Systems By Design

Model 5800

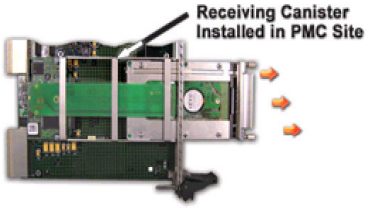
Standard, Extended Temp or Conduction Cooled MPC7448 VME64x VITA 31.1 Single Board Computer

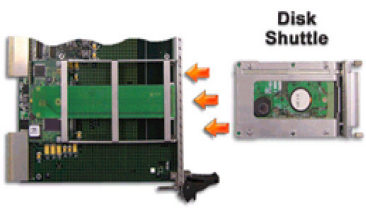
The 5800 is a VME64x processor board based on the Freescale e600 processor. It is designed to provide the highest level of performance and integration available today.

The 2eSST capabilities of the 5800 provide up to a 300MB/s transfer rate across the VMEbus. Backwards compatibility protects existing infrastructure investments. The MPC7448 is a high-performance embedded e600 core. These low power PowerPC processor are ideal for military, industrial automation, and medical imaging applications.

The 5800 can be used in many highly integrated applications such as leading-edge computing, embedded network control and signal processing, etc.

Optional removable rotating or flash storage with our PMC ShuttleStor. Call or visit acttechnico.com for details.





SBC Description

The model 5800 is powered by an MPC7448 PowerPC processor featuring a high frequency super scalar PowerPC core capable of issuing four instructions per clock cycle. The MPC7448 provides 3450MIPS @ 1,5GHz.. The board's 2eSST capabilities provide up to a 300MB/s transfer rate across the VME back plane.

The 5800 runs as a system controller or standard board. Automatic detection can be used with the VME64x backplane. The VMEbus interface is based on a combination of the Tundra Tsi148 VME bridge and the latest generation of Texas Instrument transceivers. This design provides the switching speed required by the 2eSST protocol on all the backplane slots.

The 5800 implements a Discovery™III chipset. This solution provides major enhancements such as: data streaming on MPX bus, read memory latency and cache coherency improvements. The MV64460 adds 2 Mbits of high speed burst SRAM, two XOR DMA (useful for RAID, iSCSI) and four IDMA engines.

The 5800 integrates many communication functions including three Gigabit Ethernet channels and one console port. A USB2 controller combined with a hub function provides three high/full speed ports. A quad UART provides four additional asynchronous channels available on P2. The 64-bit PCI/PCI-X bridge allows the 5800 to control two PMC mezzanine boards. The SATA controller, allows the 5800 to manage several storage devices.

The 5800 can be used with many major RTOS and Linux.

The 5800 can run as a host or peripheral board. The boot software will automatically configure the PCI bridge.

Power Management

With Dynamic Frequency Switching, processor clock speed is regulated dynamically to adjust for thermal information provided by a sensor embedded on the processor die.

5800 can be used with Linux and many major RTOSs.

Key features of the Model 5800

Processor Unit

- MPC7448 running at 1.5 GHz* (1 GHz in CC) with :
  - L1 caches : 32KB Inst. and 32KB Data with parity
  - 1MB of L2 integrated cache with ECC
  - 512MB or 1 GB of SDRAM-DDR with ECC
  - 64MB or 128MB of soldered Mirror Flash
- Up to 1 GB soldered Nand Flash
- 256KB (128-bit wide access) of high speed SRAM
- 32KB of FRAM (non-volatile memory)
- PPC Real Time clock and four 32 bit-timers
- Calendar clock with supercap backup
- Temperature sensor and monitoring
- **(*)** : higher speed available later according to the grade of the board and the MPC7448 availability.

I/O subsystem

- VME64x with 2eSST (Tsi148)
- Two PMC slots with VITA35 routing : one Pn4 (64 IO) on P2 rows A/C, one partial Pn4 on P0
- Marvell Discovery™ III system controller:
- Three Ethernet 10/100/1000TX ports with:

    - Support for Jumbo frames
    - Virtual Cable Tester on line
    - Two routed on rear P0 and one on the front panel
- One serial interface for the front console port
- One USB2 controller with a three ports internal hub
- GPIO on P0
- A four channels SATA controller with two ports on P0 and two ports available through an on-board planar connector

Accessories

- Engineering kit for debug : JTAG/COP, console cable, etc.
- 6U Rear Transition Module providing: two Giga RJ45, USB2, four RS232/422 ports, two SATA connectors and an HD68 connector for the PMC IO.

5800 will be available in standard, extended and conduction-cooled grade

5800 on-board firmware

On-board firmware is a comprehensive set of software stored in flash memory including:

UBoot

Initiated by the reset vector when the board is powered up, UBoot initializes the PowerPC and the Discovery TMIII system controller and performs a comprehensive power-on self-tests (PBIT), before jumping into different applications according to the values stored in memory. If the board acts as a Monarch PMC, the software executes an enumeration step, otherwise it waits for the PCI startup sequence from the host. In stand alone mode the board runs the configured application.
The firmware allows loading files from Ethernet via Bootp, running files in RAM or flashing them. In addition, it allows some monitor functions such as display or modification of the RAM data and enables the user to perform maintenance tests.

Bios

This module allows the user to access the specific 5800 hardware resources via an easy-to-use API. Approximately 60 functions are provided.

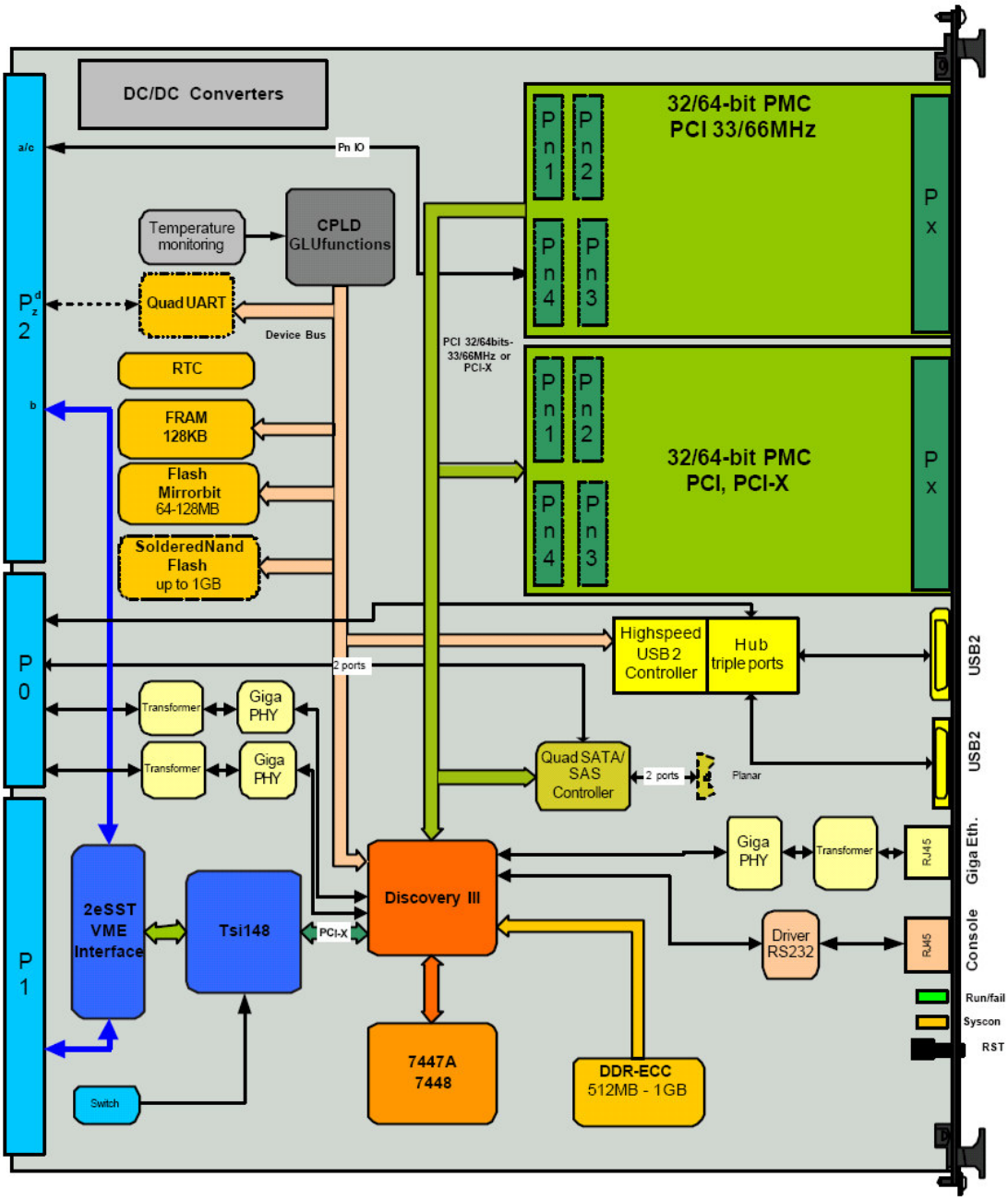
Tools

Tools is a firmware monitor which allows for loading files from Ethernet via Bootp, running files in RAM or flashing them. In addition, it allows the user to display or modify the RAM data and enables the user to perform maintenance tests.

BSP basic

These BSPs products are based on the standard distribution of the OS editor. They control hardware initialization, interrupt handling and generation, hardware clock and timer services, memory management, PCI management, mapping of memory spaces, serial ports, MAC driver for Gigabit and USB2 ports, and disk drivers for SATA/SAS controllers.
ACT/Technico provides and supports BSP for **VxWorks®** from Windriver and **Linux®** operating systems. Other RTOS (LynxOS, Integrity, etc.) can be ported on request.

Block Diagram



Interface Features

VMEbus 64x interface
DTB Master: A16, A24, A32, A64 ; D08-D64, SCT, BLT, MBLT, 2eVME, 2eSST DTB Slave : A16, A24, A32, A64 ; D08-D64, SCT, BLT, MBLT, 2eVME, 2eSST, UAT Arbiter : RR/PRI
Interrupt: handler/generator with IRQ[1..7]
System controller with auto detect

PMC slot :

Signaling: 3.3 and 5V tolerant
PCI, PCI-X 32/64-bit at 33, 66 or 100 MHz
Address/Data: A32/D32
PMC IO routed on a/c rows of P2

P0 connector :

2 Giga Ethernet Compliant with Vita31.1
One USB2
Two SATA/SAS ports
GPIO

Ordering Information

All Extended Grade, Rugged Grade and Conduction Cooled boards below are conformal coated
S= standard grade (0-+55C), X= ext grade (-20-+65C), R = rugged grade (-40 - +75C), cc = cond cooled

Model Number	Description	Temp
5800-S	PowerPC e600 "G4" MPC7448 @ 1000MHz - 512MB-DDR ECC333 - 64MB Mirrorbit Flash xxx MB Nand Flash - 256KB SRAM High speed write - 32KB FRAM Real Time Clock (RTC) with Backup (Super Cap) - T° monitoring 1*RS232 Console port on front panel + 4*asynchronous port through P2 3*Giga Ethernet ports: 1*10/100/1000BT (FB) + 2*10/100/1000BT (RB_P0) VITA 31.1 3*USB2 ports: 1 on front panel + 2 through P0 4*SATA1: 2 through P0 + 2 through on-board planar connector VME 64x 2eSST - 2*PMC site 64 bits PCI or PCI-X compliant	0-+55C
5800-X	PowerPC e600 "G4" MPC7448 @ 1000MHz - 512MB-DDR ECC333 - 64MB Mirrorbit Flash xxx MB Nand Flash - 256KB SRAM High speed write - 32KB FRAM Real Time Clock (RTC) with Backup (Super Cap) - T° monitoring 1*RS232 Console port on front panel + 4*asynchronous port through P2 3*Giga Ethernet ports: 1*10/100/1000BT (FB) + 2*10/100/1000BT (RB_P0) VITA 31.1 3*USB2 ports: 1 on front panel + 2 through P0 4*SATA1: 2 through P0 + 2 through on-board planar connector VME 64x 2eSST - 2*PMC site 64 bits PCI or PCI-X compliant	-20-+65C
5800-CC	Conduction cooled PowerPC e600 "G4" MPC7447A @ 1GHz - 512MB-DDR ECC333 - 64MB Mirrorbit Flash 128MB Nand Flash - 256KB SRAM High speed write - 32KB FRAM Real Time Clock (RTC) with Backup (Super Cap) - T° monitoring 1*RS232 Console port through P0 + 4*asynchronous port through P2 2*10/100/1000BT (RB_P0) VITA 31.1 2*USB2 ports 2 through P0 2*SATA1 through P0 VME 64x 2eSST - 2*PMC site 64 bits PCI Rev.2.2 or PCI-X compliant	-40 to+75C
6800-Eng Kit	Engineering kit + User' s Manual (Hw & Sw) + Console cable	

Model Number	Support required with first time purchases
Hw & Firmware + BSP support	One-year HW, Firmware + BSP support : unlimited access to ACT/Technico technical team for one designated customer contact. Software releases included. Per project.
BSP / VxWorks v5.x / Tornado II	One-time fee, unlimited copies. Per project.
BSP / VxWorks v5.x / Tornado II	One-time fee, unlimited copies. Per project.
BSP / Linux v2.4.x	One-time fee, unlimited copies (per project). CD includes the Linux interface to the board, Linux basic drivers in source for a cross development solution Per project.

Environmental Grade Guide

Criterion	Standard Grade	Extended Grade	Rugged Grade	CC Grade
Coating	Optional	Standard	Standard	Standard
Operating Temp	0 to 55°C	-20 to 65°C	-40 to 75°C	40 to 75°C at the thermal interface
Recommended airflow	1m/s	1.5m/s	2m/s	
Oper. RH% no condensation	5 to 90%	5 to 95%	5 to 95%	5 to 95%
Storage Temp	-45 to 85°C	-45 to 85°C	-45 to 100°C	-45 to 100°C
Sinusoidal Vibration	2G [20..2000]Hz	2G [20..2000]Hz	5G [20..2000]Hz	5G [20..2000]Hz
Random Vibration	0.002g²/Hz [10..2000]Hz	0.002g²/Hz [10..2000]Hz	0.05g²/Hz [10..2000]Hz	0.1g²/Hz (10 to 2000 Hz)
Shock 1/2Sin. 11ms	20G	20G	40G	40G, 1/2Sin. 11ms

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