

A21B – 6U VMEbus QorIQ™ P1013/P1022 CPU (M-Modules)

- **Freescall™ 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**
- **3 M-Module slots**
- **U-Boot Universal Boot Loader**
- **-40 to +85°C screened**



The A21B is a Freescall™ 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 A21B 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 Ethernet ports 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 A21B can be equipped with up to three M-Module mezzanine cards supporting both front I/O and rear I/O. M-Modules are ideal for real-world I/O

like analog/binary process and instrumentation input/output. 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.

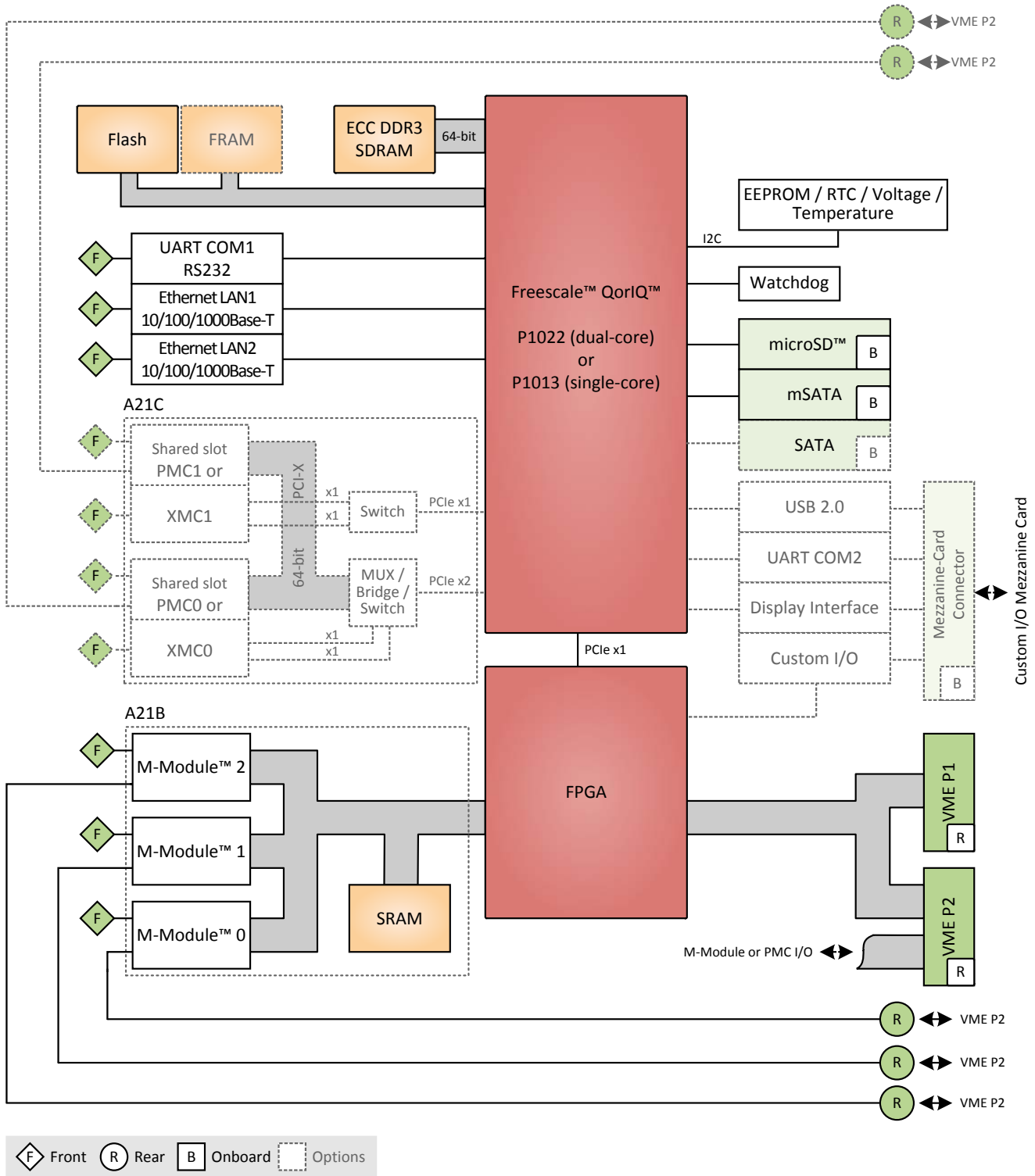
Its sister card, the [A21C](#), offers two PMC/XMC slots instead of M-Modules, for different I/O requirements.

Where there's a need for even more or other I/O, the A21B also includes a custom mezzanine-card option that reduces the board by one M-Module 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 A21B a semi-custom solution.

The A21B 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.

Diagram



Technical Data

CPU	<ul style="list-style-type: none">■ The following CPU types are available:<ul style="list-style-type: none">□ Freescale™ QorIQ™ P1022, dual core, 600 MHz memory bus□ Freescale™ QorIQ™ P1022, dual core, 800 MHz memory bus□ Freescale™ QorIQ™ P1022, dual core, 1.067 GHz memory bus□ Freescale™ QorIQ™ P1013, single core, 600 MHz memory bus□ Freescale™ QorIQ™ P1013, single core, 800 MHz memory bus□ Freescale™ QorIQ™ P1013, single core, 1.067 GHz memory bus
Memory	<ul style="list-style-type: none">■ System Memory<ul style="list-style-type: none">□ Soldered DDR3 with ECC support□ 1 GB or 2 GB■ Boot/Program Flash<ul style="list-style-type: none">□ 32 MB or 64 MB■ FRAM, non-volatile<ul style="list-style-type: none">□ 0 KB or 128 KB
Mass Storage	<ul style="list-style-type: none">■ The following mass storage devices can be assembled:<ul style="list-style-type: none">□ One microSD™ card□ One mSATA disk□ Option: One in-system SATA hard-disk drive
Front Interfaces	<ul style="list-style-type: none">■ Ethernet<ul style="list-style-type: none">□ Two RJ45 connectors, 1000BASE-T (1 Gbit/s)□ Two link and activity LEDs per channel■ UART (COM1)<ul style="list-style-type: none">□ One RJ45 connector, RS232 interface, up to 230.4 kbit/s■ Reset button■ Status LEDs■ M-Module front I/O if populated
Onboard Interfaces	<ul style="list-style-type: none">■ M-Modules<ul style="list-style-type: none">□ Three slots compliant with M-Module standard□ Characteristics: A08, A24, D16, D32, INTA, INTC, TRIGI, TRIGO■ SATA<ul style="list-style-type: none">□ Option: One channel, SATA Revision 2.x (3 Gbit/s)■ Various I/O possible using onboard mezzanine card<ul style="list-style-type: none">□ 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 M-Module slot 3□ Please note that the custom I/O mezzanine card is always completely customized, including front I/O, no standard cards are available.
Rear Interfaces	<ul style="list-style-type: none">■ M-Module<ul style="list-style-type: none">□ Signals from M-Modules 0, 1 and 2
Supervision and Control	<ul style="list-style-type: none">■ Real-time clock<ul style="list-style-type: none">□ Buffered by a supercapacitor, or□ Buffered by a battery using an onboard battery holder (may be in mechanical conflict with M-Module slot 0)■ Watchdog■ Voltage monitor and temperature sensor

Technical Data

Backplane Standard	<ul style="list-style-type: none"> ■ VMEbus, compliant with VME64 Specification ■ Slot-1 function with auto-detection ■ Master <ul style="list-style-type: none"> □ D08(E0):D16:D32:D64:A16:A24:A32:ADO:BLT:RMW ■ Slave <ul style="list-style-type: none"> □ D08(E0):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	<ul style="list-style-type: none"> ■ Supply voltages <ul style="list-style-type: none"> □ +5 V (-3%/+5%) □ +3.3 V (-3%/+5%) □ ±12 V (-5%/+5%), only provided for mezzanines that need 12 V ■ Power consumption <ul style="list-style-type: none"> □ +5 V: 1.3 A typ. □ +3.3 V: 1 A typ.
Mechanical Specifications	<ul style="list-style-type: none"> ■ Dimensions: 6U, 4 HP ■ Weight (without mezzanines): 428 g
Environmental Specifications	<ul style="list-style-type: none"> ■ Temperature range (operation): <ul style="list-style-type: none"> □ -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	<ul style="list-style-type: none"> ■ MTBF <ul style="list-style-type: none"> □ 346 417 h @ 40°C according to IEC/TR 62380 (RDF 2000) (model 01A021B00)
Safety	<ul style="list-style-type: none"> ■ Flammability <ul style="list-style-type: none"> □ UL 94V-0
EMC	<ul style="list-style-type: none"> ■ 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	<ul style="list-style-type: none"> ■ Linux ■ VxWorks® ■ OS-9® (on request) ■ QNX® (on request) ■ For more information on supported operating system versions and drivers see Software.
BIOS	<ul style="list-style-type: none"> ■ U-Boot Universal Boot Loader

Configuration & Options

Standard Configurations

Article No.	CPU Type and Clock	System RAM	Flash	FRAM	SATA	Mezzanine Slots	Operating Temperature
01A021B00	P1013 single-core, 800 MHz	1 GB	32 MB	128 KB	Only mSATA	3 M-Modules	-40..+85°C
01A021C00	P1013 single-core, 800 MHz	1 GB	32 MB	128 KB	Only mSATA	2 PMC/XMC	-40..+85°C

Ordering Information

Standard A21B Models	01A021B00	A21B, Freescale™ QorIQ™ single-core P1013, 800 MHz, 1 GB DDR3 ECC SDRAM, 32 MB Flash, 3 M-Module slots, -40 to +85°C screened
Related Hardware	01A021C00	A21C, Freescale™ QorIQ™ single-core P1013, 800 MHz, 1 GB DDR3 ECC SDRAM, 32 MB Flash, 2 PMC/XMC slots, -40 to +85°C screened
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
Miscellaneous Accessories	05F006-00	RS232 interface cable RJ45 to 9-pin D-Sub (1 COM to 1 COM), 2m
	05M000-17	25 mounting screw sets to fix M-Modules on carrier boards
Software: Linux	This product is designed to work under Linux. See below for potentially available separate software packages from MEN.	
	10A021-90	General Linux BSP for A21B and A21C
	13MD05-90	MDIS5 System (and Device Driver) Package (MEN) for Linux. This software package includes most standard device drivers available from MEN.
	13Z014-90	Linux device driver (MEN) for PCI-to-VME bridge on A12, A13, A14, A15, A17, A19, A20, A21B/A21C and B11
Software: VxWorks®	This product is designed to work under VxWorks®. For details regarding supported/unsupported board functions please refer to the corresponding software data sheets.	
	10A021-60	VxWorks® 6.9 BSP (MEN) for A21B and A21C, SMP
Software: Firmware/BIOS	This product uses the U-Boot bootloader available from DENX together with board-specific additions from MEN.	
	14A021-00	U-Boot Bootloader (DENX/MEN) for A21B and A21C
For operating systems not mentioned here contact MEN sales.		
Documentation	Compare Chart 6U VMEbus CPU and I/O cards » Download	
	20A021BER	A21B Errata
	20A021-00	A21B/A21C User Manual

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