Mercury Systems is a leading commercial provider of secure sensor and mission processing subsystems. Optimized for customer and mission success, Mercury’s solutions power a wide variety of critical defense and intelligence programs.

**BuiltSAFE™ RIO6-8093**

Freescale® QorIQ® P2 6U VME Single Board Computer (SBC)

- Board Management Controller (BMC)
- Freescale® QorIQ® P2020 processor
- Xilinx Spartan®-6 LXT user-programmable FPGA
- Static routing module (FlexIO™)
- 2x PMC/XMC sites
- Rugged air-cooled packaging

Mercury’s BuiltSAFE™ products bring the highest level of flight safety assurance to aerospace and defense applications. Our proven, reusable Design Assurance Level (DAL) certified artifacts for mission computing, avionics, networking and datalink comms processing save time and cost while decreasing risk.

The BuiltSAFE RIO6-8093 is an air-cooled, 6U VME Single Board Computer for ground applications. It is specifically designed for the most demanding applications, which require very high compute capabilities.

The BuiltSAFE RIO6-8093 is a sixth generation 6U VME PowerPC compute platform. It combines a fast dual-core processor with modern interconnect high-speed links and bridges (PCIe, Gigabit Ethernet) and programmable FPGA for application development.

The BuiltSAFE RIO6-8093 provides a PCI connection over the VME-P0 connector. This additional bus routed on the backplane enables VMEbus offload for operations such as splitting the data plane from the control plane.

For an easy configuration of the I/O pinout and support of legacy pinouts a static routing module (FlexIO) is placed between the different I/O sources and the backplane. Combined with the onboard FPGA-based PCIe to VME bridge FlexIO makes the RIO6-8093 a versatile fit for legacy placements requiring additional compute performance.

**BuiltSAFE for Avionics**

Mercury’s expertise and experience in safety certifiable solutions has been built on successful execution of dozens of programs over three decades. This domain knowledge is the foundation of our BuiltSAFE portfolio of open architecture modules, systems and software for avionics, communications, video servers, and mission computing.
Technical Specifications

Compliance
Air-cooled 6U VME64x
Power Consumption
25 Watts (typical)

Processor
Freescale QorIQ P2020 (2 cores) @ 1.0 GHz

Memory
1 GB DDR3 SDRAM at 6.4 GB/s peak with ECC protection
2 GB Flash (NAND)
128 MB Flash (NOR)
256 KB NVRAM

FPGA/User-Programmable/User I/O Lines
Xilinx Spartan-6 LX100T FPGA with dual 128 MB DDR3 SDRAM, 4 GB Flash (NAND) and 8 MB Flash (SPI)
32x user-specific I/O lines on PMC-J14 to VME-P2
48x user-specific I/O lines on PMC-J24 to VME-P2
64x user-specific I/O lines on FPGA to CES FlexIO

IO Customization
1x FlexIO static routing module (interconnect between PMCs/XMCs, VME-P2 and user FPGA)

Buses
1x 64-bit VME64x 2xSST bus on VME-P1/P2
1x 64-bit PCI 3.0 bus at 33/66 MHz on VME-P0
1x 64-bit PCI 3.0 bus at 33/66 MHz on PMC-J11/J12/J13/J21/J22/J23

High-Speed Links/Connections
3x PCIe x4 on XMC-J15/J25/J26 (1x each) (VITA 42.3)
2x 10/100Base-T / 10/1000Base-T on RJ45 connector
1x USB 2.0 host on USB connector
2x RS-232 on µDB9 connectors (COM 0 supports external trigger input/output) (1)
4x high-speed links on FPGA to XMC-J16 (1)
(1) “T” model only
(1) Depends on FPGA configuration

Sites
2x PMC/XMC sites (VITA 42.3)

Board Management Controller
Power management
Board start-up and voltage monitoring
Temperature monitoring (thermal sensors on critical positions)

Development/Debug
Onboard JTAG test port
Xilinx ChipScope Pro FPGA debugging tool

Ruggedization Levels

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
<th>Cooling Type</th>
<th>Operating Temperature</th>
<th>Vibration (1 hour per axis)</th>
<th>Operating Shocks</th>
</tr>
</thead>
<tbody>
<tr>
<td>A1</td>
<td>Commercial</td>
<td>Forced Air</td>
<td>0°C to 55°C [AC1]</td>
<td>5-100 Hz: increase at 3 dB/octave, 100-1000 Hz: 0.04 g²/Hz, 1000-2000Hz: decrease at 6 dB/octave</td>
<td>20g, 11ms saw-tooth, three axes</td>
</tr>
</tbody>
</table>

Environmental Specifications

<table>
<thead>
<tr>
<th>Condition</th>
<th>Limits, standards</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-operating temperature</td>
<td>-55°C to 105°C [C4]</td>
<td></td>
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<tr>
<td>Humidity</td>
<td>95%</td>
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<tr>
<td>Altitude</td>
<td>-1,500 to 60,000 feet</td>
<td>May require conformal coating</td>
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<tr>
<td>Fungus resistance</td>
<td>No nutrient materials</td>
<td></td>
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<tr>
<td>Workmanship</td>
<td>IPC-A-160 class 3</td>
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<tr>
<td>Soldering</td>
<td>IPC J-STD-001 class 3</td>
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<tr>
<td>PCB Manufacturing</td>
<td>IPC-A-600 class 3</td>
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<tr>
<td>Conformal coating</td>
<td>IPC-CC-830</td>
<td>Optional</td>
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<tr>
<td>Materials</td>
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<tr>
<td>Flammability</td>
<td>UL 94 Class V0</td>
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<tr>
<td>Quality</td>
<td>EN 9100:2008</td>
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Product Ordering
RIO6-8093AF Air-cooled 6U VME SBC with QorIQ P2020 @ 1.0 GHz,
512 KB L2, 1 GB DDR3, 2 GB NAND, 128 MB NOR,
256 KB NVRAM, Spartan-6 LXT

RIO6-8093TF Air-cooled 6U VME SBC with QorIQ P2020 @ 1.0 GHz,
512 KB L2, 1 GB DDR3, 2 GB NAND, 128 MB NOR,
256 KB NVRAM, Spartan-6 LXT, external trigger input/output on front panel

OWW-30920B VxWorks® BSP for RIO6-809x
OWW-30930E VxWorks 653 BSP for RIO6-809x
OWX-30930D Linux® Toolbox for RIO6-809x

Related Hardware Products
BPA-6413A0 Passive blackpane adaptor (2 slots)
BPA-6414A0 Passive blackpane adaptor (3 slots)
PEB-6416A0 6U VME PMC carrier board

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