

# Ensemble 2000 Series LDS2100 Intel Penryn Fabric-Enabled AMC Module

Dual-Core Processing Power and High-Bandwidth Communications

- Scalable processing for both ATCA® and MicroTCA® Ensemble platforms
- Choice of RapidIO®, 10 GigE or PCI Express® switch fabrics



The Ensemble™ 2000 LDS2100 Intel® Penryn Fabric-Enabled AMC Module from Mercury Computer Systems combines dual-core processing power and flexible I/O for AdvancedTCA® (ATCA) and MicroTCA® platforms. The LDS2100 provides an industry-first coupling of Intel dual-core processing to RapidIO®, PCI Express®, or 10 Gigabit Ethernet, allowing system integrators to select from multiple fabric interfaces according to their specific application needs.

The LDS2100 is ideal for multi-nodal signal processing applications for ground-based radar, and data-plane routing in 4G networks.

## Scalable High-Performance Processing

The LDS2100 features a dual-core, 64-bit, 1.8-GHz Intel® Penryn processor supported by an Intel 3100 chipset. It has multiple options for serial data-plane communications and a Gigabit Ethernet control-plane connection. The Penryn processor subsystem

encompasses a 2-GB application NAND flash, 2-GB DDR2 SDRAM with ECC, and dual x4 PCI Express (PCIe) direct interfaces to an onboard Bridge FPGA.

The module is a single-width AMC, either mid-height or full-height, differing only by faceplate. It also includes an IPMI controller and IPMI links for chassis management-based configuration.

## Switch-Fabric Choices

The LDS2100's Bridge FPGA can connect the PCIe Port A of the 3100 chipset to Ports 4-7 and 8-11 of the AMC connector, carrying either serial RapidIO or 10 Gigabit Ethernet. A configuration alternative is to depopulate the Bridge FPGA and connect the two x4 PCIe ports of the 3100 directly to the fat-pipe ports of the AMC connector.

## AMC Reliability and Configurability

An onboard Module Management Controller (MMC) monitors board temperatures and all power-supply voltages and currents, reporting any irregularities to an IPMI Controller on a carrier card or a MicroTCA carrier hub (MCH). This automatic monitoring of system health contributes to overall system reliability. The MMC is also responsible for controlling the front-panel LED indicators.

The LDS2100 can be replaced without a system shutdown (hot-swapped) for maximum system configurability.

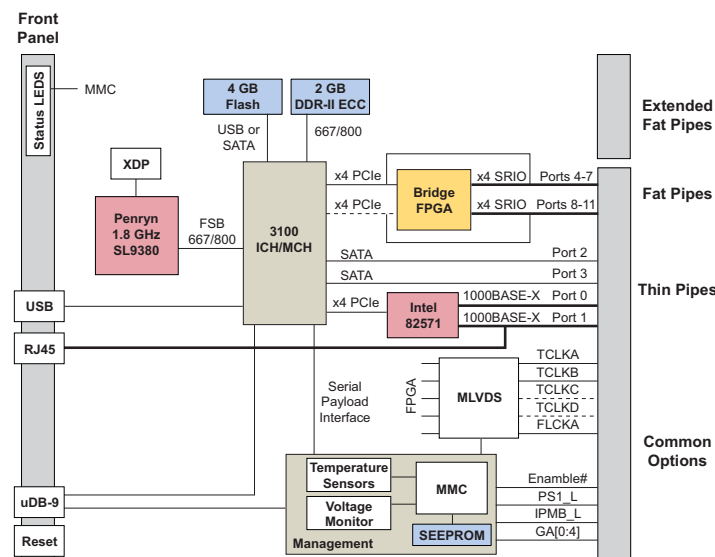


Figure 1. LDS2100 Module functional block diagram

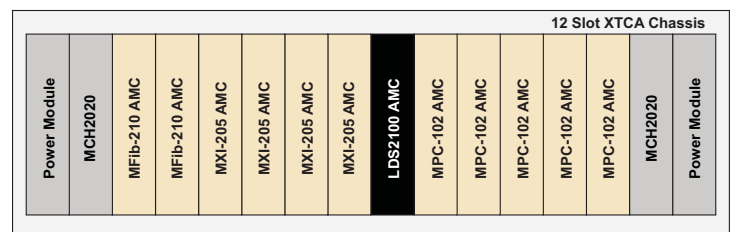


Figure 2. The LDS2100 fits in a variety of system configurations

## Ensemble xTCA Platform

The LDS2100 contributes Penryn cost-effective, high-performance, dual-core processing capabilities to the Ensemble xTCA Platform. The Ensemble xTCA Platform is a standards-based solution built around the power, functionality, and scalability of RapidIO®, AdvancedMC®, AdvancedTCA®, and MicroTCA®. The platform supports a variety of I/O sources and heterogeneous processing endpoints, thereby reducing integration costs, improving efficiency, and minimizing risks in design of next-generation applications.

The Ensemble xTCA Platform has many advantages that accelerate application development activities:

- The variety of heterogeneous Ensemble AMCs allows developers to customize solutions with the processing and I/O modules that best fit their application requirements.
- AMCs can be combined with Ensemble carrier boards that provide RapidIO chip-to-chip and multi-chassis connectivity, enabling seamless scaling from a single-sector system to multi-sector, multi-antenna, multi-carrier base-station implementations.
- Ensemble offers developers the flexibility to easily expand specific processing nodes to address application performance bottlenecks. Additional FPGA or DSP modules connected over RapidIO can be used to support specific application requirements.
- The homogeneous RapidIO interconnect among processing nodes enables ease of programming of DSPs, communication processors, and FPGAs.

## Specifications

### Processor

SL9380 low-voltage dual-core Penryn CPU	1.8 GHz
Front side bus	800 MHz

### Memory Controller

Whitmore Lake chipset 3100 (memory controller and I/O controller)	
DDR2 interface	400 MHz
Front side bus	800 MHz
Single/dual x4 PCIe link to Bridge FPGA	
x4 PCIe link to a dual Ethernet controller	
Dual SATA interfaces	

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2320.00E-0909-DS-lds2100

## Memory

NAND flash disk USB 2.0 interface	4 GB
DDR2 x72 bits wide (ECC protected)	2 GB, 800 MHz

## Fabric Options

Dual 4x or single 8x PCIe  
4x serial RapidIO at 10 Gbps

## Bridge FPGA

Xilinx® Virtex™-5 LX50T	
Flash for Bridge IP bitstream storage and loading	128 Mb
x4 SERDES to AMC Ports 4-7	3.125 GHz
Optional support for AMC Ports 8-11	
Backplane connectivity	
4x serial RapidIO	2.5/3.125 Gbps
With available PCIe-to-sRIO bridging IP	
4x PCIe	2.5 Gbps
Optional support for dual x4 or single x8 (factory population option)	
4x 10 Gigabit Ethernet	2.5 Gbps
PCIe-to-10 Gigabit Ethernet bridging IP required	

## IPMI Controller

Renesas® HD64-F2166 micro-controller  
FRU 4-KB serial EPROM  
Two NE1618DS temperature sensors for a total of 4 sensing locations  
Including internal temperatures of 3100 and Penryn ICs  
IPMB-L 2-wire interface to carrier  
Voltage monitoring

## Front-Panel I/O

RJ45 10/100/1000Base-T Ethernet  
USB 2.0 port  
Dual serial ports (accessing 3100 and IPMC)

## Mechanical

Full-height	Width	Depth	Height
	73.81 mm	180.6 mm	28.96 mm
Mid-height	Width	Depth	Height
	73.81 mm	180.6 mm	18.96 mm

Supports AMC B+ bays

## Test and Development

XDP Intel emulator connector  
14-pin JTAG/programming header for IPMI controller  
Full JTAG chain from AMC connector

## Power Consumption

+12V payload power	60W max; 45W typ
+3.3V management power	0.250W max; 0.100W typ

## Software Support

Linux® and Windows® support



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