals: up to 1250MHz
- Sampling frequency of output signals: up to 2800MHz
- Width of the DAC input data: 14 bit
- Width of the ADC output data: 14 bit
- Power consumption: up to 21 W
- Operating temperature range: from –40 to +85°C

Grifon – High-Performance Heterogeneous Computing Platform

The platform is designed to create systems for processing signals, streaming video, traffic of telecom networks and other applications with high requirements to computing power and large volumes of data.

Grifon is a multipurpose, compact, high-performance computing platform with scalable capacity and high resistance to external factors.

Grifon is based on the CompactPCI Serial (CPCI-S), standard, features a modular structure and consists of 3U units for nine and five slots.

Grifon enables you to create configurations with the simultaneous use of computers of different architectures, including x86, Elbrus, NVIDIA GPUs and FPGA-based modules. The configuration is selected in accordance with the customer's requirements depending on the application tasks.

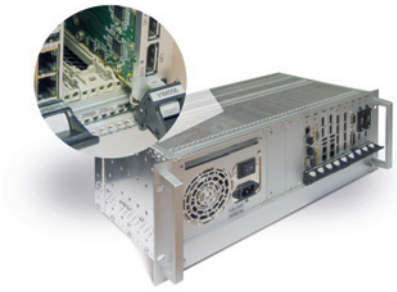
The developers of the Grifon-based application systems are offered a set of service software that enables them to disregard the features of data exchange channels and types of computers, providing standard interaction protocols:

- The interaction among the modules based on x86 processors, is ensured by using the BSD Sockets, MPI mechanisms;
- The interaction among the x86 processors and FPGA is ensured by FPGA character driver;
- The interaction among the x86 processors and GPUs is ensured by CUDA SDK;
- The interaction among FPGA and GPU is ensured by add-in to CUDA SDK.

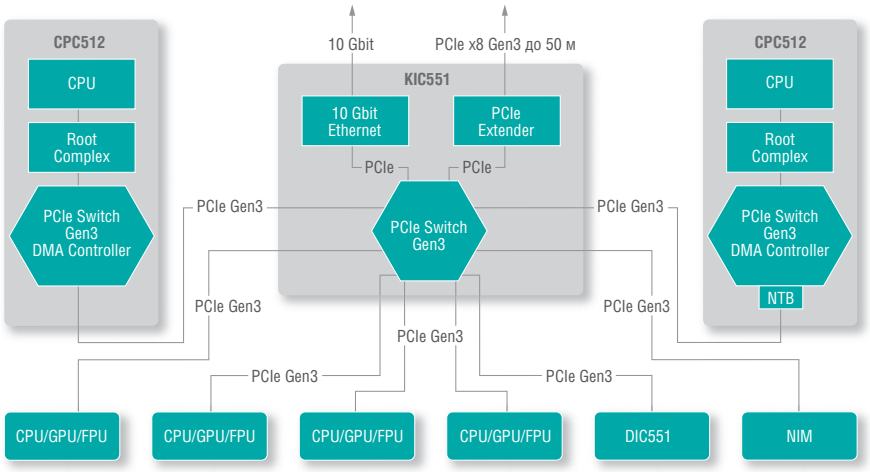
Griffon — new PCIe bus capabilities with the use of KIC551 switch that ensures the peer-to-peer (P2P) interaction and enables high-performance parallel-pipeline configurations.

Key features

- Possibility to jointly use the computers of different architectures (x86, Elbrus, GPU NVIDIA, FPGA) in a single unit
- Placing up to 8 x computers within one unit
- Support of the certified operating systems (Astra Linux)
- Inter-modular data exchange over PCIe Gen3, all the nodes are interconnected
- aggregate capacity inside the unit is up to 640 GB/s
- Grifon is manufactured in conduction and air cooled modifications



Block diagram



MicroPC Standard

Due to their original development concept, MicroPC embedded computers are currently among those being the most resistant to the rough environment factors. MicroPC modules enable to promptly build cost-effective highly reliable embedded and automation systems.

Special technology used for manufacturing processor cards and extension boards ensures their steady operation at the temperatures from –40 to +85°C, resistance to vibrations up to 5g and shocks up to 20g. Reliability of devices is provided by a range of technical solutions throughout all manufacturing and testing stages. A three-year warranty period is offered for all MicroPC devices.

MicroPC CPU boards are distinguished by their compact sizes 124×114 mm. At the same time, the boards have high performance and an entire range of standard PC-interfaces, including Ethernet and USB.

The four-point system of fastening MicroPC boards to ISA bus, ensures that the boards are firmly fixed from all the sides using connector, guide rails and securing bars, which absolutely eliminates sideways motion of the boards and protects them against shocks and vibrations. In addition, Hot Swap of the board is available.

MicroPC boards are fully compatible with such embedded operating systems as Windows CE, Windows XP Embedded, QNX and Linux.

CPU modules

Model	CPC109	CPC152
CPU	Vortex86DX 600 MHz	
Chipset	—	
RAM	DDR SDRAM 256 MB (soldered)	
Video system	—	Independent connection of 2 displays (CRT, TFT), port for connection of monochrome STN-panels 4/8 bit (Beneq)
I/O ports	4×USB 2.0, 2×RS-232, 2×RS-422/485, 1×LPT, PS/2, Matrix keyboard port (4×4, 4×5)	4×USB 2.0, 2×RS-232, 2×RS-422/485, 1×LPT, PS/2
Ethernet	1×Fast Ethernet	
Expansion interfaces	PC/104 (ISA 8/16 bit, 8/16 MHz)	PC/104 (ISA 8/16 bit, 8/16 MHz)
Digital I/O channels	72 CMOS/TTL-lines of DIO, 8×GPIO	—
Analog I/O channels	8×AI (0…+5 V, ±5 V, 0…+10 V ±10 V, 0…20 mA, ± 20 mA), 2×AO (0…+5 V, ±5 V, 0…+10 V)	—
Data storage devices	2 GB NAND Flash (soldered), 1×PATA (connection of up to 2 x devices with IDE interface), 1×CompactFlash	
Operating temperature range	–40…+85°C	
OS compatibility	FreeDOS, MS-DOS 6.22, Linux 2.6, Windows CE 5, QNX 6.4x	FreeDOS, MS-DOS 6.22, Linux 2.6, Windows CE 5 Xpe, QNX 4.25, 6.4x
Additional functions	Temperature sensor (LM92, –55...+125°C), digital accelerometer (measuring acceleration along 3 axes), digital barometer (measuring pressure from 50 to 115 kPa)	

Peripheral Modules

DIC120

Programmable I/O Module

- 96/48 input-output channels with logical levels of CMOS,TTL
- Ability to develop your own) FPGA configurations (firmware)
- Programmable debouncing time interval for inputs
- Operating temperature range: –40…+85°C

DIC122

Digital Input Card with Galvanic Isolation

- 32×digital/frequency input channels
- Single-wire or two-wire connection of signals
- Frequency measurement via any channel
- Generation of the event hardware interrupts at inputs
- Operating temperature range: –40…+85°C

DIC123

Digital Input Card with Galvanic Isolation

- 32×digital input channels
- Single-wire or two-wire connection of signals
- Switching input voltages/currents: 60 B/500 ma
- Control of output states (before isolation)
- Operating temperature range: -40…+85°C

AIC124

14-bit Analog I/O Module with Galvanic Isolation

- 16×single-wire or 8×differential channels
- 2×analog output channels
- Group galvanic isolation
- Programmable gain factor
- 8×channel digital output port: CMOS levels
- Operating temperature range: –40...+85°C

NIM151

Module of Serial Interfaces

- 8 x bit ISA Bus
- 4 (NIM151-01) or 8 (NIM151-02) UART channels with signal logical levels (CMOS, TTL)
- Data rate: up to 115,200 baud
- Operating temperature range: –40…+85°c

Ps151

Power Supply Module

- Range of input voltages: 11–36 V
- Total power output: 50 W
- Intelligent control system
- UPS function
- Operating temperature range: –40 (–50)…+85°C

Additional equipment

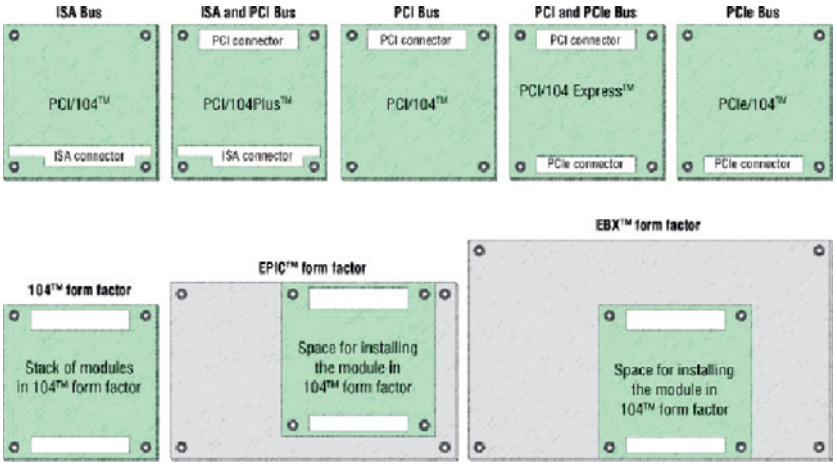
Frames with 8-bit ISA bus of the ICC series

ICC19001 – ISA-8 MicroPC mounting frame, 4 slots
ICC19101 – ISA-8 MicroPC mounting frame, 8 slots
ICC19201 – ISA-8 MicroPC mounting frame, 12 slots
ICC19301 – ISA-8 MicroPC mounting frame, 3 slots, desk-mounted
ICC19401 – ISA-8 MicroPC mounting frame, 6 slots, wall-mounted

PC/104 Standard

PC/104 standard describes module principle to build compact integrated systems in the form of a stack of boards mated to each other. The PC/104 standard has proved its high efficiency among developers of compact onboard computer systems. Many engineers chose PC/104 due to the advantages which include their low weight and dimensions of such devices (boards with dimensions 90×96 mm), mechanical reliability of both connectors and the entire structure in general.

Family of PC/104 standards describes data exchange between modules via 16 bit ISA parallel buses, PCI 32 bits and using PCI-Express, USB 2.0 and SATA serial interconnects and contains of 5 specifications. Despite the most compact size 90×96 mm, the standard family includes EPIC and EBX form-factors.



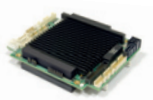
For systems of PC/104 standard, FASTWEL manufactures CPU modules, peripherals, power supply modules as well as system platform based on the specified components.

Computer platform for solving transportation tasks based on CPC307

Multipurpose PC platform for modules in PC/104+ form-factor

Fastwel helps and offers advices on the selection of the most efficient solution based on the PC/104 standards.

CPU Modules


Model		CPC307	CPC310	CPC314	CPC316	CPC318
Compliance with the standard PC/104-Plus: PCI (32 bit), ISA (16 bit)		✓	✓	✓	✓	✓
CPU		DM&P Vortex86DX 600 MHz	Intel Atom E3815/E3825 1,33/1,46 GHz	DM&P Vortex86DX3 800 MHz	DM&P Vortex86DX3, 800 MHz	Intel Atom E3810 1,46 GHz (Single Core) or Intel Atom E3825 1,33 GHz (Dual Core) or Intel Atom E3845 1,91 GHz (Quad Core)
RAM		DDR2 SDRAM 256 MB (soldered)	DDR3L-1066/1333 SDRAM up to 4 GB, with ECC support (soldered)	DDR3 SDRAM 2 GB (soldered)	DDR3 SDRAM 2 GB (soldered)	DDR3L-1066 MHz, 4 GB, with ECC support
Graphics subsystem	Type	No	Integrated	Integrated	Integrated	Integrated
	Interfaces	No	2D/3D-accelerator	2D-accelerator	2D-accelerator	2D/3D-accelerator
	Number of independent displays	—	2×(VGA and LVDS)	2×(VGA and LVDS), 1920×1440@60Hz	2×(VGA and LVDS), 1920×1440@60Hz	2×LVDS
Storage subsystem interfaces	EIDE	1×EIDE, NAND flash drive 1 GB	No	No	No	—
	SATA	No	1×SATA II, NAND Flash drive 8 GB	1.5 Gb Gen I and 3 Gb Gen II,	1.5 Gb Gen I and 3 Gb Gen II, 8 GB NAND Flash	eMMC SLC flash drive 16 GB
	Removable storage devices	2×microSD	1×CFast	SDHC speed class 6, microSD 4 GB	No	1×CFast
Communication interfaces	Ethernet	1×Fast Ethernet	2×Gigabit Ethernet	1×Ethernet 10/100 Mb/sec	2×Gigabit Ethernet with optoisolation	2×10/100/1000/2500 Mb
	USB	4×USB 2.0	4×USB 2.0	2×USB 2.0	4×USB 2.0	4×USB 2.0
	COM-ports	2×RS-232, 2×RS-232/422/485, 2×RS-485/422 with galvanic isolation	2×RS-232, 2×RS-422/485 with galvanic isolation	2×RS-232, 2×RS-232/422/485	2×RS-232, 2×RS-422/485 with galvanic isolation	2×RS-232, 2×RS-422/485 with galvanic isolation
	CAN-ports	2×CAN 2.0b with galvanic isolation	No	No	No	No
	Digital I/O channels	8×I/O channels, individually programmable	8×I/O channels, individually programmable	8×I/O lines, compatibility with the +5 V level (TTL)	48×CMOS/TTL lines, load up to 24 mA	8×I/O channels, individually programmable
	Analog I./O channels	No	No	No	No	No
	Others	PS/2, 1×LPT (SPP, EPP, ECP), 2×I²C	PS/2, LPT (EPP, ECP)	PS/2, 1×LPT, Audio In/Out	Console ports COM1 / COM2 / COM3/ COM4	—
Service equipment and features		3×watchdog timers, Real Time Clock, optoisolated reset	2×watchdog timers, Real-Time Clock, optoisolated reset, sound recording device, linear input/output	2×watchdog timers, Real Time Clock, optoisolated reset, temperature sensor	3×watchdog timers, Real Time Clock, optoisolated reset	2×watchdog timers, Real Time Clock, optoisolated reset sound recording device, linear input/output
OS compatibility		FreeDOS, MS-DOS 6.22, WinCE 5.0, Linux 2.6, QNX 6.4	FreeDOS2, Windows Embedded Standard 7, Linux 2.6, QNX 6.5	FreeDOS, Linux 4.9, Windows Embedded Standard 7	FreeDOS2, Windows Embedded Standard 7, Linux 3.2	Linux, Microsoft Windows Embedded Standard 7, Microsoft Windows Embedded Standard 8, Microsoft Windows 10 Embedded/IoTCore
Estimated power consumption*		Up to 5 W, depending on the version	Up to 10 W, depending on the version	Up to 7.5 W, depending on the version	Up to 8 W, depending on the version	Up to 9 W
Vibration and shock resistance		10g/150g	5g/100g	10g/150g	5g/100g	5g/100g
MTBF (GOST standard 15150-69)		200,000 h	More than 100,000 h	100,000 hours	More than 170,000 h	More than 100,000 h
Operating temperature range**		–40…+85°C/–50…+90°C	–40…+85°C			

* Estimated power consumption – Power consumption for calculating the system of heat dissipation from the module. The actual power consumption depends on the load and running application and may be less than the specified value.

** The operating temperature range depends on the product version.

Peripheral Modules

NIM351

PC/104-Plus Fieldbus Interface Module

- Form factor PC/104-Plus
- Pass through PCI Bus
- 2×isolated channels CAN 2.0a and 2.0b
- 2×isolated channels RS-422/485
- Power supply 5 W
- Operating temperature range: –40…+85°c
- Conformal coating (option)
- OS compatibility: FreeDOS, QNX 6.3x, Windows XPe, Linux 2.6.x
- MTBF: 730,000 h

VIM301

PC/104-Plus Video Graphics Controller Card

- System controller interface – PCI, 32 bit, pass through ISA bus
- GPU Lynx3DM8+
- Interfaces:
- 1×RGB
- 2×FP 9-24 bit with resolution up to 1280×1024
- 2×LVDS 9-24 bit with resolution up to 1280×1024
- Support of electroluminescent displays Beneq (Lumineq) with interface SGD 240×320 , 4 bit
- Support up to 4 x analog video cameras PAL/SECAM/NTSC with resolution of up to 720×576, frame rate: 25/30 frames/s
- OS compatibility: MS-DOS 6.22, FDOS 6.22, QNX 6.3, Linux 2.6, Windows 98, ME, NT, 2K, XP, CE 4.2
- Operating temperature range: –40…+85°C and 0…+70°C (depending on the version)
- MTBF: 100,000 h

CNM350

PC/104-Plus Communication and Navigation Module

- Compliance with the PC/104-Plus, PCI 32 bit specifications
- Modem GSM 850/900/1800/1900 MHz, GPRS Class 10, EDGE Class 10
- Satellite navigation GPS/GLONASS, 24 channels
- 2×interfaces for SIM-cards
- Operating temperature range: –40…+65/85°C
- Conformal coating: (option)
- OS compatibility: QNX 4.25/6.3x, Linux, Windows XPe
- MTBF: 100,000 h

DIC 334

PC/104-Plus Digital I/O Module with Galvanic Isolation

- System Bus: PCIe interface
- Digital input: 16 x digital / frequency input channels
- Digital output: 8 x digital output channels
- Power supply and power consumption: +5 V±5%, no more than 160 mA
- Resistance to sinusoidal vibration: 5 g for the frequencies from 10 to 500 Hz
- Operating temperature range: from –40 to +85°C
- Software: Linux
- MTBF: 710,000 hours

VIM302

PC104 Video Graphics Controller Card with StackPC expansion connector

- System-on-a-chip TMS320DM8186 (VLIW-processor C674X
- DSP; RISC-processor ARM cortex-A
- 3D-graphics accelerator SGX530
- RAM: DDR3 SDRAM 1 GB
- NAND Flash 256 MB for storing OS
- PCI-E BUS: Compatibility with the PCI-E 2.0 specification
- SATA interface: transfer rate up to 300 MB/sec
- USB interface: support of USB 1.1 (12 MB/sec), USB 2.0 (480 MB/sec)
- Operating temperature range: from –40°C to + 85°C
- Software compatibility: Open Source Linux

AIC324

PC/104-Plus Analog and Digital Input / Output Module

- System controller interface – ISA, 16 bit, pass-through PCI bus
- 32×analog inputs ADC 16 bit, 250 KHz/±10…±0,625V / 0..20, 0..10, 0..5 ma
- 4×analog outputs DAC 16 bit, installation time – no more than 6 µs, ±10…±2,5V, program calibration of the board's analog paths
- 24×digital I/O channels, 5 in CMOS, support of 16-bit and 32-bit counters, protection of outputs against static discharge
- Galvanic isolation of analog section from the digital one
- OS compatibility: Linux 2.6, QNX 6, FreeDOS, Windows XPe
- Operating temperature range: –40…+85°C and 0…+70°C (depending on the version)
- MTBF: 100,000 h

DIC324

PC/104 Digital Input / Output Module with Galvanic Isolation

- ISA system bus
- 16×digital/frequency input channels
- 8×digital input channels
- Single-wire or two-wire connection of signals
- Switching output voltages/currents 60 V/500 ma
- Measuring frequencies over any channel
- 6×shared lines of hardware interrupts
- Control of output states
- Programmable debouncing time interval for inputs
- OS compatibility: FDOS, FreeDOS, Windows XPe, Linux 2.6
- Operating temperature range: from –40 to +85°C

PS351

PC/104 Power Supply module

- PC/104-Plus form-factor with heat dissipation to the enclosure wall
- Range of input voltages: 10,5–36 V
- I/O galvanic isolation: 1000 V
- Total power output: 50W: +12 V @ 20 W; +5 V @ 30 W; +3,3 V @ 5 W
- Derating: along the circuit +5 V – 2,5%/°C for the temperatures above +60°C; along the circuit +12 V – 3,4%/°C for the temperatures above +75°C
- Protection against overloads and overheating along the circuits +5 and +12 V
- System of control:
- Galvanically isolated interface RS-232/422;
- Modes of automatic control of switching-on/switching-off: according to the schedule, with due consideration of the ambient temperature, according the outside event, etc.;
- WDT-timer that controls power supply;
- Real Time Clock (RTC);
- System event log (shift to backup power supply, voltage drop at the input, etc.);
- Temperature sensor;
- System activation under –50°C, control of the heater and fan
- MTBF: 160,000 h

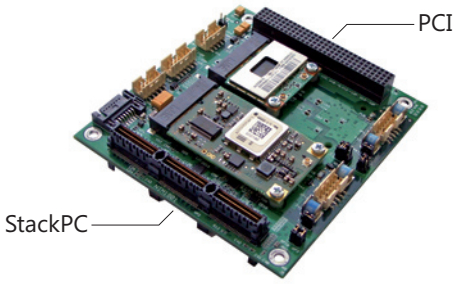
StackPC Standard

The StackPC specification defines a new module standard for building stack computer systems. It incorporates all the main advantages of the PC/104 standards, complementing them with the new StackPC connector.

Connector "A" StackPC

BANK1 4×PCIe x1, 2×USB, SMB

BANK2,3 1×PCIe x4, 2×SATA, LPC, 2×GbE, 4×USB, SPI, CAN/RS-485/UART



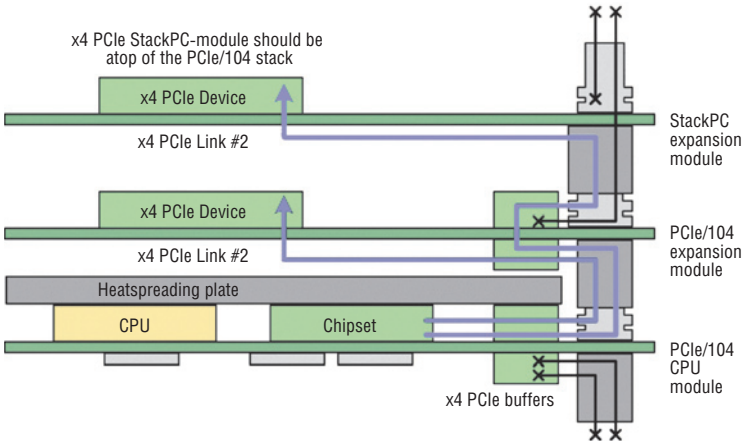
The core distinct advantage of the StackPC connector is combine the most demanded low-speed interfaces such as USB, COM, CAN, SPI, LPC, along with the high-speed SATA, Gigabit Ethernet and PCI Express x1, x4.

Such a combination makes it possible to minimize the number of cables, improve the ease of manufacture and add flexibility in building, expanding and modifying the system.

Due to the unified approach to stack building only in one direction, the StackPC products are easier to design because of the simplified technology of distributing PCI Express interfaces. The unified approach to supplying power to the stack and output of communication interfaces is designed for increasing the interoperability of products from different manufacturers.

The standard describes a StackPC expansion connector and a StackPWR power connector that should be applied in embedded modules, which comply with the standard.

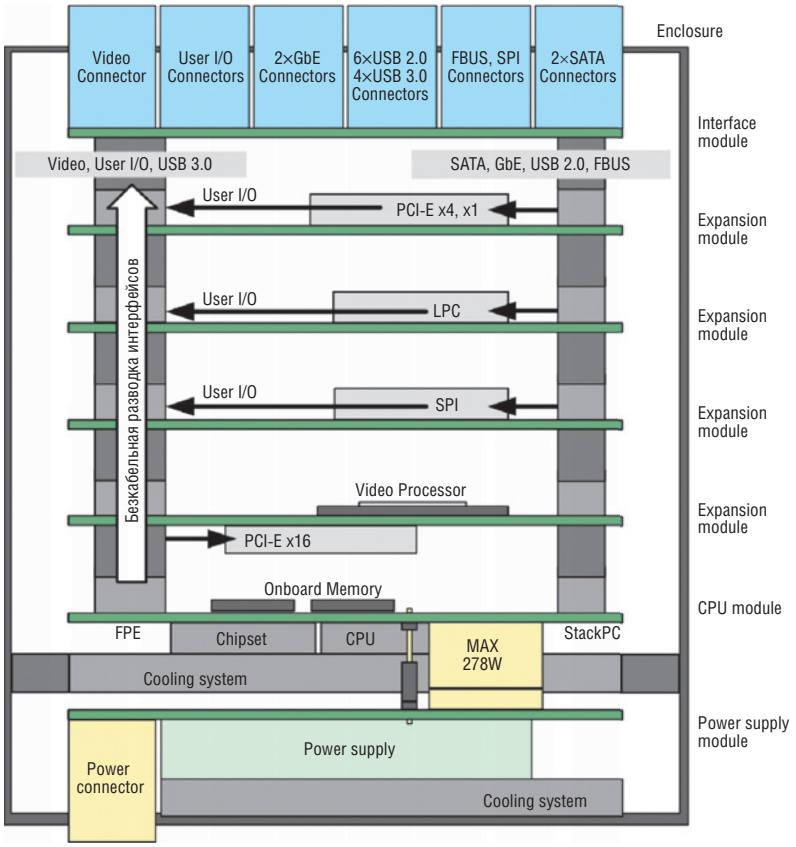
Possibilities of StackPC Standard



Compatibility with other standards

- compatibility with PCIe/104 and PC/104 Express (1st bank of the PCIe/104 connector))
- Compatibility with PCI/104

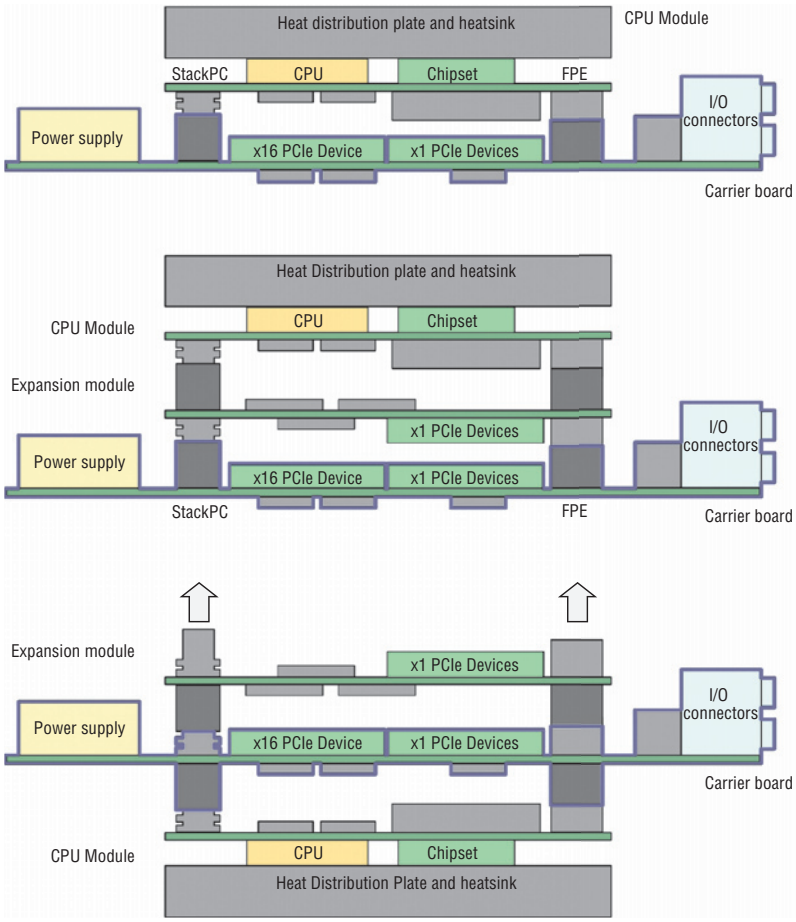
Mixed stack of PCIe/104 and StackPC modules using x4 PCIe bus



New approach to building the system

- stack expansion in one direction
- support of peripheral interfaces on stack connectors
- Minimizing the number of cable connections
- Standardization of system power connectors
- Support of expansion buses 4×1 and 1×4 PCI Express

StackPC-based stack system



Possibility to apply StackPC modules as COM-modules

- Possibility to apply modules similar to the COM-Express PICMG COM.0 standard
- Easy to develop carrier-boards for StackPC modules
- Possibility to install modules between the StackPC COM-module and the carrier-board

Options of StackPC modules application for COM-solutions

CPU Modules



Model		VIM302	CPC313	CPB909
Form-factor		StackPC	StackPC	3,5"
Compatibility with PCI/104		—	✓	✓
Compatibility with PCIe/104 and PC/104-Express		—	1st bank of the PCIe/104 connector	1st bank of the PCIe/104 connector
CPU		TMS320DM8168 VLIW-processor C674x DSP (up to 1 GHz), RISC-processor ARM Cortex-A8 (up to 1,2 GHz)	Baikal-T1 1,2 GHz	Intel Atom E3825/E3845 1,33/1,91 GHz
RAM		DDR3 SDRAM 1GB (soldered)	DDR3-1600 SDRAM 4GB with ECC support (soldered)	DDR3L-1066 SDRAM up to 4 GB with ECC support (soldered)
Graphics subsystem	**Type**	Integrated	External	Integrated
	Interfaces	VGA and HDMI 16video outputs (resolution up to D1(720×576), coding H.264/MJPEG/RAW, frame rate per channel 30/25 (NTSC/PAL), CBR and VBR flow control), 8 audio inputs (resolution up to 16 bit and frequency rate up to 44 KHz)	VGA (1920r1080, 50Hz), LVDS (1366×768, 60Hz 18/24 bit)	VGA (2560×1600, 60Hz), DisplayPort – 2 x ports (2560×1600, 60Hz), LVDS – 2 x ports (1920r1200, 60 Hz 18/24 bit)
	Number of independent displays	2	2	3
Storage subsystem interfaces	**SATA**	2×SATA, NAND flash 256 MB for storing OS, SPI flash 16 MB for storing bootloader	1×SATA III, NAND flash drive 8 GB	1×SATA II, NAND flash drive 16 GB
	Removable storage devices	1×MicroSD	No	1×CFAST, 1×MicroSD
Communication interfaces on the board	**Ethernet**	—	1×10 Gigabit Ethernet	2×Gigabit Ethernet
	USB	—	2×USB 2.0	2×USB 2.0, 1×USB 3.0
	COM-ports	—	No	2×RS-232, 4×RS-485/422
	Digital I/O channels	18×I/O channels, individually programmable	8×I/O channels, individually programmable	16×I/O channels, individually programmable
	Others	2×UART	No	MiniPCI Express, PS/2
Communication interfaces on StackPC connector	**PCI Express**		4×1 PCIe Gen2, 1×4 PCIe Gen3	4×1 PCIe Gen2
	Ethernet	2×Gigabit Ethernet	2×Gigabit Ethernet	2×Gigabit Ethernet
	USB	2×USB 2.0	4×USB 2.0	3×USB 2.0
	COM-ports	No	2×RS-232	2×RS-232
	Others	UART, SPI, I²C	SPI, SMBus	LPC, SPI, SMBus
Service equipment and features		Real Time Clock	1 watchdog timer, Real Time Clock sound recording device, linear input/output	2 watchdog timers, optoisolated input of external reset/interrupt, Real Time Clock, sound recording device, linear input/output
OS compatibility		Open Source Linux	Linux (Debian 7.x)	FreeDOS, Windows 7/8, Linux 3.x, QNX 6.5
Estimated power consumption*		Up to 15 W	7 W	Up to 15 W depending on the version
Vibration and shock resistance		5g/100g	5g/50g	5g/50g
MTBF (GOST standard 15150-69)		18,000 h	100,000 h	100,000 h
Operating temperature range**		–40…+85°C	–40…+85°C	–40…+85°C

* Estimated power consumption –Power consumption for calculating the system of heat dissipation from the module. The actual power consumption depends on the load and running application and may be less than the specified value.

** The operating temperature range depends on the product version.

Peripheral Modules

KIC301

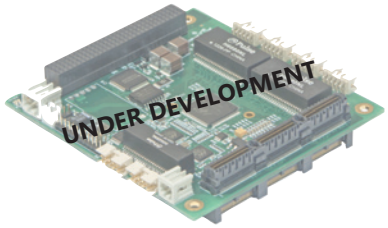
Interface Module in StackPC-PCI form-factor

- StackPC-PCI form-factor
- 2×miniPCI Express slots for installation of additional communications equipment
- 2×slots for SIM-cards
- Connector for CFast drives
- Interfaces: SATA, RS-232/485/482, 1 Wire
- OS compatibility: Linux 2.6, Windows XPe, Windows 7 Embedded
- Power supply: 5 V ±5%
- Operating temperature range :–40...+85°C
- MTBF: 100,000 h

NIM354

StackPC-PCI Network Module in StackPC-PCI Form-Factor

- StackPC-PCI form-factor
- Integrated unmanaged switch for 7 Ethernet channels;
- QoS IEEE 802.1p, IPv4, IPv6, 4096 VLAN IDs with 3×safety levels 802.1Q;
- PoE PSE 4×ports with galvanic isolation from other circuits, corresponding to the IEEE 802.3af/at standards and compatible with the devices with up to 25W;
- Software management PoE PSE over SMBus
- OS compatibility: QNX 6.5, Linux 2.6, Windows XPe
- Operating temperature range: –40...+85°C
- MTBF: 500,000 h



DIC334

Digital I/O Module with galvanic isolation

- System bus: LPC
- 16×digital / frequency input channels
- 8×digital output channels
- Single- or two-wire connection of signals
- Switching output voltages/currents: 60 V/500 ma
- Measuring frequencies over any channel
- 6×shared lines of hardware interrupts
- Control of output states
- Programmable debouncing time interval for inputs
- SO compatibility: FDOS, FreeDOS, Windows XPe, Linux 2.6
- Operating temperature range: from –40 to +85°C

PS353

Power Supply Module

- StackPC-FPE form-factor
- Range of input voltages: 9–36 V
- Output voltage: +3,3; +5; +12; +5 STDBY
- Maximum output power: 100 W
- I/O galvanic isolation: 1500 V
- Protection of inputs against the pulse voltage, short circuits and overheating

NIM355

Interface Module

- StackPC-PCI form-factor
- System bus: PCI 32 bit/33 MHz
- 4×digital input channels, input voltage of 24 V
- 4×digital output channels, of potential-free contact type
- 4×CAN channels, transmission rate up to 1 Mb/s
- OS compatibility: Windows XPe, Linux 2.6.x, QNX 6.5

KIC303

Interface Module

The module is designed for debugging systems, with StackPC bus

- Access to the interfaces on the connector StackPC: 2×LAN, SATA, 2×USB, 2×RS-232
- Simple transition to cylindrical connector through IDCxx

In addition:

- mPCIe/mSATA slot
- 8×DIO, with isolation
- Audio In/Out
- Slot for SIM-card
- POST-indication

Embedded Computers of Small Form-Factors

The class of small form-factor embedded computers includes full-featured processor boards with an installed CPU, RAM and, as a rule, having the ability to expand functionality by installing various mezzanines.

Fastwel supports two lines of form-factors – 3.5" and EPIC – expandable with modules conforming to the PC/104 (www.pc104.org) and StackPC (www.stackpc.org) family of standards.

The embedded computers of small form-factors are based on processors and chipsets from long-term manufacturing programs and support a wide range of operating systems.

In addition to the products mentioned in this section, the FASTWEL computer boards in the PC/104, MicroPC and StackPC standards can also be used as single-board computers.

The compact size, a wide range of interfaces well-known in the industry, such as high-speed serial ports, parallel ports, digital I/O channels, programmable watchdog timers and possibility of expanding functionalities by installing standard modules - all this is far from a final and conclusive list of the key features of single-board embedded computers that make them highly popular among the designers of embedded systems.

3,5" Embedded Single Board Computer Based on Intel Atom e38xx with MiniPCI Express Bus and Support of the StackPC Format Modules

CPB909 is designed for embedded systems that require high-performance and low power consumption. The module provides developers of highly reliable compact size systems with compatibility with x86 processor family, the most advanced functionality based on the PCI Express bus, as well as cost efficiency due to the use of Intel Atom E38xx processors. The module is best used in the construction of real-time systems, onboard systems, security and communication facilities, for high-speed data acquisition and other critical applications in harsh operating conditions. The guaranteed product life cycle – 7-10 years.

CPB909

CPU Module

- StackPC-PCI form-factor
- Intel Atom D510 CPU, 1,66 GHz
- RAM: DDR2 SDRAM 667 MHz, without ECC, 2 GB, soldered
- Flash-memory: 4 GB NAND Flash, CompactFlash type 1/2
- Graphics: VGA up to 2048×1536, LVDS 18 bit, up to 1366×768
- 2×USB 2.0, 2×RS-232, PS/2, Audio
- Expandability:
  - PCI-104: 32-bit PCI
  - StackPC: 4×PCIe x1, 2×GbE, 6×USB 2.0, 2×RS-232, LPC, SMBus
- OS compatibility: FreeDOS, Windows XPe, Linux 2.6, QNX 6.5

Computer-on-Modules

The Computer-on-modules (COMs) are designed for the use as mezzanines installed on embedded carrier boards specially designed for them and equipped with the rest of the necessary system components and made in a dimensional form factor that meets the requirements of the application. The COMs are equipped with CPU, RAM, BIOS, controllers described in the specification, and secondary power supplies. All user interfaces, customized functionality and primary power supplies are implemented on the carrier-board.

Having compact size, low heat dissipation and a wide range of interfaces via standard connectors, the COMs make it possible to combine the up-to-date computer functionality, customized interfaces and application functionality within a single embedded system. The computer-on-modules are widely used both for those tasks that cannot be efficiently solved with standard embedded boards, and for the tasks of updating the technical solutions of legacy or outdated systems.

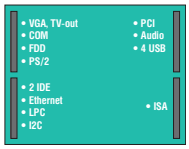
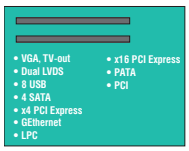
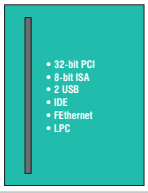
FASTWEL's portfolio has COMs of the main generally accepted standards - ETX, COM Express and SMARC, as well as the most compact format - FCOM, based on x86 processor platforms of Intel, AMD, DM&P and NXP architecture from long-term manufacturing programs with low heat dissipation.

For analyzing system performance and development start, we offer you special design evaluation boards made in a standard format and with a very wide range of interfaces and service signals. The use of these boards enables you to develop software components in parallel with the development of your own hardware, thereby reducing risks and speeding up the system's entry to the market.

Key advantages of using COMs

- Reduction of design time
  - no need for designing single-board computers – that saves 9 ... 18 months
  - the ability to design a carrier board and software in parallel – that saves 1 ... 9 months
- Lowering development costs
  - reduction in the cost of the carrier board (2 ... 6 layers versus 10 ... 12 layers with COM) and commonality of the components
  - Reduction in development costs
- Business continuity
  - Focus on the key competence
  - High speed of innovations and launching products on the market

Next to supplying the COMs and development board, Fastwel offers a range of services for the development of client carrier boards. For inquires and further information: info@fastwel.com.

ETX **5 V@~8 A**		ETX is the standard of COMs that appeared among the first. it has a set of standard interfaces and parallel buses, including PCI and ISA buses, via four connectors on the carrier board. The ETX standard makes it possible to withdraw up to 40 watts from a single module. Dimensions: 95×111.6 mm.
COM Express **12 V@10 A**		COM Express is a standard of the PICMG consortium and enables you to use the highest performance interfaces available in up-to-date processors and chipsets. The standard describes three size form-factors: mini (84×55 mm), compact (95×95 mm) and basic (125×95 mm) – with ten pinouts types.
FCOM		The FCOM standard was developed by Fastwel and is the smallest form factor – its dimensions are 65×45 mm, that is, it is even smaller than a credit card. One high density 220-pin connector is used as the main connector in COM Express modules (pin assignments are different). FCOM is designed for solving tasks that require low power consumption and compact size.
SMARC **5 B@5 A**		The standard is designed and developed by the Standardization Group for Embedded Technologies (SGET). This standard is focused on the market of low power consumption devices, and such a consumption is usually less than 6 watts. It defines two module sizes: 82×50 mm and 82×80 mm.

Line of Fastwel Computer Modules



Model		CPB906	CPC1001	CPC1311
Compliance with the standard		FCOM	SMARC	COM Express mini Type 10
Dimensions		65,2×40,2×10,5 mm	82×50×5,5 mm	84×55×15 mm
CPU		Vortex86DX	IMX6 Quad Core	Intel Atom E38xx
RAM		DDR2 SDRAM 256 MB (soldered)	DDR3L-1600 SDRAM 4 GB	DDR3L-1066/1333 SDRAM up to 4 GB with ECC support (soldered)
Graphics subsystem	Type	No		Integrated into CPU
	Interfaces	No	24-bit Parallel RGB LVCMOS, 1/2×18/24-bit LVDS MIPI DSI 2 Lane HDMI 1.4	LVDS up to 1600×1200 (60 Hz) DDI0, eDP up to 2560v1600 (60 Hz)
	Number of independent displays	—	3	2
Storage subsystem interfaces	IDE	1×IDE, NAND Flash Drive 1 GB, soldered	No	No
	SATA	No	1×SATA II	2×SATA II
	Removable storage devices	No	32 GB	No
Communication interfaces	ISA	8 bit	No	No
	PCI	32 bit	—	No
	PCI Express	No	1×PCIe x1 Gen2	3(4)×PCIe x1
	Ethernet	1×Fast Ethernet	1×Gigabit Ethernet	1×Gigabit Ethernet
	USB	2×USB 2.0	2×USB 2.0	5×USB 2.0, 1×USB 3.0
	COM-ports	2×RS-232	3×RS-232/485	1×RS-232, 1×RS-232 or 1×CAN
	Digital I/O channels	6×digital I/O channels, 2×chip select lines of internal programmable address decoder (I/O or Memory map)	12×programmable I/O channels	4×programmable I/O channels
	Others	PS/2, 1×LPC, 1×I²C	2×CAN 2.0B, MIPI CSI-2 2/4 Lane (Camera), 2×I²S/ESAI (Audio), 3×I²C, 2×eCSPI, PWM	1×LPC, 1×SPI, 1×I²C, 1×SMBus
Service equipment and features		2×watchdog timers, Real Time Clock, external reset	1×watchdog timer	1×watchdog timer, Real Time Clock, console I/O
OS compatibility		FDOS, MS-DOS 6.22, Windows CE 5, Linux 2.6, QNX 6.4x	Linux, Android, NEUTRINO Protected RTOS, Astra Linux Novorossiysk	MS DOS 6.22, Windows ES7, Windows ES8, Linux 2.6, QNX 6.5
Power supply		+5 V	+3…+4,5 V	+4,75…+20,0 V
Estimated power consumption*		2,25 W	Less than 5 W	From 8 to 16 W depending on the version
Vibration/ Shock resistance		5g/100g	5g/100g	5g/100g
MTBF (GOST 15150-69)		320,000 h	100,000 h	200,000 h
Operating temperature range**		–40…+85°C	–40…+85°C	–40…+85°C

* Estimated power consumption – Power consumption for calculating the system of heat dissipation from the module. The actual power consumption depends on the load and running application and may be less than the specified value.

** The operating temperature range depends on the product version.

Line of Fastwel Computer Modules

Model		CPC1302	CPC1303	CPC1304
Compliance with the standard		COM Express Basic Type 6	COM Express Basic Type 7	COM Express Basic Type 7
Dimensions		125×95×23,4 mm (with due consideration of the heat-dissipation board and racks)	125×95×23,4 mm (with due consideration of the heat-dissipation board and racks)	125×95×23,4 mm (with due consideration of the heat-dissipation board and racks)
CPU		Intel Core i7-5850EQ/i5-4422E	Intel Xeon D-1559 1,5GHz, Intel Xeon D-1539 1,6 GHz, Intel Pentium D-1519 1,5 GHz	Intel Xeon E3 v7 47/37W, 6 or 4 cores Intel x64
RAM		DDR3L-1600 SDRAM up to 8 GB with ECC support (soldered)	DDR4-2133 SDRAM up to 32 GB with ECC support (soldered)	DDR4-2666 SDRAM up to 32 GB with ECC support (soldered)
Graphics subsystem	Type	CPU-integrated	No	Integrated into CPU
	Interfaces	1×LVDS Channel (24 bit), 1920×1200, 60 Hz, 3×DDI 4096×2304, 60 Hz, 1×VGA CRT 1920×2000, 60 Hz	No	LVDS Dual Channel 24 bit 1920×1200@60 Hz or eDP port 4096×2304@60 Hz
	Number of independent displays	3	—	3
Storage subsystem interfaces	IDE	No	No	—
	SATA	4×SATA III	2×SATA III	4×SATA III 6 Gbps
	Removable storage devices	16 GB	32 GB	32 GB
Communication interfaces	ISA	No	No	No
	PCI	No	No	No
	PCI Express	1×PCIe x16 Gen3, 7×PCIe x1 Gen2	1×PCIe x16 Gen3, 1×PCIe x8 Gen3, 7(8)×PCIe x1 Gen2	1×SPCIe x16 GEN3, 8×SPCIe x1 GEN3
	Ethernet	1×Gigabit Ethernet	2×10 Gigabit Ethernet, 1×Gigabit Ethernet	1×Gigabit Ethernet
	USB	8×USB 2.0, 4×USB 3.0	4×USB 2.0, 4×USB 3.0	8×USB 2.0, 4×USB 3.1
	COM-ports	2×RS-232	2×RS-232	2×RS-232
	Digital I/O channels	4 x channels of programmable I/O	4 x channels of programmable I/O	4 x channels of programmable I/O
	Others	1×SPI, 1×LPC, 1×I²C, 1×SMBus, HD-Audio, Speaker Out	1×SPI, 1×LPC, 1×I²C, 1×SMBus	1×SPI, 1×LPC, 1×I²C, 1×SMBus, HD-Audio, Speaker Out
Service equipment and features		1×watchdog timer, Real-Time Clock, console I/O, monitor of 7 power supply voltages, PCB temperature monitor	1×watchdog timer, Real-Time Clock, Console I/O, monitor of 7 power supply voltages, PCB temperature monitor	1×watchdog timer, Real-Time Clock, Console I/O, monitor of 7 power supply voltages, PCB temperature monitor
OS compatibility		MS DOS 6.22, Windows 7/8, Linux 3.8.x, QNX 6.x,	Linux Debian 8 Jessie (kernel 3.16), QNX 6.x, Microsoft Windows Embedded 10 64 bit, Microsoft Windows Embedded Standard 7 64 bit	Linux Debian 9 QNX 6.x Microsoft Windows 10 IoT Enterprise 64 bit
Power supply		+8…+14 V	+12 V from COM Express connector, +5 V_STBY from COM Express connector (option)	+12 V from COM Express connector, +5 V_STBY from COM Express connector (option)
Estimated power consumption*		From 38 to 51 W depending on the version	From 45 to 58 W depending on the version	No more than 50 W
Vibration/ Shock resistance		2g/50g	5g/100g	5g/100g
MTBF (GOST 15150-69)		100,000 h	100,000 h	100,000 h
Operating temperature range**		–40…+85°C	–40…+60°C/–40…+85°C	—

* Estimated power consumption –Power consumption for calculating the system of heat dissipation from the module. The actual power consumption depends on the load and running application and may be less than the specified value.

** The operating temperature range depends on the product version.

Platforms and Tools for Development of COM-Based Applications

DVK906

Development Kit for CPB906 Computer Module of FCOM-standard

EPIC form-factor

- Compatibility with PC/104+ modules (ISA 8 bit, PCI 32 bit)
- Standard connectors for interfaces: PS/2, USB, Ethernet, UART
- Slot for connection of CompactFlash type 1/2; two slots for miniSD cards; IDE connector for HDD 2,5"
- 2×RS-232, 2×RS-485/422
- Installed in the VIM301 Video Graphics Controller Card
- Installed OS: Windows CE or Linux, depending on the version
- Power supply: +5V ±5%, +3,3V ±5%

KIB1400

Development board for CPC1311 Computer Module of COM Express standard

Micro ATX form-factor

- DisplayPort , LVDS, eDP
- 1×Gigabit Ethernet, 2×SATA, 2×RS-232, 3×USB 2.0, 1×USB 3.0, 1×CAN, SPI, I²C, SMBUS, GPIO, SDIO, LPC
- 2×MiniPCI-E, PCI Express x1
- HD-Audio with In, Out, Mic connectors

Embedded and On-Board Computers

Fastwel Embedded and On-Board Computers

FASTWEL offers proven Box PC solutions of the MK series based on proprietary processor boards and expansion modules. The original design solutions, the use of industrial components and accurate testing at all manufacturing stages enabled to create efficient on-board computers that have maximum resistance to factors peculiar to ground and rail transport, aviation and special applications. The modular structure make it possible for you to modify the design of the products or increase their functionality in accordance with serial orders.

MK303

Computer Platform

MK303 is designed for being used as the basis for development of rugged computers with a stack of PC/104, PC/104-Express and StackPC modules, both with and without the conduction cooling via the heat distribution plate.

MK1302

Computer Platform

The computer platform for creating special-purpose high-performance computers with the ability to install expansion modules of the StackPC format.

Key Features of Fastwel Modular Computers

Model	MK303	MK1302
Processor board	CPC313	CPC1302
Form-factor	StackPC	StackPC
Protection class	IP67	IP67
Processor	Baikal-T1	Intel Core i7-5850EQ/i5-4422E
RAM	DDR2 82 GB	DDR3L-1600 SDRAM 8 GB with ECC support (soldered)
Video output	VGA, LVDS	VGA, LVDS
Ethernet	1×10Gigabit Ethernet, 2×Gigabit Ethernet	3×Gigabit Ethernet
Support of solid state memory	Up to 8 GB, support of 1,5 Gb Gen I, 3 Gb Gen II, 6 Gb Gen III	SSD
Interfaces	2×COM, 6×USB, 8×GPIO	1×COM, 2×USB, 2×CAN, digital I/O 5/27 V
	Glonass/GPS/GPRS/Wi-Fi	—
Expansion	StackPC modules, PCIe/104, PC/104-Express	StackPC modules, miniPCIe
Power supply	9–36 V	22–29 V
OS compatibility	Linux (Debian 7.x)	Windows 7/8, Linux, QNX, Astra Linux
Operating temperature range	–40...+70°C	–50...+55°C
Vibration and shock resistance	50/2g	150/3g
Dimensions	301×162×132 mm	
Weight	Depending on the configuration	

* Estimated power consumption – Power consumption for calculating the system of heat dissipation from the module. The actual power consumption depends on the load and running application and may be less than the specified value.

** The operating temperature range depends on the product version.

Display and Control Systems

ONYX08

Freescale i.MX6-based 8,4" Tablet Computer

The computer is designed for the use in transport and process control systems as a touchscreen PC.

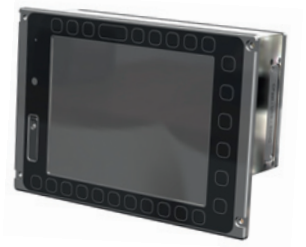
- Display size: 8,4"
- 5 functional luminous keys
- Interfaces (USB 2.0, Gigabit Ethernet, CAN 2.0, audio output, microphone, Wi-Fi, Bluetooth, GSM, GLONASS/GPS, video camera/flash, compass, accelerometer, temperature sensor)
- OS compatibility: Astra Linux, Android, QNX
- Operating temperature range: –30…+50°C

ONYX12

12,1" Tablet Computer

The computer is designed for the use as control/navigation onboard system in transport means with a possibility of stand-alone use as information-mapping computer. The device can be applied in severe operating conditions outdoors and in unheated premises.

- Display size: 12,1"
- 7 luminous keys
- Interfaces (1×RS-232, 1×RS-422/485, 1×GbEthernet, 2×USB, GPIO, GPS/GLONASS, audio output)
- OS compatibility: Windows XPe/8, Astra Linux SE, Linux 2.6
- Operating temperature range: –50…+60°C



BS04

Rugged HMI 10,4" Panel PC

The panel PC is designed for the use in transport and industry under the conditions of adverse mechanical and electromagnetic effects, in a wide range of ambient temperatures. The product design is based on the possibility of flexible adaptation to consumer requirements.

- Display size: 10,4"
- 26×functional luminous keys
- Interfaces (2×CAN, 2×RS-422/485, 2×GbEthernet, 2×CFAST, 1×SDHS, 3×USB, audio output)
- OS compatibility: Windows XPe/8, Astra Linux SE, Linux 2.6
- Operating temperature range: –50…+60°C

Rugged Ethernet Switch

NM350

Gigabit Ethernet Network Switch

The switch is designed for the use in data acquisition and processing systems fit for harsh operating conditions and built on the basis of the Gigabit Ethernet interface with the ability to connect up to 4 devices supporting the PoE (Power over Ethernet) technology.

- Integrated switch for 6×Gigabit Ethernet channels, operating at the data-link (second) layer of the OSI model
- 4×ports with support of PoE PSE technology with the standard IEEE 802.3af
- Compatibility with devices: up to 15,4 W per channel
- M12 industrial connectors
- Dust- and moisture protection: IP65
- Operating temperature range: –40…+85°C.

Peripherals for Data Input and Acquisition

Data input devices

ACS00009 (FK-3)

16-keys Dust- and Moisture-Proof Keyboard

- complete integrity
- IDC connector, 10 contacts, pitch: 2,54 mm, two rows
- Operating temperature range: –40...+85°C

MSHR01

Trackball

Designed for controlling the cursor on the screen and entering control commands

- Ball diameter: 50 mm
- PS/2 output port (male connector RS19TV)
- Operating temperature range: 0…+55°C

Memory Modules

MIC430

MIC430 is a storage device with a SATA III 6.0 Gb/s interface based on NAND-type memory microchips manufactured using the SLC (Single-Level Cell) technology.

- Form-factor: 2,5"
- Read/Write rate: 490/340 Mb/s
- Operating temperature range: –40…+85°C
- MTBF: 3,000,000h
- Storage size: up to 512 GB

MIC432

2.5" SATA III SSD Memory Module

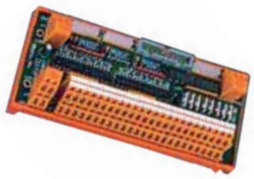
- From-factor: 2.5"
- Power supply voltage: 5 V DC ± 5%
- Power consumption: no more than 3.5 W
- Dimensions (max): 100.5×70.0×9.5 mm
- Weight (max): 0.11 kg
- Operating temperature range: from –40° C to +85°
- MTBF: 3,000,000 hours

MIC433

2.5" SATA III SSD

- From-factor: 2.5"
- Power supply voltage: 5 V DC ± 5%
- Power consumption: 3.25 W (5 V, 0.65 A)
- Dimensions (max): 100.3×69.85×9.5 mm
- Weight (max): 0.1 kg
- Operating temperature range: from –40° C to +85°
- MTBF: 1,500,000 hours

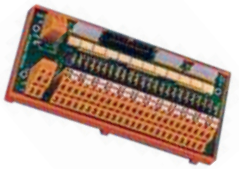
Digital I/O Module



DIB915 (TBI 16/8S)

Terminal Board with Optical Isolation

- 16 x digital signal input channels
- Input signal levels: ±3,2, ±52 V (for TBI-16/8S-1,2), 3,2, 52 V (for TBI-16/8S-3)
- 8 x digital signal output channels
- Switched output voltages @ currents: 60 V @ 800 MA
- Limit output voltages @ currents: 100 V @ 5 A
- Channel-by-channel optical isolation of inputs 1500 V
- Maximum switch on/switch off time 3 ms
- Operating temperature range: –40...+85°C



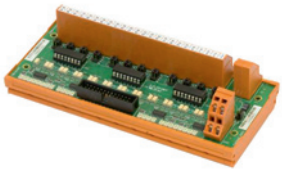
DIB913 (TBI 0/24C)

Terminal Board with Optical Isolation

- 24 x digital signal output channels
- Switching voltage: up to 60 V DC
- Load current: up to 800 mA
- Input to output isolation: 1500 V
- Maximum switch on/switch off time: 3 ms
- Parameters of the channel control signals:

Minimum current 4 mA, input voltage: 3,5–5/0–1,5 V

- Operating temperature range: –40...+85°C



DIB912 (TBI 24/0C)

Terminal Board with Optical Isolation

- 24 x digital signal input channels
- Input signal levels ±3,2...52 V (6 x subranges)
- Minimum channel latching current 4 mA
- Input signal delay:

– 100 ns (TBI 24/0C 3);
– 25 µs (TBI 24/0C 1, TBI 24/0C 2)

- Control of the potential-free contact type (TBI 24/0C 2) with the use of internal power supply +9 V
- Channel-by-channel optical isolation of inputs from the system 1500 V
- Power supply voltage 5 V ±10%
- Operating temperature range –40...+85°C

Communication Modules

NIB941 (TBCOM)

Interface Conversion Board RS-232C–RS-485/422

- Transfer rates: 1200, 2400, 4800, 9600, 38 400, 57 600, 115 200 bit/s
- Input RS-232, connector IDC10
- WAGO spring contact connector for connecting the board to the RS-485/422 interface circuits
- Power supply voltage 5 V
- Operating temperature range: –40...+85°C

Terminal Boards

TIB961 (TBI-24lC)

Terminal Board for Isolated Modules

The TIB961 (TBI-24LC) boards are designed for installing 12 x Grayhill 70L/73L optical isolation modules (up to 24 x analog/digital I/O channels). The board can be controlled by DIC120 modules or any modules with a parallel digital port.

- Operating temperature range: –40...+85°C

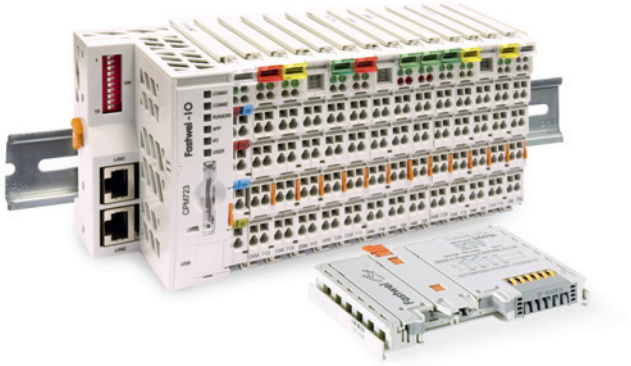
TIB963–TIB967 (TBxx)

Terminal Boards

The TBxx series boards are used to connect the actuator signals to the computer-process interface modules and controllers. The connection to the modules is performed by the FCxx Fastwel connecting cables, while connection to the actuators - via two-level spring clamp terminal blocks.

- Operating temperature range: –40...+85°C

Fastwel I/O



FASTWEL I/O consists of the modules connected with a specific automation object, which form a node of the data acquisition and processing system. Such a unit can be installed in direct proximity to the item to be automated, which makes it possible to shorten the length of connecting wires, simplify equipment installation and refuse to use patch panel. All I/O modules have a uniform design that enables optimum compliance with the requirements of a particular automation system. In general, the module contains 8 external spring contacts. The modules are installed on a standard DIN-rail and fixed to it with a latch. The FASTWEL I/O modules have 2 to 8 I/O channels. This selection of the number of channels enables to reduce the redundancy of the system. Each module has a protective earthing contact. Almost all modules have contacts for supplying control circuits of signal sensors. Such contacts can be combined for a group of modules into supply rails, thereby generating segments with isolated power supply to external circuits. The status of the channels of the digital I/O modules is indicated by LEDs.

Communication between the I/O modules and a network node controller is carried out via the internal FBUS. All the FASTWEL I/O modules have structural parts that ensure secure contact over FBUS.

System composition

- Network node controllers
- Digital signal input modules
- Digital signal output modules
- Analog signal input modules
- Analog signal output modules
- Temperature measurement modules
- Network interface modules
- Power supply modules
- Computers with FBUS interface

The FASTWEL I/O ideology is based on providing the developers with maximum opportunities in configuring, expanding and maintaining the system.

Parameters	
Operating temperature range	–40…+85°C
Storage temperature	–40…+85°C
Relative air humidity	Up to 95% at +50°C, non-condensing
Sinusoidal vibration	Frequency range 10..500 Hz in accordance with the GOST 28203-89 (IEC 60068-2-6), acceleration of 5g
Single shocks	Peak acceleration: 100g in accordance with the GOST 28213-89 (IEC 60068-2-27)
Multiple shocks	Peak acceleration: 50g in accordance with the GOST 28215-89 (IEC 60068-2-29)
Protection class in accordance with IEC529	IP20
Resistance to radio interference	In accordance with the GOST R 51318.22-99 Class A (CISPR 22-97)
Immunity to electromagnetic interference	In accordance with the GOST R 50839-2000 (group II) (BS EN 61000-6-2:2001)
Immunity of inputs to high energy microsecond pulse interference	In accordance with the GOST R 51317.4.5
Immunity of inputs to high-energy fast transient burst	In accordance with the GOST R 51317.4.4

Modular Computers with FBus Interface

MK150-02

The universal modular computer designed for solving average performance problems in control systems. The MK150-02 can be mounted on either a DIN rail or a panel and enables direct connection of Fastwel I/O modules. The computer's distinctive features are the availability of channels of digital input-output and non-volatile memory, resistance to severe environmental conditions. This computer can be used both with Fastwel I/O controller modules and as a stand-alone device in data acquisition and control systems.

Programmable Controllers

Depending on the version, the controllers support data-transfer protocols CANopen, Modbus RTU, Modbus TCP, PROFIBUS DP-V1, DNP3, IEC60870-5-104. Due to the integrated development environment, in addition to the standard functions of data acquisition and data exchange over the network, the CoDeSys controller has the ability to execute applied technological programs. The network interface circuits are galvanically isolated from the controller internal circuits.

The CPM71x network node controllers are capable of running application programs (applications) that implement algorithms for data acquisition, processing and control, developed using the CoDeSys 2.3 adapted programming environment.

The CPM723 programmable controller is designed for execution of applications on data acquisition, data processing and control developed in the CODESYS V3 development environment.

The communication capabilities of the CPM711 / CPM712 / CPM713 / CPM723 controllers can be easily expanded by connecting RS-485 (NIM741) and RS-232C (NIM742) interface modules to the FBUS.

For implementing the user exchange protocols through the NIM741 and NIM742 modules in CoDeSys applications, the FastwelSysLibCom.lib system library can be used. In addition, communication functions can be supplemented with ready-to-use Modbus servers using the FastwelModbusServer.lib library.

Technical Features of the Controllers




Model	CPM711	CPM712	CPM713	CPM723
Network interface	CAN	RS-485	Ethernet	Ethernet
Transfer protocol	CANopen	Modbus RTU DNP3	Modbus TCP DNP3	Modbus TCP IEC60870-5-104
Maximum number of network nodes	127	247	Determined by Ethernet specification	Determined by Ethernet specification
Data transfer medium	Screened copper twisted pair 28AWG		Twisted pair UTP 100, cat. 5	Twisted pair UTP 100, cat. 5
Length of network segment	From 30 to 1000 m (depending on the data transfer rate)	1200 m	100 m, determined by Ethernet specification	100 m, determined by Ethernet specification
Data transfer rate	Up to 1 Mb/s	Up to 115,200 bit/s	10/100 Mb/s	10/100 Mb/s
Number of I/O modules	Max. 64			64/192 with the use of 2 remote FBUS
Program segment size	2 MB			8 MB
Configuration size	2 MB			8 MB
Size of the Internal variable segment	2 MB			6 MB
Segment size of non-volatile variables	128 KB			131 KB
Real Time Clock	Yes			Yes
Power supply voltage	24 V (+20/–15%) DC			24 V (+20/–15%) DC
Current consumption	150 mA, with the voltage of 24V			65 mA, with the voltage of 24V

I/O and Auxiliary Modules

The modules ensure connection of sensors and actuators, and also contain galvanic isolation and status indication circuits. The modules are powered via the internal bus by the integrated controller source or additional power supply modules.

Exchange of data and service information between the node controller and I/O modules is carried out via the internal FBUS at the data transfer rate of 2 Mb per second with the control of transmission validity. The maximum bus bandwidth for cyclic group communication with all the modules connected to the network node controller is more than 165 kBps.

All I/O modules have a unified design, which enables them to optimally meet the requirements of a particular automation system.

Technical features of Fastwel I/O modules

Model	Number of channels	Description
Digital Input Modules		
DIM715	2	Digital input module, 230 V AC, 2-wire connection logic 0 level from 0 to 40 V logic 1 level from 79 to 250 V AC
DIM717	8	Digital input module, 24 V DC, active level 24V, single-wire connection, 2-channel pulse counter up to 300 Hz debouncing 200 μs, 3 ms
DIM760	4	Digital input module, 24 V DC, 2-wire connection, 2-channel pulse counter up to 300 Hz debouncing 200 μs, 3 ms
DIM761	4	Digital input module, 48 V DC, 2-wire connection, 2-channel pulse counter up to 300 Hz debouncing 200 μs, 3 ms
DIM762	8	Digital input module, 24 V DC, active level 0V, 1-wire connection, 2-channel pulse counter up to 300 Hz debouncing 200μs, 3ms
DIM764	8	Module for measuring frequency, duration, phase offset, pulse counters 0,8–50 000,0 Hz 24V DC, active level 0V, single wire connection, input signal hardware filtering frequency measurement error: no more than 0,03% in the range 0,8–5000,0 Hz no more than 0,3% in the range 5–50 kHz
DIM765	8	Digital input module with circuit integrity control, 24 V DC, active level 24 V, single-wire connection, type of input 1 and/or 2, support of shunts with the resistance of 1,8–33,0 kOhm, programmable switching on/off delay, the ability to evaluate the resistance of supervised circuits
DIM766	8	Digital input module with circuit integrity control, 24 V DC, active level 0V, single-wire connection, type of input 1 and/or 2, support of shunts with the resistance of 1,8–33,0 kOhm, programmable switching on/off delay, the ability to evaluate the resistance of supervised circuits
Digital Output Modules		
DIM711	4	Digital output module, 24 V/2 A DC, high side, 2-wire connection, protection against short circuits and diagnostics, 4×PWM channels with a pitch of half-waves sampling 12,5 and 50,0 μs
DIM712	2	Relay output module, changeover contacts, up to 250 V AC, up to 30 V DC, rated current 1A
DIM713	2	Relay output module, normally open contacts, up to 250 V AC, up to 30 V DC, rated current 2A
DIM718	8	Digital output module, 24 V/0,5 A DC, high side, 2-wire connection, protection against short circuits and diagnostics, 4×PWM channels with a pitch of half-waves sampling 50,0 μs
DIM719	8	Digital output module, 24 V/0,5A DC, low side, 2-wire connection, protection against short circuits and diagnostics, 4×PWM channels with a pitch of half-waves sampling 50,0 μs
DIM763	4	Digital output module, normally open contacts, optical relay 60 V/500 mA DC or AC with channel-by-channel isolation
Analog Output Modules		
AIM730	2	0…20 or 4…20 mA, software-installed current growth basic error 0,08% current growth temperature error 0,002%
AIM731	2	–10… +10 or 0…+10 V, software-installed voltage generation basic error 0,08% voltage generation temperature error 0,002%

Technical features of Fastwel I/O Modules (continued)

Model	Number of channels	Description
Analog Input Modules		
AIM721	4	0…20 mA single-wire measurement mode error at +25°C 0,04% (at a filter frequency of 1000 Hz) overload and overvoltage protection signal conversion time on one channel at 1000 Hz – 8,4 ms
AIM722	2	0…20 mA differential measurement mode error at +25°C 0,04% (at a filter frequency of 1000 Hz) overload and overvoltage protection signal conversion time on one channel at 1000 Hz – 8,4 ms
AIM723	4	4…20 mA single-wire measurement mode error at +25°C 0,04% (at a filter frequency of 1000 Hz) overload and overvoltage protection signal conversion time on one channel at 1000 Hz – 8,4 ms
AIM724	2	Connection of thermocouples type V (+600…+1800°C), E (–100…+1000°C), J (–100…+1200°C), K (–100…+1370°C), L (–200…+800°C), N (–100…+1300°C), R (0…+1700°C), S (0…+1700°C), T (–100…+400°C) Thermocouple break diagnostics
AIM725	2	Connection of thermal resistances 2-/3-wire connection Pt 50, Pt 100, Pt 200, Pt 500, Pt 1000, Ni 100, Ni 120, Cu 50 TSP 50P, TSP 100P, TSM 50P, TSM 100M open and short circuit diagnostics
AIM726	2	0…40 V DC single-wire measurement mode basic measurement percentage error at +25°C no more than 0,1% (for the voltage of 0…10 V)/no more than 0,04% (for the voltage of 0…40 V)
AIM727	4	0…40 V DC single-wire measurement mode basic measurement percentage error at +25°C no more than 0,1% (for the voltage of 0…10 V)/no more than 0,04% (for the voltage of 0…40 V)
AIM728	4	From –20 up to + 20V DC single-wire measurement mode error at +25°C no more than 0,03% (–10…+10 V)/ no more than 0,02% (–20…+20 V)
AIM729	2	From –20 up to + 20V DC single-wire measurement mode measurement error at +25°C no more than 0,03% (–10…+10 V)/no more than 0,02% (–20…+20 V)
AIM791	8	Module for analog input of DC signals in the ranges: 0...5, 0...20, 4...20 mA. Single-wire connection, measurement time for 8 channels no more than 1.1 ms, 16 bit ADC. Surge and pulse interference protection
AIM792	8	Analog input module for voltage measurement: 0…5, 0…10, –5…+5, –10…+10 V. Single-wire connection, measurement time for 8 channels no more than 1.1 ms, 16bit ADC. Surge and pulse interference protection
Power Supply Modules		
OM750	—	FBUS stub – terminal module: needs to be installed at the end of the module line
OM751	—	Power supply connection module with fuse and diagnostics, 24 V/6,3 A
OM752	—	Power supply connection module, 24 V/6,3 A
OM753	—	FBUS power input module with protection against polarity reversal, overload, input overvoltage and output short circuit. Output voltage +5 V/2 A is generated from the input current of 24 V
OM755	—	Power input module 0…230 V AC/DC designed for supplying voltage to the power supply bus switch blades maximum total current through the switch blades of the power supply bus is no more than 10 A
OM756	—	Internal FBUS Expansion Module – right side maximum distance between the module OM756 and OM757 counter module is no more than 5 m
OM757	—	Internal FBUS Expansion Module – left side maximum distance between the OM756 module and OM757 counter module should be no more than 5 m
OM758	—	Module for expanding potential of power bus 0 V
OM759	—	Module for expanding potential of power bus 24 or 48 V DC maximum total current through the switch blades of the power supply bus is no more than 10A
Interface Modules		
NIM741	—	FBUS interface module – RS-485 data transfer rate 1200, 2400, 4800, 9600, 14 400, 19 200, 38 400, 57 600, 115 200 bit/s the module implements the master (client) function of the Modbus RTU protocol using the FastwelModbusRTUClient.lib library
NIM742	—	FBUS interface module – RS-232C data transfer rate 1200…115 200 bit/s integrated receive buffer 1000 byte integrated transfer buffer 1000 byte
NIM745-01	—	Converter of Ethernet interfaces to FBUS. Ensures connection of FASTWEL I/O modules to the system of data acquisition and processing, based on the Ethernet TCP/IP (10/100 Mb/s) interface
NIM745-02	—	Nonprogrammable controller of the slave node of the MODBUS TCP protocol. Ensures connection of FASTWEL I/O modules to MODBUS TCP networks

PARTNERS AND ALLIANCES

Partnerships with Developers

The Intel Communications Alliance – is a community of communications and embedded developers and solutions providers committed to the development of modular, standard-based solutions based on Intel technologies.

AMD processors with x86 architecture have proven themselves in a range of application areas.

DMP Electronics INC is a developer and manufacturer of highly integrated SoC with an x86 processor core and a wide range of interfaces well-known in the industry.

Baikal Electronics is a Russian-based company that develops and sells microprocessors. The company specializes in ARM-based and MIPS-based systems on a chip (SoC). Pilot projects of the company are intended for the use on the global markets in power-efficient computing and industrial systems with various performance and functionality levels.

MCST Joint Stock Company specializes in the development of Russian microprocessors and computing systems on their basis.. Key products are Elbrus microprocessors with the "Elbrus" Russian architecture and MCST-R microprocessors using the SPARC command system. The MCST microprocessors are universal and suitable for a wide range of applications – from cost-effective embedded systems to multiprocessor servers and computer clusters on multiple machines.

Partnerships with Software Developers

Microsoft operating systems (www.microsoft.com) are widely used in embedded applications. FASTWEL provides support for the functioning of its products with such Microsoft operating systems as Windows Embedded Standard/XP Embedded, Windows Embedded Compact (CE), Windows 2000, Windows Vista, Windows 7.

The Wind River company (www.windriver.com) is a global leader among suppliers of operating systems as well as in-circuit debugging (JTAG) and development tools for VxWorks and Linux. Fastwel is a partner of Wind River and provides support to the VxWorks operating system for their computers.

QNX Software Systems has been developing real-time microkernel operating systems for 25 years. FASTWEL delivers support for the QNX operating system for its equipment.

The 3S-Smart Software Solutions company is a developer of an integrated tool set for programming industrial controllers in IEC 61131-3-comapliant languages: CoDeSys (Controller Development System).

FASTWEL extensively uses CoDeSys state-of-the-art technologies for programming high-performance industrial FASTWEL I/O controllers.

International Consortiums

The PC/104 Consortium ((www.pc104.org) is an international organization of manufacturers of PC/104 products that maintains the PC/104 specifications, disseminates PC/104 technology, and promotes the welfare of its members. The Consortium is one of the most active and effective associations in the electronics industry, and as a result of its many activities, PC/104 is accepted as a significant emerging standard in the embedded-computer electronics industry.

PICMG (PCI Industrial Computer Manufacturers Group) is a consortium (www.picmg.org) of over 450 companies who collaboratively develop open specifications for high performance telecommunications and industrial computing applications. PICMG specifications include CompactPCI® for Eurocard, rackmount applications and PCI/ISA for passive backplane, standard format cards.

CiA s the international users' and manufacturers' organization that develops and supports CAN-based higher-layer protocols (CiA, CAN in Automation, www.can-cia.org). All activities are based on CiA members' interest, participation and initiative. CiA representatives actively support international standardization of CAN protocols and represent the members' interest in national and international standardization committees, such as ISO and IEC. CiA members initiate and develop specifications that are then published as CiA standards. These specifications cover physical layer definitions as well as application layer and device profile descriptions. Fastwel was honored to join the association and has become its active participant.

Since 1992 the PCI-SIG Association (www.pcisig.com) develops standards for the usage of PCI buses for connection of peripherals to computers. Computer and peripheral modules with PCI buses are manufactured by FASTWEL and fully conform to the PCI_SIG certifications.

The OPC Foundation www.opcfoundation.org develops open program standards for data exchange among peripheral devices and computers in industrial automation. FASTWEL develops and supports various software products that comply with the OPC specifications.

Fastwel
Creating the Future!

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