**KEY FEATURES AND BENEFITS**

- Latest POWER PC Processor MPC8640 / 8640D operating at 1000 MHz
- Integrated L1 cache (32KB of Data cache and 32KB of Instruction cache for each core)
- Integrated 1MB L2 cache with ECC for each core
- Upto 2GB DDR-II SDRAM operating at 200MHz clock rate and at 400MHz data rate with ECC
- PCI Express (PCIe) / Serial Rapid IO (SRIO) / PCI-X based on-board interconnects
- High performance PCIe/SRIO solution for signal processing
- Upto 512MB of user flash
- Upto 256MB of boot flash
- 1 2 8 K B N V S R A M w i t h integrated RTC
- On-board battery backup for RTC (48mAH)
- Upto 16GB NAND memory
- Quad 10/100/1000 BASE-T Gigabit Ethernet (GbE) ports
- Upto 8 serial ports
- Upto 4 Serial ATA (SATA) ports or Narrow /Wide SAS ports
- 2 XMC / PMC slots
- Support for Rugged Personality Module (RPM)
- 4 High speed USB ports
- 8 TTL GPIOs
- Phased power up feature to avoid high inrush current
- Compact rugged design for harsh environments
- Air cooled and conduction cooled versions
- Standard 6U VPX VITA 46.0 form factor (1" Pitch)

**APPLICATIONS**

- Radar signal processing
- Image signal processing
- Airborne payloads
- Artificial Intelligence
- EW / ECM / ECCM
- SEEKERs

**DESCRIPTION**

The DP-VPX-0689 is a 6U VPX based Single Board Computer (SBC) which combines the processor with the serial switched fabric capabilities of the new military aerospace COTS standard, VITA-46.

The MPC8640D (single core / dual core) is an integrated host processor from Freescale, which provides one or two cores running up to 1000MHz, dual DDR-II memory controllers operating at 200MHz clock rate and 400MHz data rate with Error Correcting Code (ECC) memory, x4 SRI0 interface, x8 PCIe interface, 4GbE controllers, dual UARTs and dual 12C channels in a single package.

It has four SRI0 ports to provide 10GB/s full duplex bandwidth which is approximately 10x faster than the currently available VME/Star fabric implementation. The DP-VPX-0689 is ideal for harsh environment, military and commercial applications. This board is available both in air cooled and conduction cooled versions.

It has an Altivec vector processing unit which is ideally suited for single board computer and leading edge computing. The flexible configuration of serial fabrics to the backplane provides a variety of system interconnect requirements. The on-board integral high speed fabric interconnect and PMC/XMC interface enables multi Giga byte data transfer. This board provides rich variety of I/O options which include GbE, RS232/RS422 serial ports, MIL-STD-1553, SCSI, SATA, SAS and GPIOs to facilitate easy connectivity with other system elements.
**Counters/Timers**

- **Watch Dog Timer**
  - Fixed / Programmable / Windowed AVIONICS style watchdog timer per core
  - Software configurable interrupt / board reset or system reset

- **Temperature Sensors**
  - Five numbers of on-board temperature sensors to measure board and processor temperatures
  - One temperature sensor to measure processor die temperature
  - Other temperature sensors were distributed to the hot spots of the board

**Reset Switch**

- Master reset for the board on front and rear I/O

**Status LEDs**

- General Purpose I/Os (GPIO)
  - Can be configured as three 64-bit counter in cascading mode
  - Software configurable interrupt / board reset or system reset
  - Upto 8 GPIO through P6 connector

**Other Temperature Sensors**

- Can be configured as three 64-bit counter in cascading mode
- Software configurable interrupt / board reset or system reset
- Upto 8 GPIO through P6 connector

**Board Dimension (LxB): 233.35mm x 160mm (1” Pitch)**

**Cooling:**

- Air cooled and conduction cooled versions available

**SERIAL I/O**

- 2 RS232 debug ports at rear P4
- 5 RS232 / RS422 configurable ports at P5
- 1 Full modem RS232 port at P5 or front panel

**USB Interface**

- 3 ports of high speed USB interface at P4 and P5
- 1 port of high speed USB interface at front panel or rear P6

**SOFTWARE**

- Software includes BSPs and driver suites for VxWorks, LynxOS, QNX and Linux
- Built In Self Test (BIST), Interprocessor communication Library and Optimized Signal Processing Libraries
**SPECIFICATIONS**

**ENVIRONMENT**: Commercial and Rugged versions

- Operating Temperature: 0°C to 55°C (Commercial)
  -40°C to 71°C (Rugged)

- Storage Temperature: -55°C to 150°C (Commercial)
  -40°C to 85°C (Rugged)

- Humidity: Upto 95% non-condensing (Rugged)

**ORDERING INFORMATION**

- **DP – VPX - 0689 – x x x x x x x x x x x x x**
  
- Other special requirements, contact factory.

- **REAR IO SELECTION**
  - Refer Rear IO table
  - (HEX value represents Rear IO options)

- **INTER CONNECT SELECTION**
  - Refer Inter connect selection table
  - (HEX value represents Rear IO options)

- **NAND FLASH**
  - 0 - No Nand Flash
  - 3 - 4GB
  - 6 - 8GB
  - 9 - 16GB

- **APPLICATION FLASH**
  - 3 - 64MB
  - 6 - 128MB
  - 9 - 256MB

- **BOOT FLASH**
  - 0 - 32MB
  - 3 - 64MB
  - 6 - 128MB
  - 9 - 256MB

- **DDR-II SDRAM**
  - 0 - 1GB
  - 3 - 2GB

- **CPU**
  - 0 - MPC8640
  - 3 - MPC8640D

- **BOARD TYPE**
  - 3 - Air Cooled
  - 6 - Conduction Cooled

- **OPERATING RANGE**
  - 3 - Commercial Temperature
  - 6 - Rugged Wide Temperature
**DP-VPX-0689 INTER CONNECT and REAR IO OPTIONS**

Inter connect and Rear I/O option is represented in binary format. Corresponding HEX value is mentioned in ordering information. The inter connect and Rear I/O bit positions are represented in the below table. Interconnect selection and Rear I/O selection example are given below.

### INTERCONNECT SELECTION

<table>
<thead>
<tr>
<th>11</th>
<th>10</th>
<th>9</th>
<th>8</th>
<th>7</th>
<th>6</th>
<th>5</th>
<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>No PMC2</td>
<td>01=3.3V PMC</td>
<td>1=64bit 100MHz PMC</td>
<td>0</td>
<td>0</td>
<td>No LINKD</td>
<td>1=LINKK sRIO</td>
<td>0</td>
</tr>
</tbody>
</table>

### REAR IO SELECTION

<table>
<thead>
<tr>
<th>11</th>
<th>10</th>
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<th>4</th>
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<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>No Front USB3</td>
<td>1=Front USB3</td>
<td>0</td>
<td>0</td>
<td>NO RPM IO</td>
<td>0</td>
<td>0</td>
<td>Reserved</td>
</tr>
</tbody>
</table>

Note

1. Only for Conduction cooled boards
2. Only for Conduction cooled boards. RS232 full modem
3. Front USB3 available only for Air cooled boards
4. SATA0-3 can be combined to make SAS ports
5. COM 4 to 8 are Null modem RS232/RS422 configurable
6. If Air cooled option is selected front USB3, 10/100/1000BASE-T port 3, COM3 will be available by default (if selected). 10/100/1000 BASE-T port 3 will not be available in rear P4

### INTERCONNECT SELECTION EXAMPLE

<table>
<thead>
<tr>
<th>11</th>
<th>10</th>
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<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1=MC2 PCIe 1=64bit 100MHz PMC1 1=Link A sRIO 1=Link B sRIO 1=LINKA PCIe</td>
<td>0</td>
<td>0</td>
<td>Reserved</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### REAR IO SELECTION EXAMPLE

<table>
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<th>4</th>
<th>3</th>
<th>2</th>
<th>1</th>
<th>0</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1=Front USB3</td>
<td>1=COM7/COM8</td>
<td>00</td>
<td>0</td>
<td>No RPM IO</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

Binary of selected option: 011010111010

Equivalent HEX value: 0x5BE