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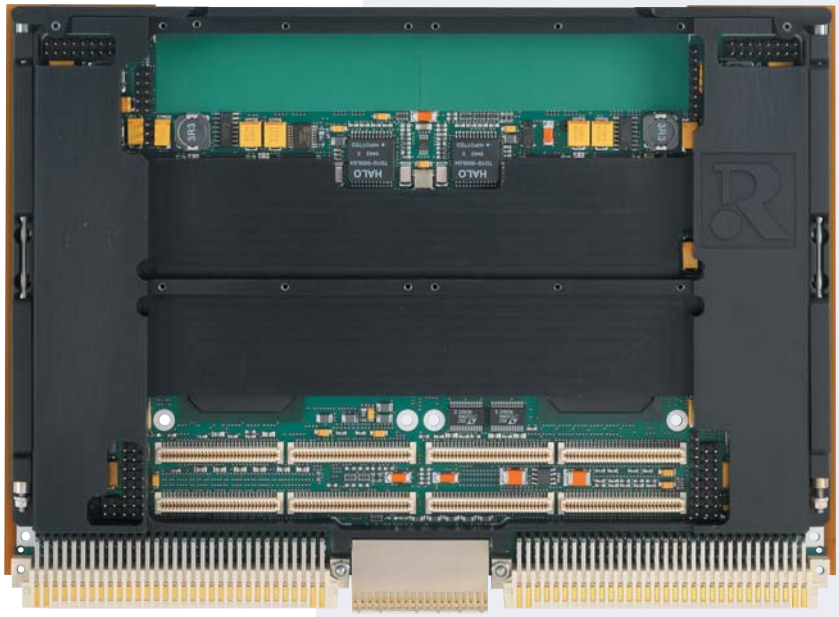
Find the *Abaco Systems / Radstone PPCM2-1G2113* at our website: ***Click HERE***

PPCM2

6U VME Dual PowerPC Processor

XtraPower™ POWER PC PROCESSOR

- High performance 6U VME dual PowerPC processing engine
- Two independent processing nodes
- StarFabric switched fabric support
- Fully rugged - air/conduction-cooled
- Extensive Radstone software support
- Key features:
  - Dual PowerPC 7448
  - Discovery III ISC
  - DDR SDRAM (133 MHz memory bus)
  - Two PMC sites
  - Two StarFabric ports
  - Two Gigabit Ethernet ports, four serial ports, two USB 2.0 ports



* Note: ISC= Integrated System Controller

RADSTONE DIGITAL PROCESSING

The PPCM2 further extends Radstone's XtraPower family of dual processor boards, offering high performance processing and I/O interfaces from two fully independent compute nodes. With enhanced high bandwidth inter-board communications via 2eSST VME and onboard StarFabric, PPCM2 is ideal for a wide range of compute-intensive, real-time applications.

Each compute node features the latest PowerPC 7448 processor and Discovery III Integrated System Controller supporting high capacity DDR SDRAM , Flash memory and NVRAM. In addition each node supports its own dedicated I/O resources including GPIO, Serial and Gigabit Ethernet plus its own PCI-X-capable PMC. Shared resources include further GPIO and USB 2.0 plus 2eSST VME and two StarFabric ports.

The PPCM2's loosely coupled architecture targets demanding real-time applications with each node running separate instances of the chosen operating system. Supported operating systems include VxWorks from Wind River, LynxOS from LynuxWorks and INTEGRITY from Green Hills Software. Mission-critical applications can also benefit from Radstone's comprehensive Deployed Test software for the PPCM2.

Features

Two independent processing nodes consisting of:		
Processor	PowerPC 7448 at 1.4 GHz	The 7448 is Motorola's latest processor in its G4+ family, offering a combination of high frequency, efficient power consumption and 1 MByte of on-chip L2 cache SBC typical power consumption when fitted with 7448 and 256 MBytes SDRAM per node
System Controller	Marvell 'Discovery III'	The Marvell Discovery III Integrated System Controller (ISC) combines a high bandwidth memory controller, two PCI-x interfaces and a range of communications peripherals, all on a single chip
Main Memory	256/512/1024 MBytes DDR SDRAM with ECC	The CPU is interfaced to the main memory via a 64-bit data bus running at 133 MHz. 256 MBytes DDR SDRAM (with ECC supported) is fitted as standard
Flash Memory	128/256/512 MBytes Flash	The CPU is interfaced to the Flash memory via a 32-bit data bus running at 133 MHz. 128 MBytes are fitted as standard, 8 MBytes allocated to Boot Flash. Within the Boot Flash is the BANC area (boot area non-corruptible) which contains a firmware monitor that can still re-boot the board should all other loaded programs be corrupted
Non-volatile RAM	128kB AutoStore NVRAM	NVRAM combines the advantages of SRAM (fast read and write) and EPROM (non-volatility) providing non-volatile storage for data which must not be lost when power is removed. Includes Powerdown Autostore capability
Ethernet Interfaces	10/100/1000 BaseT one port	One Gigabit Ethernet channel is provided from the Discovery III
Serial Ports	RS232/422/485 two ports sync/async	Two serial channels are provided from the Discovery III ISC. Both channels are software selectable to be RS232/422 or 485
Timers	Four 32-bit timer/counters	Four 32-bit wide timer/counters configurable as either a timer or counter, provided from the Discovery III ISC
Watchdog Timer	Programmable 32-bit timers	Watchdog timer provided by the Discovery III ISC
Real-Time Clock	1 sec resolution	The RTC provides TOD/ calendar with 1 sec resolution. 5V Standby must be connected to maintain data during power down (also features alarm interrupts)
Elapsed Time Indicator	Quarter second resolution	The ETI logs the total accumulated time the SBC has been powered, with quarter second resolution, and the number of power cycles
DMA Engines	Six available	Six DMA controllers are available in the Discovery ISC for efficiently moving large blocks of data
PMC Sites	PCI-x capable	Each processing node has a PCI-x capable PMC site on a separate bus ensuring no loss of performance if running a state of the art or legacy PMC
Discrete Digital I/O	6 bits	Further GPIO can be allocated to each node in addition to the 10 shared GPIO bits (see shared resources below)
Shared resources:		
Inter-Node PCI bus	64-bit 66 MHz	Provides a high speed inter-node communication path and access to shared interfaces
VME	Tundra Tsi 148	64-bit VME with 2eSST support. Two programmable DMA controllers
StarFabric	Two channels	2.5 Gbits/sec full-duplex. Provides high speed serial off-board interconnect to other system elements or expansion modules
USB	Two ports	USB 2.0 capable
Discrete Digital I/O	10 bits	Shared between processing nodes. Maximum 16 per node (including the 6 node specific GPIO bits)
JTAG Interface	On-card connector	A JTAG header is accessible for both factory test and software de-bug purposes
Software	Full Radstone software support	Radstone's Deployed Test strategy is fully implemented with a combination of BIT (comprehensive power-up built-in test firmware) and BCS (Background Condition Screening for non-destructive, continuous online testing). Also included in Radstone's COTS software support are BSPs (Board Support Packages) and ESPs (Enhanced Support Packages) for WindRiver's VxWorks, Green Hills Software's INTEGRITY and LynuxWorks' LynxOS. BCS is delivered as part of the ESP

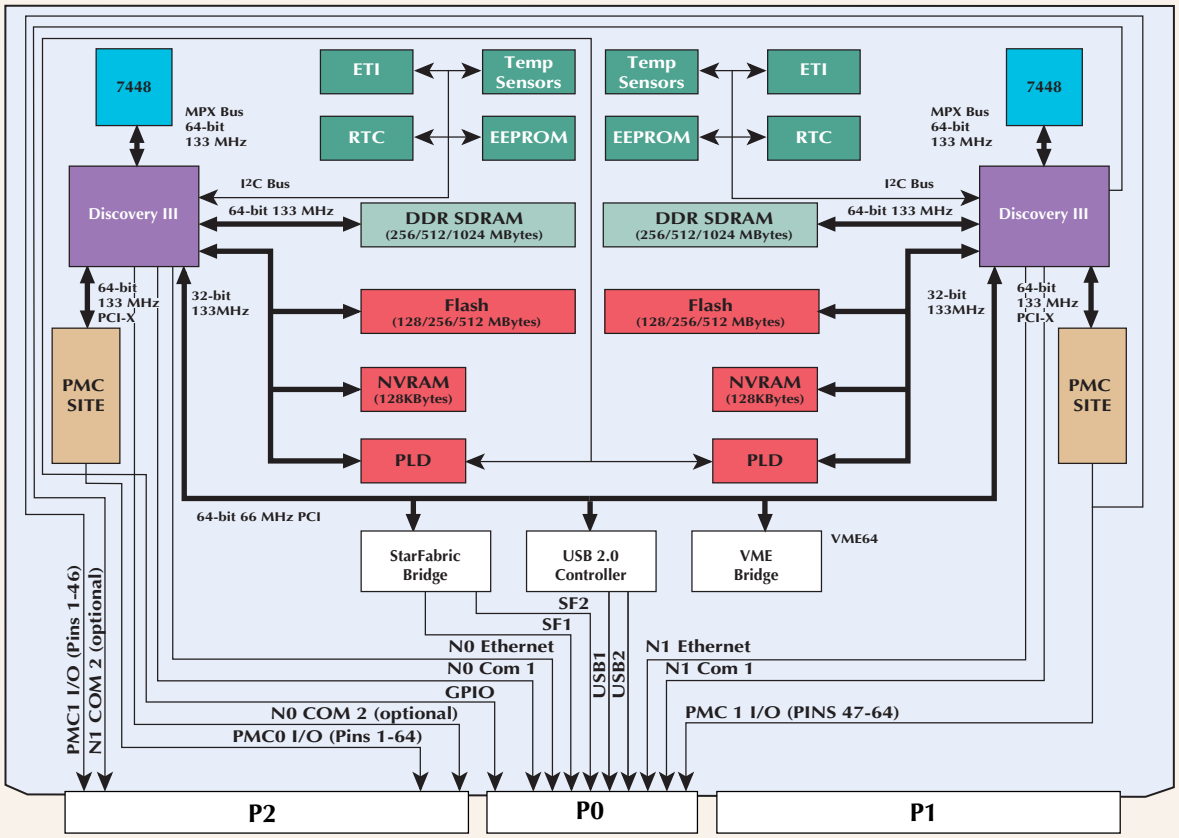


Figure 1: PPCM2 Functional Block Diagram

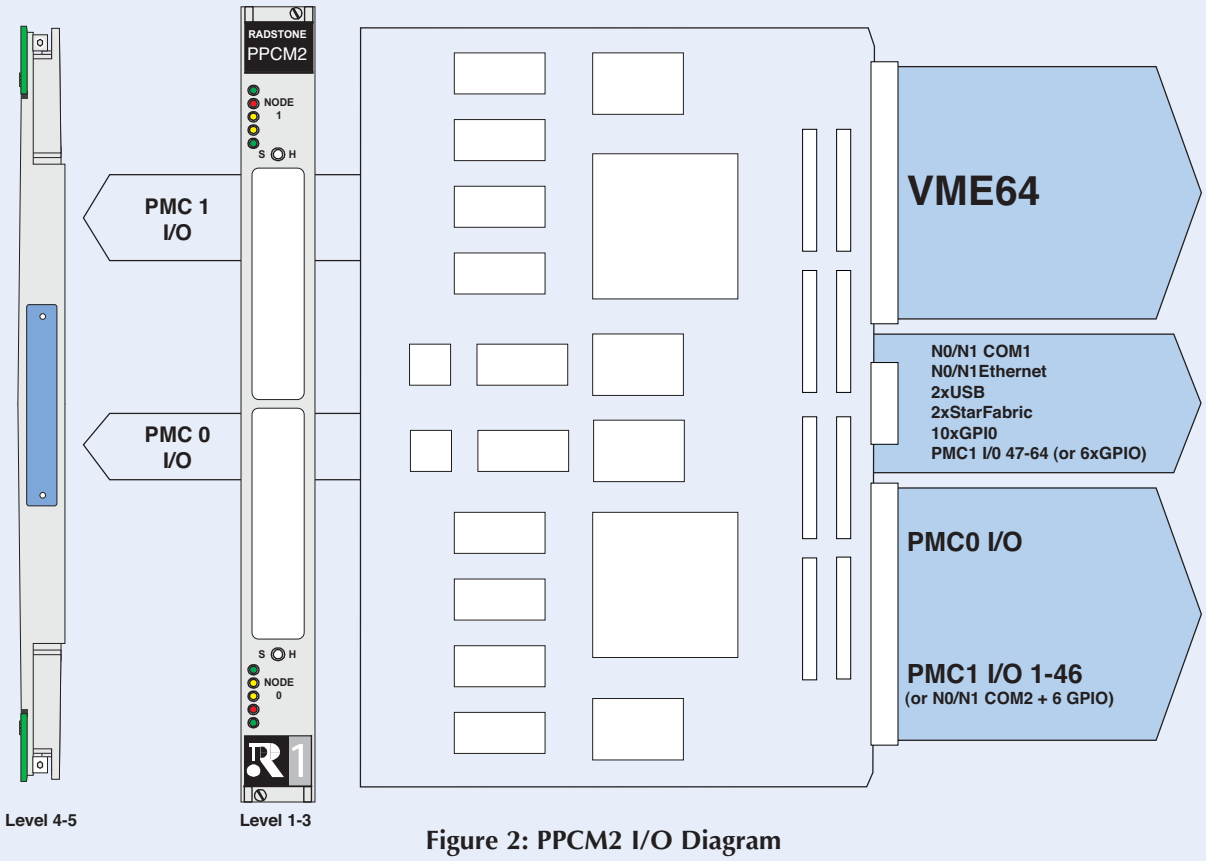


Figure 2: PPCM2 I/O Diagram

Operating System Support

A number of mission-critical, real-time operating systems are supported on the PPCM2. Board Support Packages for each are pre-configured to bring up a kernel per node and manage all resources appropriately.

WIND RIVER

VxWorks is a highly scalable and deterministic real-time system. It provides distributed backplane and networking support, and commands a large base of third-party product. Wind River's new VxWorks 6.x includes full MMU support, task protection and enhanced error management, yet is also backwards-compatible with previous VxWorks versions. The latter form the most widely adopted real-time operating system (RTOS) in the embedded industry. VxWorks 6.x is delivered with the Workbench IDE, the leading development suite for Device Software Optimization (DSO). Radstone provides a Board Support Package and Enhanced Support Package for the PPCM2.

INTEGRITY

INTEGRITY is a maximum reliability, royalty-free real-time operating system. Support for Radstone single board computers, including the PPCM2, is available direct from Radstone's technology partner, Green Hills Software Inc. The royalty-free INTEGRITY RTOS uses hardware memory protection to isolate and protect itself, and user tasks, from incorrect operation caused by accidental errors or malicious tampering. Its object-oriented design allows strict access control and verification of the security and integrity of data, communications, individual components, and the system as a whole.

LYNUXWORKS™

LynxOS is a hard, real-time Unix system with full memory management support. LynxOS conforms to full POSIX standards and features Linux binary compatibility at 4.0 and above. In addition to a Board Support Package as defined by LynuxWorks, Radstone provides an Enhanced Support Package for the PPCM2, with extra hardware related support. Key features include determinism; complete MMU-based protected address spaces for tasks; Linux application binary interface (ABI) personality; Linux binaries run unchanged on LynxOS v4.0; and comprehensive POSIX API conformance 1003.1, .1b & .1c. LynxOS 4.0 also exhibits true linear scalability.

Deployed Test Software

The PPCM2 features the most effective deployed test strategy in the industry, highly adapted to the characteristics of modern COTS silicon and COTS operating systems. This strategy is implemented through Radstone's built-in test (BIT) and Background Condition Screening (BCS) components.

Built-in test (BIT)

BIT provides an initialization test for all onboard functional areas of the PPCM2. Highest possible coverage, 95%, is achieved by the use of intrusive testing, with BIT assuming exclusive use of device resources. BIT executes before any COTS operating system, and passes control to the operating system upon completion. Testing in conjunction with a COTS operating system is accomplished by BCS (see below).

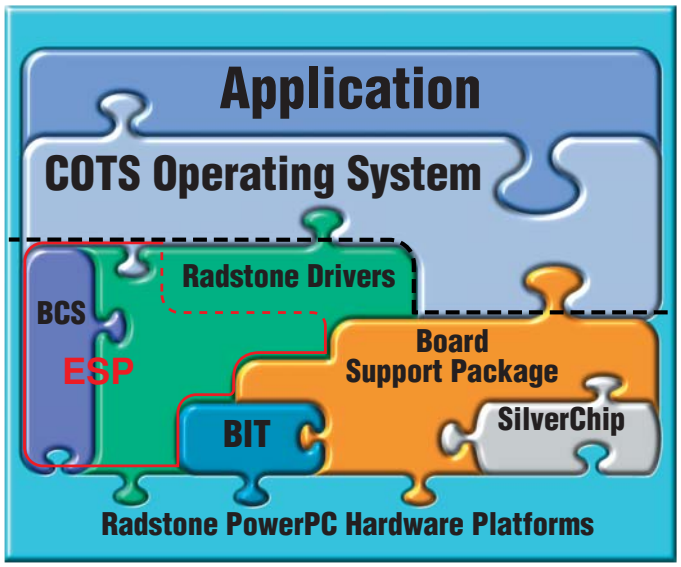


Figure 3: Software Support Model

BIT is a highly configurable component, with options for individual tests and sub-tests. System-wide coverage to Radstone PMCs or other Radstone VME boards is supported. Custom tests for bespoke equipment can readily be added.

Test results are stored in Flash memory for later analysis by the application, in addition to visual indication. Radstone BIT features 'Fast Start', whereby if BIT detects a state change of a particular backplane pin, it skips all tests. The

backplane pin is usually connected to an electromechanical 'brown-out' detector.

For more information on Radstone's coverage methodology, please request the brochure *BIT Coverage – a Straightforward Guide*.

Background Condition Screening (BCS)

BCS provides continuous, online health monitoring. It runs as a task thread, featuring non-intrusive tests that are specifically designed to be co-operative with the normal functioning of the COTS operating system that is running the application. In addition to having minimal impact on system latency, this method avoids a difficulty that arises when 'calling back' into a traditional, stand-alone test firmware, written in ignorance of the operating system and probably assuming exclusive use of board resources. Such firmwares may not guarantee the restoration of the entire and complex machine state as the operating system left it. BCS works primarily through operating system mechanisms and does not compromise the machine state imposed by the operating system.

Radstone's BCS for VxWorks is downloadable or can be linked to the VxWorks operating system executable image. It can be launched from the VxWorks shell or from an application. Configuration can be static, via Workbench Project Tools, or dynamic via an interactive menu. A BCS version for LynxOS is under development.

Configurable parameters include the BCS task priority together with various test options and other characteristics. An error log is stored in Flash memory, in addition to visual indication of a detected failure. An application interface is provided for immediate invocation of individual tests in addition to the default running of tests in background mode.

Ruggedization Levels

PPCM2 is available in Radstone's five environmental ruggedization levels (see Table 1). Air-cooled variants are designed to be used in standard industrial VME chassis. Conduction-cooled builds are for use in Radstone or third-party ATR-style enclosures. Radstone uses advanced thermal and mechanical design in the printed circuit board, metal work and assembly process in order to build in the required levels of ruggedness. Ruggedization Level 2 and higher circuit card assemblies include conformal coating as standard.

Ruggedization Level	**1**	**2**	**3**	**4**	**5**
Cooling Method	Air			Conduction	
Conformal Coating	Optional	Standard	Standard	Standard	
Low Pressure Operational	15,000 ft	15,000 ft	15,000 ft	70,000 ft	
Low Pressure Storage	50,000 ft	50,000 ft	50,000 ft	70,000 ft	
Rapid Decompression	-	-	0-50,000 ft	0-70,000 ft	
High Temp Operational	55°C@ 300 ft/min	65°C@ 300 ft/min	75°C@ 600 ft/min	75°C	85°C
				At card edge	
Low Temp Operational	0°C	-20°C	-40°C	-40°C	
High Temp Storage	100°C	100°C	100°C	100°C	
Low Temp Storage	-50°C	-50°C	-50°C	-50°C	
Temperature Shock	10°C/min over Ts	10°C/min over Ts	10°C/min over Ts	10°C/min over Ts	
Humidity	95% non-condensing	95% 10 cycles 240 hrs	95% 10 cycles 240 hrs	95% 10 cycles 240 hrs	
Salt Fog	-	-	5% salt 48 hrs	5% salt 48 hrs	
Acceleration	13.5g	13.5g	13.5g	13.5g	
Vibration Sine	10-500 Hz 2g	10-500 Hz 2g	5-2000 Hz 5g	5-2000 Hz 5g	
Vibration Random	0.002g²Hz from 10-2000 Hz	0.002g²Hz from 10-2000 Hz	0.04g²/Hz with a flat response to 1000 Hz. 6dB/Oct roll off from 1000-2000 Hz	0.1g²/Hz with a flat response to 1000 Hz. 6dB/Oct roll off from 1000-2000 Hz	
Shock	20g peak sawtooth, 11mSec duration	20g peak sawtooth, 11mSec duration	20g peak sawtooth, 11mSec duration, bench handling	20g peak sawtooth, 11mSec duration, bench handling	

Table 1: Ruggedization Levels Table

Standard Ordering Information

Sales Code	Description
PPCM2-1G111x	Dual 1.4 GHz PowerPC 7448, 6U VME SBC, level 1, 256 MBytes DDRSDRAM & 128 MBytes Flash per processing node, two 10/100/1000 BaseT Ethernet ports, up to four RS232/4xx sync/async ports, 22 GPIO, two PMC slots, two USB 2.0 ports, two Star fabric ports
PPCM2-2G111x	Air-cooled level 2 as above with conformal coating
PPCM2-3G111x	Air-cooled level 3 as above with conformal coating
PPCM2-4G111x	Conduction-cooled level 4 as above
PPCM2-5G111x	Conduction-cooled level 5 as above

x=software option

NOTE: The standard ordering information (above) defines the standard build variant. Consult your local Radstone sales office for availability of further build options.

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