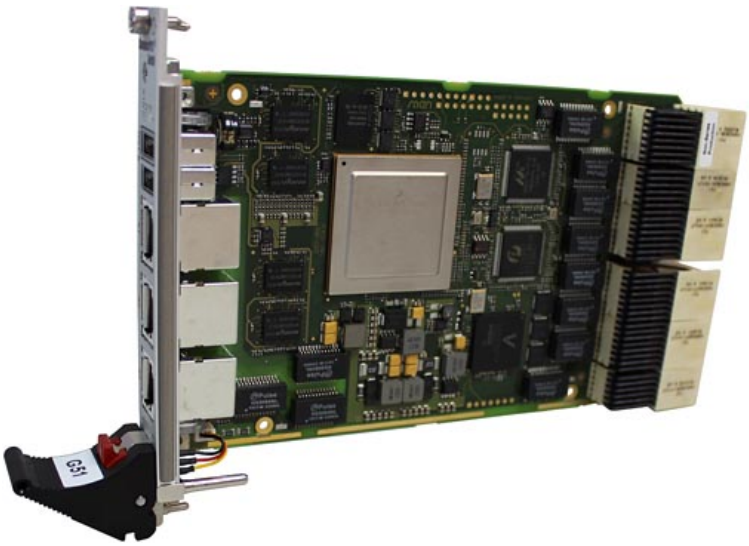
G51 – 3U CompactPCI® Serial QorIQ™ Communications CPU Board

- **Single-board computer with up to 4 Gb Ethernet**
- **P3041 Freescale™ QorIQ™ quad-core PowerPC® processor**
- **4 HP system master and peripheral slot**
- **PICMG CPCI-S.0 CompactPCI® Serial**
- **Up to 8 GB DDR3 SDRAM soldered, ECC**
- **Standard front I/O: 3 Gb Ethernet, 2 USB 2.0**
- **Standard rear I/O: 3 PCIe®, 4 Gb Ethernet, 5 USB 2.0, 2 SATA (3 Gb)**
- **-40 to +85°C with qualified components**
- **Compliant to EN 50155 (railways)**



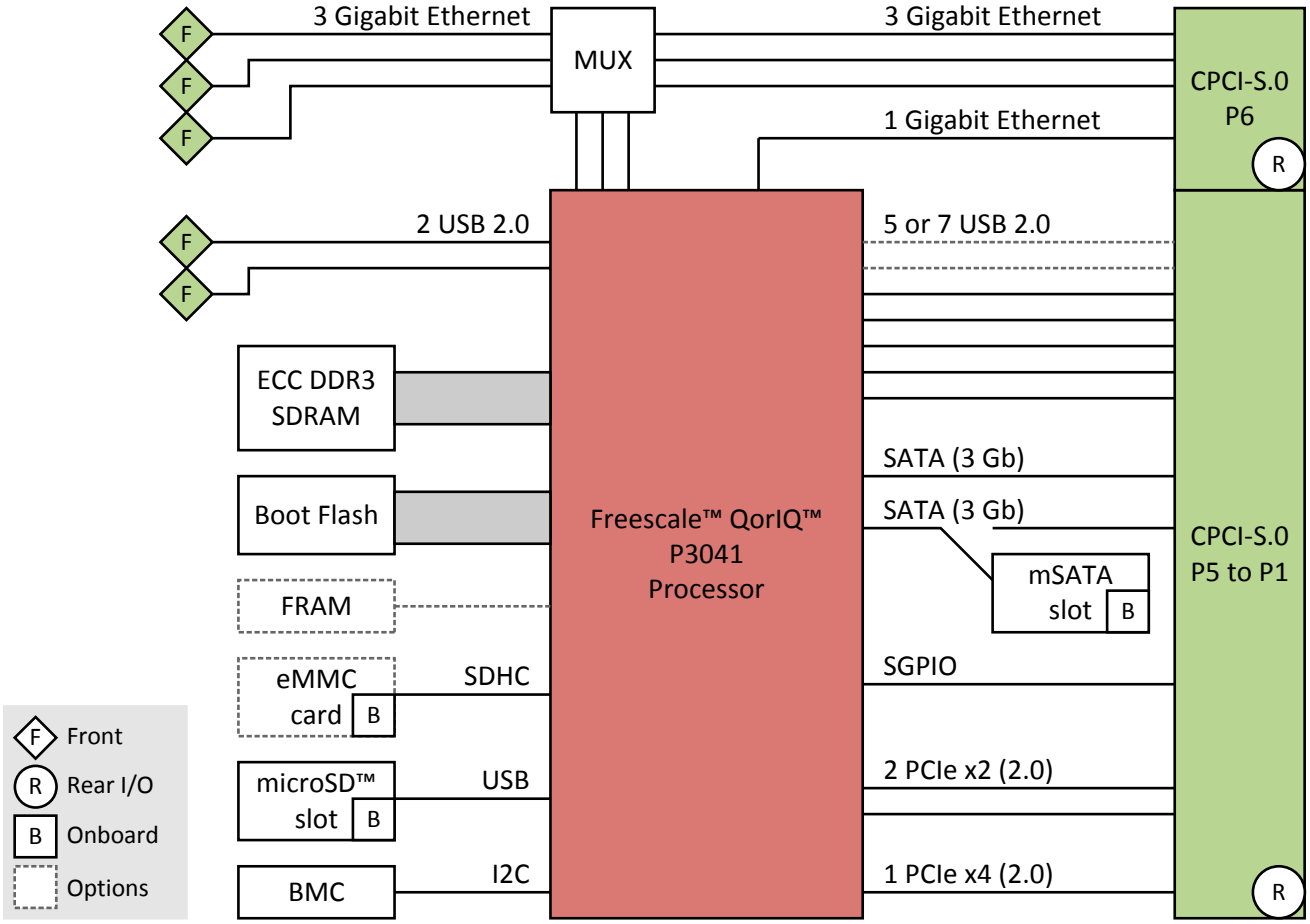
The G51 single-board computer unites the benefits of CompactPCI® Serial and the interface capabilities and calculation power of a QorIQ™ CPU. Being based on a Freescale™ quad-core QorIQ™ P3041 processor, the 3U, 4 HP SBC provides a large number of high-speed serial interfaces both at the front and at the CPCI-S.0 rear connectors.

Three Gigabit Ethernet channels at the front and another standard port at the rear provide solid connectivity. The three front ports can also be routed to the rear, so that a maximum of four Ethernet channels are available on the backplane. This routing option is a standard feature, and can be set in the U-Boot boot loader.
In a similar way, the G51 single-board computer comes with two SATA 2.x channels, where one can either be used for an onboard mSATA disk, or as a second port at the rear - also switchable via U-Boot. SGPIO is available, too.
The G51 comes with five standard rear USB 2.0 ports, and the two standard front interfaces can be led to the rear as a hardware option, for a total of seven backplane channels. Three PCI Express® links (two x2 and one x4) add another important column of CompactPCI® Serial features to the G51's rear I/O.

Its abundant connectivity, flexible configuration options and multi-core computing performance make the G51 a universal off-the-shelf platform for all kinds of communication and processing tasks. Data acquisition, data encryption, simulation and process control systems are only a few examples. Suitable CompactPCI® Serial peripheral cards are available to add specialized functions in a modular system where necessary.

Apart from its connectivity, the card comes with fast DDR3 RAM, a microSD™ card slot, a number of board management functions and Linux BSP support. All components are soldered for protection against shock and vibration and withstand an extended operating temperature of -40°C to +85°C. As an option, the board can be equipped with M12 Ethernet front connectors. The G51 is also ready for coating so that it can be used in humid and dusty environments.
All this makes the G51 a perfect choice for railway, avionics or marine applications, but also for fields like automation or power & energy, where computers face harsh environments.

Diagram


3 Gigabit Ethernet
MUX
3 Gigabit Ethernet
CPCI-S.0
P6
1 Gigabit Ethernet
R
2 USB 2.0
5 or 7 USB 2.0
ECC DDR3
SDRAM
SATA (3 Gb)
Boot Flash
SATA (3 Gb)
Freescale™ QorIQ™
P3041
Processor
CPCI-S.0
P5 to P1
mSATA
slot
B
FRAM
SGPIO
eMMC
card
B
SDHC
2 PCIe x2 (2.0)
microSD™
slot
B
USB
BMC
I2C
1 PCIe x4 (2.0)
R
F
Front
R
Rear I/O
B
Onboard
Options

Technical Data

CPU	■ The following CPU types are available: □ Freescale™ QorIQ™ P3041, quad core, 1.2 GHz, 600 MHz memory bus, with encryption □ Freescale™ QorIQ™ P3041, quad core, 1.2 GHz, 600 MHz memory bus, without encryption □ Freescale™ QorIQ™ P3041, quad core, 1.33 GHz, 667 MHz memory bus, with encryption □ Freescale™ QorIQ™ P3041, quad core, 1.33 GHz, 667 MHz memory bus, without encryption □ Freescale™ QorIQ™ P3041, quad core, 1.5 GHz, 667 MHz memory bus, with encryption □ Freescale™ QorIQ™ P3041, quad core, 1.5 GHz, 667 MHz memory bus, without encryption
Memory	■ System Memory □ Soldered DDR3 □ With or without ECC support □ 2 GB, 4 GB, or 8 GB ■ Boot Flash □ 64 MB, 128 MB or 256 MB ■ FRAM, non-volatile □ 0 KB or 8 KB ■ Please see Ordering Information for available standard versions.
Mass Storage	■ The following mass storage devices can be assembled: □ microSD™ card □ mSATA disk □ eMMC device, soldered; different sizes available
Front Interfaces	■ USB □ Two Series A connectors, USB 2.0 (480 Mbit/s), host/client, or □ No front connectors, for two additional host ports via CPCI-S.0 rear connector ■ Ethernet □ Three RJ45 connectors, 1000BASE-T (1 Gbit/s), or □ Three M12 connectors, 1000BASE-T (1 Gbit/s) □ All front ports can be switched to the rear using U-Boot for a total of four rear channels □ Two link and activity LEDs per channel □ IEEE 1588 support (PTP, Precision Time Protocol) for 3 front/rear ports and 1 additional rear port ■ Front-panel LED for board status ■ Blue front LED for hot plug ■ Reset button
Onboard Interfaces	■ Two onboard user LEDs
Rear Interfaces	■ Compatible with CompactPCI® Serial PICMG CPCI-S.0 Specification ■ SATA □ Two channels, SATA Revision 2.x (3 Gbit/s) (reduces to one port if the link to the mSATA disk is required, can be switched in U-Boot) ■ Serial GPIO (SGPIO) □ One channel, compliant with SFF 8485 specification ■ USB □ Five channels, USB 2.0 (480 Mbit/s), host □ Option: Two additional host ports via CPCI-S.0 rear connector instead of front connections, one of them also usable as a client port ■ Ethernet □ One channel, 1000BASE-T (1 Gbit/s) □ All front ports can be switched to the rear using U-Boot for a total of four rear channels ■ PCI Express® □ Two x2 links (1000 MB/s per link), PCIe® 2.x (5 Gbit/s per lane) □ One x4 link (2 GB/s per link), PCIe® 2.x (5 Gbit/s per lane)

Technical Data

Supervision and Control	■ Board controller ■ Watchdog timer ■ Temperature measurement ■ Real-time clock with supercapacitor or onboard battery backup □ Data retention of supercapacitor: 72 hours ■ Hot-plug capability □ Hot-pluggable when used as a peripheral board
Backplane Standard	■ CompactPCI® Serial PICMG CPCI-S.0 Specification ■ System or peripheral slot
Electrical Specifications	■ Supply voltage: +12 V (-5%/+5%)
Mechanical Specifications	■ Dimensions: 3U, 4 HP
Environmental Specifications	■ Temperature range (operation): □ -40..+85°C (qualified components) □ Airflow: min. 1.5 m/s ■ Temperature range (storage): -40..+85°C ■ Cooling concept □ Air-cooled, or □ Conduction-cooled in MEN CCA frame ■ Relative humidity (operation): max. 95% non-condensing ■ Relative humidity (storage): max. 95% non-condensing ■ Altitude: -300 m to +3000 m ■ Shock: 50 m/s², 30 ms (EN 61373) ■ Vibration (function): 1 m/s², 5 Hz - 150 Hz (EN 61373) ■ Vibration (lifetime): 5.72 m/s², 5 Hz - 150 Hz (EN 61373) ■ Conformal coating on request
Reliability	■ MTBF: 361 403 h @ 40°C according to IEC/TR 62380 (RDF 2000)
Safety	■ Flammability □ UL 94V-0 ■ Electrical Safety □ Insulation measurement test according to EN 50155 (12.2.9.1) □ Voltage withstand test according to EN 50155 (12.2.9.2) □ Information technology equipment test according to EN 60950
EMC Conformity	■ EN 55022, IEC 61000-6-4 (radio disturbance) ■ IEC 61000-4-2 (ESD) ■ IEC 61000-4-3 (electromagnetic field immunity) ■ IEC 61000-4-4 (burst) ■ IEC 61000-4-5 (surge) ■ IEC 61000-4-6 (conducted disturbances)
Software Support	■ Linux (in preparation) ■ For more information on supported operating system versions and drivers see Software.
BIOS	■ U-Boot Universal Boot Loader

Configuration & Options

Standard Configurations

Article No.	CPU Type / Clock	Encryption	System RAM	FRAM	eMMC	USB	Ethernet Conn.	Operating Temperature
02G051-00	P3041, 1.2 GHz	No	2 GB	0 KB	0 GB	2 front, 6 rear	RJ45	-40..+85°C

Ordering Information

Standard G51 Models	**02G051-00**	3U CompactPCI® Serial communications SBC, Freescale™ QorIQ™ P3041, 1.2 GHz, 2 GB RAM with ECC, RJ45 Ethernet at front, -40..+85°C
Memory	**0751-0046**	MicroSD card, 2 GB, -40..+85°C
	0751-0051	SSD mSATA, 8 GB, -40..+85°C
	0751-0052	MicroSD card, 4 GB, -40..+85°C
Systems & Card Cages	**0701-0058**	CompactPCI® Serial 19" 4U/84 HP rack-mount enclosure for 3U cards (vertical), 9-slot backplane, system slot left, full mesh, 460 W ATX PSU 90..264VAC, 1U fan tray with 2x 12 VDC fans, 0..+45°C
	MEN delivers turn-key systems completely installed (hardware, operating system, accessories), wired and tested. Different rack sizes, power supplies and backplanes on request. For details please contact your local sales representative.	

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