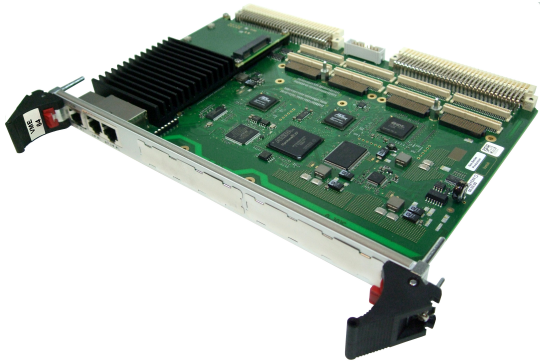
A21C

Embedded Single Board Computer, QorIQ P1xxx, PMC/XMC

6U VME64

- NXP PowerPC QorIQ P1013, 800 MHz
- Up to dual-core P1022, 1.067 GHz
- 64-bit VMEbus master and slave
- Up to 2 GB DDR3 DRAM soldered, ECC
- Up to 64 MB Flash and 128 KB FRAM
- microSD card and mSATA slot
- 2 Gb Ethernet, 1 COM, additional I/O options
- 2 PMC/XMC slots
- U-Boot Universal Boot Loader
- -40°C to +85°C (screened)



The A21C is an NXP (formerly Freescale) QorIQ based single-board computer for embedded industrial applications. The SBC features full VME64 support and can be used as a master or a slave in a VMEbus environment. The A21C provides 1 MB local dual-ported SRAM for slave access and communication between the local CPU and another VMEbus master.

The CPU card comes with a single-core P1013 or dual-core P1022 QorIQ processor with up to 1.067 GHz clock frequency and a serial communication architecture. With two Gigabit Ethernetports and one RS232 COM at the front, and DDR3 SDRAM with ECC, Flash and FRAM, the board offers the crucial basics of an industrial computer. To satisfy your needs for mass storage, you can use microSD cards and mSATA plug-in modules.

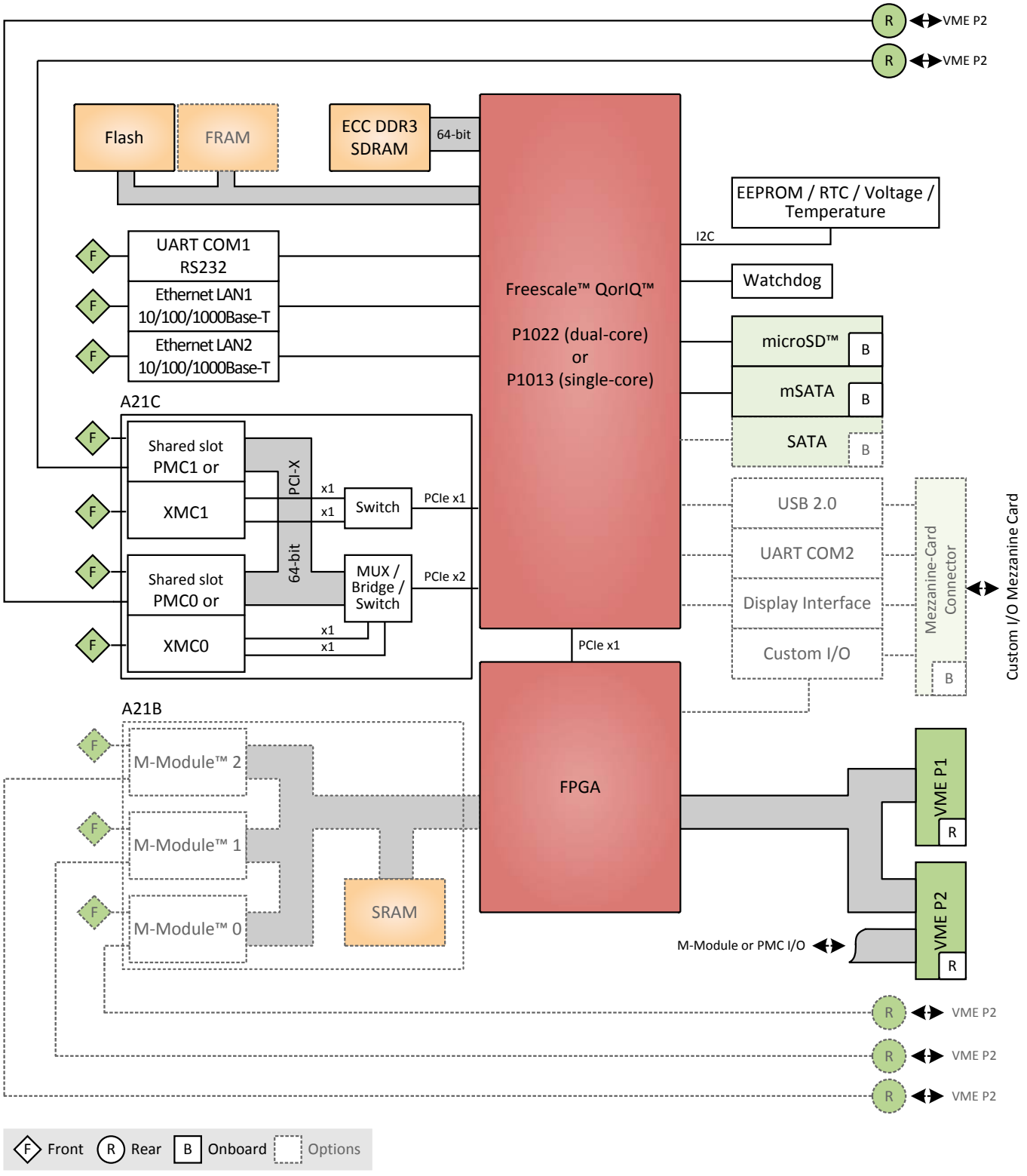
In addition, the A21C can be equipped with up to two XMC or PMC mezzanine cards on shared sites, providing both front I/O (XMC/PMC) and rear I/O (PMC) for functions such as graphics, mass storage, or further Ethernet. The two PMC slots support modules up to 64-bit/133-MHz PCI-X, while the XMC slots are powered by two PCI Express x1 links each. The modular combination of I/O functionality on a single-board computer allows to build up tailored control systems which appear as customized solutions based on standard components.

Its sister card, the A21B, offers three M-Module slots instead of XMC/PMC, which are ideal for process I/O requirements.

Where there's a need for even more or other I/O, the A21C also includes a custom I/O mezzanine card option that reduces the board by one PMC/XMC slot but provides interfaces like USB 2.0, COM or even custom I/O controlled by the onboard FPGA. The mezzanine card is always an entirely customized adapter PCB, including front I/O, and makes the A21C a semi-custom solution. The A21C supports operation in a -40°C to +85°C temperature range, and the board withstands shock and vibration.

The CPU board is supported by the U-Boot Universal Boot Loader, which can be used for bootstrapping operating systems, for hardware testing, or for debugging applications without running any operating system.

Data Sheet


R
VME P2
R
VME P2
Flash
FRAM
ECC DDR3 SDRAM
64-bit
Freescale™ QorIQ™
P1022 (dual-core)
or
P1013 (single-core)
EEPROM / RTC / Voltage / Temperature
I2C
Watchdog
microSD™
B
mSATA
B
SATA
B
USB 2.0
UART COM2
Display Interface
Custom I/O
Mezzanine-Card Connector
B
Custom I/O Mezzanine Card
F
UART COM1
RS232
F
Ethernet LAN1
10/100/1000Base-T
F
Ethernet LAN2
10/100/1000Base-T
A21C
F
Shared slot
PMC1 or
F
XMC1
PCI-X
x1
x1
Switch
PCIe x1
F
Shared slot
PMC0 or
F
XMC0
64-bit
MUX / Bridge / Switch
PCIe x2
x1
x1
PCIe x1
A21B
F
M-Module™ 2
F
M-Module™ 1
F
M-Module™ 0
SRAM
FPGA
VME P1
R
VME P2
R
M-Module or PMC I/O
R
VME P2
R
VME P2
R
VME P2
F Front
R Rear
B Onboard
Options

Diagram

CPU

- The following CPU types are supported:
  - NXP QorIQ P1022, dual core, 600 MHz
  - NXP QorIQ P1022, dual core, 800 MHz
  - NXP QorIQ P1022, dual core, 1.067 GHz
  - NXP QorIQ P1013, single core, 600 MHz
  - NXP QorIQ P1013, single core, 800 MHz
  - NXP QorIQ P1013, single core, 1.067 GHz

Memory

- System Memory
  - Soldered DDR3 with ECC support
  - 1 GB or 2 GB
- Boot/Program Flash
  - 32 MB or 64 MB
- FRAM, non-volatile
  - 0 KB or 128 KB

Mass Storage

- The following mass storage devices can be assembled:
  - One microSD card
  - One mSATA disk
  - Option: One in-system SATA hard-disk drive

Front Interfaces

- Ethernet
  - Two RJ45 connectors, 1000BASE-T (1 Gbit/s)
  - Two link and activity LEDs per channel
- UART (COM1)
  - One RJ45 connector, RS232 interface, up to 230.4 kbit/s
- Reset button
- Status LEDs
- PMC / XMC front I/O if populated

Onboard Interfaces

- XMC
  - Two XMC slots compliant with XMC standard VITA 42.3-2006
  - Two x1 PCI Express links for slot 0, data rate 250 MB/s per link in each direction (2.5 Gbit/s per lane)
  - Two x1 PCI Express links for slot 1, data rate 125 MB/s per link in each direction (1.25 Gbit/s per lane)
  - PCIe 1.0a support (PCI Express Base Specification)
- PMC
  - Two PMC slots compliant with PMC standard IEEE 1386.1
  - PCI / PCI-X 32/64 bits, 33/66/133 MHz, 3.3 V V(I/O)
  - PMC I/O module (PIM) support through J4 for both slots
- SATA
  - Option: One channel, SATA Revision 2.x (3 Gbit/s)
- Various I/O possible using onboard mezzanine card
  - Partly fixed set of interfaces, plus 16 pins for custom I/O
  - One USB 2.0 port, EHCI implementation
  - Additional UART COM interface
  - Display interface
  - Custom I/O functions can be implemented as FPGA IP cores (16 pins usable)
  - Occupies the space of PMC/XMC slot 1
  - Please note that the custom I/O mezzanine card is always completely customized, including front I/O, no standard cards are available.

Rear Interfaces

- XMC
  - Signals from XMC modules 0 and 1
- PMC
  - Signals from PMC modules 0 and 1

Supervision and Control

- Real-time clock
  - Buffered by a supercapacitor, or
  - Buffered by a battery using an onboard battery holder (may be in mechanical conflict with PMC/XMC slot 0)
- Watchdog
- Voltage monitor and temperature sensor

Backplane Standard

- VMEbus, compliant with VME64 Specification
- Slot-1 function with auto-detection
- Master
  - D08(EO):D16:D32:D64:A16:A24:A32:ADO:BLT:RMW
- Slave
  - D08(EO):D16:D32:D64:A16:A24:A32:BLT:RMW
- 1 MB shared fast SRAM
- DMA
- Mailbox functionality
- Interrupter D08(O):I(7-1):ROAK
- Interrupt handler D08(O):IH(7-1)
- Single level 3 fair requester
- Single level 3 arbiter
- Bus timer
- Location Monitor

Electrical Specifications

- Supply voltages
  - +5 V (-3%/+5%)
  - +3.3 V (-3%/+5%)
  - ±12 V (-5%/+5%), only provided for mezzanines that need 12 V
- Power consumption
  - +5 V: 1.3 A typ.
  - +3.3 V: 1 A typ.

Mechanical Specifications

- Dimensions: 6U, 4 HP
- Weight (without mezzanines): 412 g

Environmental Specifications

- Temperature range (operation):
  - -40..+85°C (screened)
  - Airflow: min. 1.0 m/s
- Temperature range (storage): -40..+85°C
- 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): 7.9 m/s², 5 Hz - 150 Hz (EN 61373)
- Conformal coating on request

Reliability

- MTBF
  - 286 910 h @ 40°C according to IEC/TR 62380 (RDF 2000) (model 01A021C00)

Safety

- Flammability (PCBs)
  - UL 94 V-0

EMC

- EN 55022 (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
- VxWorks
- For more information on supported operating system versions and drivers see Software.

BIOS

- U-Boot Universal Boot Loader

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