Platform Manager™ 2

Scalable Hardware Management Controller

Platform Manager 2 devices feature programmable analog with FPGA on a single chip to integrate all hardware management (power, thermal and control plane management) functions in a circuit board. The Platform Manager 2 architecture uses centrally located hardware management algorithm within the FPGA to control distributed hardware management expanders (L-ASC10 ICs) to integrate power, thermal and control plane management functions cost effectively from simple to complex boards.

The Platform Designer™ tool integrated in Lattice Diamond® software provides a single design environment to integrate a circuit board’s hardware management using LogiBuilder (GUI-based logic entry), Verilog or VHDL. The correct-by-construction (automatic selection, customization and wiring of IPs for a given design) design methodology enables seamless scaling of analog channels, Digital I/Os and FPGA LUTs to optimally meet specific hardware management requirements of a given board.

Power management functions include monitoring, supply sequencing, fault log, voltage scaling/VID control, trimming and margining functions. Thermal management includes temperature monitoring, fan speed control, power control and fault log. The control plane management includes reset distribution, I²C/SPI port expansion, level translation, system interface, fault logging, and other glue logic.

Key Features and Benefits

- **Optimized Hardware Management through Scalability**
  - 10 to 80 precision voltage monitor channels
  - 3 to 24 temperature monitoring channels
  - 60 to 384 I/Os and 640 to 9400 LUTs density

- **Precision Voltage Monitoring Increases Reliability**
  - Programmable threshold from 0.67V to 5.7V & 4.5V to 13.2V
  - Differential input sensing
  - Over/under voltage detection with window comparison
  - 10-bit voltage measurement ADC

- **Temperature Monitoring Simplifies Thermal Management**
  - Measures temperature using external diode
  - Over/under temperature detection
  - Temperature measurement range -60 to +150°C

- **High-side Current Measurement Reduces BOM**
  - Measures current across shunt resistor
  - Differential range 7.5mV to 200mV
  - Common mode voltage up to 13V
  - Programmable gain amplifier for current measurement
  - Fast fault detection (1µs) and over current detection

- **High-Voltage FET Drivers Reduce # POLs Needed**
  - Scalable from 4 to 32 N-channel MOSFET drivers
  - Digitally controlled power supply ramp control
  - Open drain output support

- **Margining and Trimming for Quality Assurance**
  - Scale from 4 to 32 power supplies
  - Digital closed-loop mode of operation
  - Voltage scaling and VID control

- **PLD to Integrate Power, Thermal & Control Plane Functions**
  - Up to 9400 LUTs and up to 384 user I/Os
  - Support for multiple interface standards

- **System Level Support**
  - Single 3.3V or 12V supply operation
  - Industrial temperature range

- **In-System Re-programmability Reduces Risk**
  - On-chip configuration memory
  - JTAG/I²C programming interface and background update
  - Dual-boot recovery
Platform Manager 2 Architecture

Hardware Management Controller

- Power Supply Monitor
- Temperature Monitor
- NV Fault Log
- Digital I/Os
- 10 Voltage Monitors
- 2 Temp Monitors + 1 Internal Temp Mon
- Non Volatile fault Log – Power & Other Board Signals
- Programming Interface: JTAG, PC
- 1200 LUTs
- 4 Voltage Monitors

Supply Trimming Control

- DAC
- 10 bit ADC
- 4 Trimming, Margining, VID, Voltage Scaling Channels

High Voltage MOSFET Drivers

- 4 HV Open-Drain MOSFET Drivers
- 4 Trimming, Margining, Channels

Analog Sense and Control (L-ASC10)

Hardware Management Expander

- Power Supply Monitor
- Temperature Monitor
- High Voltage MOSFET Drivers
- NV Fault Log
- Digital I/Os
- 10 Voltage Monitors
- 2 Current Monitors + 1 Internal Temp Mon
- 4 HV Open-Drain MOSFET Drivers
- Programming Interface: PC
- Connects ASC to Platform Manager 2 or MachXO2 IC
- Non Volatile Fault Log-Power & Other Board Signals
- 9 Open-Drain Outputs

Hardware Management Using
Platform Manager 2

- Platform Manager 2 Device
- Hardware Management Controller
- Low # Supplies, Low I/Os
- Analog Sense & Control
- ASC: Hardware Management Expanders

Hardware Management Using MachXO2/XO3 + L-ASC10

- MachXO2/XO3 640 to 9400 LUTs
- 21 to 334 I/Os
- ASC: Hardware Management Expanders
- Hardware Management Controller
- High # Supplies, High I/Os
Hardware Management With Platform Manager 2

Advantages
- Increased Reliability
- Smaller Board Space
- Reduced Number of Components
- Reduced Risk of Board Re-spin
- Reduced Time-to-market
- Standard Solution Across a Wide Range of Applications
- Single Design Environment with End-to-end Simulation
Platform Designer
Unified, Flexible, Verifiable Design Methodology

Development Tools
Development Boards + Debug Aid Software

Platform Manager 2
Flexibly Design Methodology

Analog Circuit/GUI
Verilog/VHDL
C/Assembly for Micro

3 Design Environments

- Supply Sequencing
- Voltage Monitoring
- Temperature Monitoring
- Reset Distribution
- Port Expansion
- JTAG Management
- Level Translation
- System Interface
- System Monitor
- Power Control
- Fan Control
- Fault Log

Platform Designer included in

Platform Manager 2 Evaluation Board
Platform Designer

GUI and/or VHDL/Verilog

- Evaluation Board: Test User Code, Expand System
- Debug User Hardware Using Debug GUI
- Extended Log Hardware Management Events During System Testing

Platform Manager 2 Family

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<th>H/W Management Expander</th>
<th>Hardware Management Controller</th>
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<tbody>
<tr>
<td>L-ASC10</td>
<td>LPTM21</td>
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<tr>
<td>Voltage Monitoring Inputs</td>
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<tr>
<td>Current Monitoring Inputs</td>
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<td>Temperature Monitoring Inputs</td>
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<td>MOSFET Drives</td>
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<td>EBR SRAM (kbits)</td>
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<td>Number of EBR Blocks (9 kbits)</td>
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<td>User Flash Memory (kbits)</td>
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<tr>
<td>Number of PLLs</td>
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Applications Support
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