FEATURES

- SBC with multi-function I/O in a Single 6U VME Slot
- Automatic background BIT (module-dependant)
- VME Bus and/or Dual Gigabit Ethernet Interfaces
- Front and/or Rear I/O Support
- Designed for Commercial and Rugged applications
- Software Support Kit(s) and Driver(s) are available

Processor Options

- Freescale PowerPC MPC8536 @ 1.25 GHz Processor
  - 1 GB SDRAM
  - 256 MB Flash
  - Dual Gigabit Ethernet
  - Serial/USB/SATA/PCIe/SD Support
  - VxWorks 6.x BSP
- Analog Devices (ADI) BF533 @ 500 MHz Processor
  - Extremely Low Power High Performance Processor
  - Windows PC Development – ADI Visual DSP++
  - Ethernet, RS232, USB, I²C, Differential and TTL I/O

DESCRIPTION

The 64DP3 is a single slot, 6U VME, low power/high performance Single Board Computer (SBC) with configurable high density multi-function I/O. Powered by a choice of Freescale’s 1.25 GHz MPC8536 PowerPC (U3) or Analog Devices’ 500 MHz BF533 (U2) processor modules, the 64DP3 offers an extremely low power, cost-conscious SBC solution for today’s demanding space-constrained, resource limited, embedded systems. Two additional high density I/O module slots enable integrators to mix-n-match a variety of I/O and communication functions including Digital I/O (Discrete or TTL), full hand-shaking modem control synchronous/asynchronous RS232/422/485, MIL-STD-1553 or 12-port unmanaged Gigabit Ethernet switch. The 64DP3 is available in air-cooled or conduction-cooled configurations.

The 64DP3 with multi-function I/O and full complement of I/O libraries and drivers is ideally suited for a multitude of commercial and rugged embedded processing and I/O systems. The 64DP3 SBC with Master VME bus capability may be utilized with other NAI high-density multi-function I/O boards to provide a complete, expandable, low power/high performance, programmable solution for sensor and communication data acquisition, management, processing and distribution. All I/O and sensor data is available on the VME Bus or Gigabit Ethernet.

Advantages of using the 64EP3 SBC for board or system-level solutions:

- Process and control of I/O functions without the need of a separate SBC or mission computer
- Direct processing and control of I/O functions via MIL-STD-1553, RS232/422/485, CANBus ARINC 429/575 and/or other functions
- Reduction of raw data to offload main mission computer—enabling performance of customer-specific algorithms such as FFT and digital filtering
- Ability to manage and process control/servo loops without mission computer intervention
## GENERAL BOARD SPECIFICATION

- **Power** – +5VDC
- **Operating Temp** – 0° C to 70° C or -40° C to 85° C
- **Size** – 233mm x 20mm x 160mm (6U)

## PROCESSOR MODULES

<table>
<thead>
<tr>
<th>Processor</th>
<th>Module</th>
<th>Flash</th>
<th>SDRAM</th>
<th>Frequency</th>
<th>Software Support</th>
</tr>
</thead>
<tbody>
<tr>
<td>PowerPC MPC8536</td>
<td>U3</td>
<td>256MB</td>
<td>1GB DDR2</td>
<td>1.25 GHz</td>
<td>Wind River BSP / VxWorks 6.x / Library</td>
</tr>
<tr>
<td>ADI Blackfin® BF533</td>
<td>U2</td>
<td>8MB</td>
<td>512KB</td>
<td>500 MHz</td>
<td>ADI Visual DSP++ / Function Library</td>
</tr>
</tbody>
</table>

## AVAILABLE FUNCTION MODULES

<table>
<thead>
<tr>
<th>Category</th>
<th>Module Designation</th>
<th>Channels</th>
<th>Input Range</th>
<th>Output Range</th>
<th>Programmable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discrete I/O</td>
<td>Module K9(-v4)</td>
<td>48</td>
<td>0 – 60 VDC</td>
<td>0 – 60 VDC</td>
<td>Input or Output</td>
</tr>
<tr>
<td>TTL</td>
<td>Module D6(-2)</td>
<td>48</td>
<td>0 – 5.5 V</td>
<td>Output level</td>
<td>Programmable</td>
</tr>
<tr>
<td>MIL-STD-1553</td>
<td>Module N3(-2)</td>
<td>2</td>
<td>BC,RT, BM, BM/RT</td>
<td>Onboard RAM</td>
<td>Coupled</td>
</tr>
<tr>
<td></td>
<td>Module N4(-2)</td>
<td>2</td>
<td>BC,RT, BM, BM/RT</td>
<td>128Kbyte per ch.</td>
<td>Transformer</td>
</tr>
<tr>
<td>RS-232/422/485</td>
<td>Module P4(-2)</td>
<td>4</td>
<td>Asyn / Sync</td>
<td>8 Mbits/s per ch.</td>
<td>64 KB</td>
</tr>
<tr>
<td></td>
<td>Module P5(-2)</td>
<td>6</td>
<td>Asyn / Sync</td>
<td>4 Mbits/s per ch.</td>
<td>64 KB</td>
</tr>
<tr>
<td>Ethernet Switch</td>
<td>Module H2(-2)</td>
<td>12</td>
<td>Unmanaged</td>
<td>Data rate</td>
<td>Architecture</td>
</tr>
</tbody>
</table>

### Notes:
1. Reserved
2. Contact factory regarding availability
3. May require specific slot designation (refer to operations manual)

### PARTICULARS OF ETHNET OPTIONS:

- **0** = No Ethernet
- **1** = MB Port A to Front Panel Connection
- **2** = MB Port A to Rear P0 Connection
- **3** = MB Port A to Front and MB Port B to P0 Connection (2 ports)
- **4** = MB Port A and Port B to Rear P0 Connection (2 ports)

### DUAL ETHERNET MOTHERBOARD (MB) ONLY

<table>
<thead>
<tr>
<th>Slot #</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slot 1</td>
<td>64DP3 – XX XX XX X X X –XX</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### MECHANICAL

- **F** = Front Panel and Rear I/O (P2 & P0)
- **A** = VME64 Blank Front Panel with Rear I/O I/O (P2 & P0)
- **S** = Front Panel Rear P2 I/O (No P0)
- **R** = VME64 Blank Front Panel with Rear P2 I/O only (No P0)
- **P** = Rear I/O only (P2 & P0)
- **B** = VME64 Front Panel and Rear I/O (P2 & P0)
- **G** = Rear P2 I/O only (No P0)
- **T** = VME64 Front Panel and Rear P2 I/O only (No P0)
- **W** = P with Wedge locks
- **D** = VME64 Blank Front Panel, Low profile extractors with Rear I/O (P2 & P0)

### ENVIRONMENTAL

- **C** = 0 TO 70 °C
- **E** = -40 TO +85 °C
- **H** = E with conformal coating
- **K** = C with conformal coating

### SPECIAL OPTION CODE (or leave blank)
**Processor (Module U2)**  
Blackfin® Processor and General Purpose I/O Resource for User Operational Programs and Control

**Processor:**
The BF533, from the ADI Blackfin family, offers support for overall system processing. The U2 is an extension of the multifunction board architecture which uses Blackfin processors to implement the motherboard, module and signal processing functions. The Blackfin is an ideal choice for this use due to its wide application and availability of third party software and design services.

**FPGA:**
A moderate scale FPGA (Altera Cyclone II family) is added to provide additional flexibility for system functions.

Processor clock rate: 500 MHz  
Flash Memory: 8 MB for program and data storage  
Ferro-Electric RAM: 8 KB for non volatile data storage  
SDRAM: 16 MB for program execution  
SRAM: 512KB for real time cache  
Power: 5V @ 1150 mA (Est. / Typ. Duty cycle)  
Weight: 2 oz. (57g)

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**U2 Processor Description**

Based on the Analog Devices Blackfin® BF-533 DSP processor, users can confidently take advantage of the powerful Analog Devices, Inc. (ADI) Visual DSP++ Development Environment. Boards fitted with the U2 Processor allow users to develop application code in support of their I/O and communication intensive application without the need for a separate Single Board Computer. The U2 coupled with NAI’s extensive I/O function capabilities and software library support offers developers a real time embedded system environment. Additionally, this low power high performance solution can interface directly to the I/O, perform embedded algorithms and communicate directly to system and sub-system computers. Operating system run-time and overhead are reduced due to direct DSP control. Additional core interfaces added to the FPGA allow for a flexible communication interface selection for controlling I/O specific modules. Reference U2 Programmer’s guide for detailed operation documentation.

**User Requirements/Utility Library**
- Analog Devices Visual DSP++ 4.5 (or later version)
- Blackfin Emulator
- NAI I/O and Communications Library support
Processor (Module U3)  

PowerPC Processor and General Purpose I/O Resource for User Operational Programs and Control

Processor: The MPC8536, high-performance member of the PowerQUICC III™ processor family combines a computation-intensive super-scalar Power Architecture™ processor core with high-performance system peripherals and advanced power management techniques. Integrates SATA, USB, multi-lane PCI Express, Gigabit Ethernet, and DDR memory to increase data bandwidths, reduce valuable board real estate, and lower overall power consumption.

Processor Clock Rate: 1.25 GHz  
NAND Flash: 256 MB for data storage  
Ferro-Electric RAM: 8 KB for non-volatile data storage  
SDRAM: 1 GB for program execution  
SPI FLASH: 16 MB for program and data storage  
Power: 5V @ 1650 mA (Est. / Typ. Duty cycle)  
Weight: 2 oz. (57g)

U3 Processor Description

Based on FreeScale™ MPC8536 processor, users can confidently take advantage of the familiar VxWorks RTC environment for developing control and application software. Boards fitted with the U3 Processor allow users to develop application code in support of their I/O and communication intensive application without the need for a separate Single Board Computer. The U3 coupled with NAI’s extensive I/O function capabilities and BSP/library support offers developers a real time embedded system environment. Additionally, this solution can interface directly to the I/O, other cards on the system bus (Bus-Master capability), perform embedded algorithms and communicate directly to system and sub-system computers. Operating system run time and overhead are reduced due to direct processor control.

User Requirements/Utility Library

- VxWorks 6.x Development Environment
- NAI U3 VxWorks 6.x BSP
- NAI I/O and Communications Library support

U3 Processor Module Block Diagram