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.

Mercury’s BuiltSAFE VGP-2870 is a DAL C (other levels upon request) certifiable E8860–powered GPGPU processing engine for the most stringent aerospace and defense applications that require certification to DO-178C/DO-254. The VGP-2870 can be delivered with all documentation, certification evidence and supporting artifacts required to prove compliance for avionics certification. Leveraging the VGP-2870 ensures a smooth development process supported by Mercury’s safety engineering team and their deep domain expertise. The BuiltSAFE VGP-2870 has been engineered with DAL safety certification in mind from the top down, with DO-178C/DO-254 best design practices systematically applied throughout all phases of development.

Driven through via OpenVPX PCIe bus, the Avionics VGP-2870 GPGPU processing module is capable of performing 2D and 3D graphic generation functions and operate as a GPGPU for intensive data computation. Featuring 6 independent video outputs and 2 video inputs, the BuiltSAFE VGP-2870 can overlay captured video stream with generated 2D and 3D graphics elements all within safety-critical environments. The BuiltSAFE VGP-2870 is engineered for the most stringent aerospace and defense applications.

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.

Visualize more
With 6 independent video outputs, the Avionics VGP-2870 displays more of your application, making no compromises on the information, feedback or data that can be simultaneously visualized.
Low-SWaP processing subsystems
With Mercury’s BuiltSAFE MFCC-8557 XMC processor installed, the VGP-2870 turns into a powerful subsystem, tailor to compute-intensive video and graphics applications - all packed in a single 3U, OpenVPX slot. The BuiltSAFE VGP-2870 and the MFCC-8557 capture, overlay, record and stream from a single 3U OpenVPX slot solution instead of the industry two slot approach, reducing cost and SWaP while increasing reliability.

Technical Specifications

Compliance
3U OpenVPX (VITA 65)/VPX-RED1 (VITA 48)
XMC baseline 2.0 (VITA 61), XMC PCIe (VITA 42.3)
Certifiable to DAL-C (DC-178C/DO-254)
Peripheral slot profile SLT3-PER-1F-14.3.2

Power Consumption

<table>
<thead>
<tr>
<th>minimum</th>
<th>typical</th>
<th>maximum</th>
<th>units</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td>42</td>
<td>50</td>
<td>Watts</td>
</tr>
</tbody>
</table>

Processor
AMD Radeon E8860 GPU @ 625 MHz
512 KB internal L2 cache with ECC protection
H.264/AVC compression

Memory
2 GB GDDR5 dedicated video memory (72 GB/s peak)
256 MB DDR3 processing memory

Software
VxWorks®653 with OpenGL SC 1.0 (Safety Critical)
Linux for Intel® processors
Built-in test interface and logging

FPGA
Xilinx Kintex®-7 FPGA
256 MB DDR3 SDRAM dedicated to video capture and output formatting

High-Speed Links / Connections
1x PCIe Gen2 x4 from PCIe switch to VPX-P1
1x XMC 2.0 (VITA 61) site to interface an MFCC-8557
3x PCIe Gen2 x1 on XMC-J16
1x PCIe Gen2 x4 on XMC-J15
1x SGMII interface on XMC-J16
1x 1000BASE-BX interface on XMC-J16
1x USB 2.0 OTG on XMC-J16
1x USB for serial link on XMC-J16
1x SATA II on XMC-J16

Safety Optimized Board Management
Voltage monitoring
Temperature monitoring (thermal sensors on critical positions)
Elapsed time counter
Error reporting
Reset management

Video Inputs (1)
2x HD/SD-SDI
1x SD analog video: CVBS, S-Video, RGB, STANAG-3350

Video Outputs (1)
2x DVI on VPX
3x DisplayPort on VPX
1x SD analog: CVBS, S-Video, STANAG-3350
2x HD/SD-SDI
(1) Depends on configuration. See “Video IO Configuration” table for more information.

Product Ordering
VGP-2870 3U OpenVPX video I/O graphics processor

Environmental
A1: 0°C to 55°C
C4: -40°C to 85°C

Safety Artifacts
D0-254(2) D0-178C(3)

Software
Green Hills INTEGRITY-178 tuMP
Linux (4)
WindRiver VxWorks® 6.x and 653 3.x
SYSGO PikeOS
DDC-I Deos
(1) For other configurations contact factory
(2) Please consult factory
(3) Only two simultaneous video inputs
(4) Contact factory for more information

Video IO configuration

<table>
<thead>
<tr>
<th>Out</th>
<th>In</th>
</tr>
</thead>
<tbody>
<tr>
<td>DP</td>
<td>DVI</td>
</tr>
<tr>
<td>Default</td>
<td>3</td>
</tr>
<tr>
<td>Analog</td>
<td>1</td>
</tr>
</tbody>
</table>

Related Hardware Products
AVIO-2353 3U OpenVPX avionic I/O board
MFCC-8557 Freescale QorIQ™ P3041 XMC safety critical Single Board Computer
ROCK-2 3U OpenVPX, low-SWaP, rugged, modular, pre-qualified subsystems
### 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 AC</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 [V2]</td>
<td>20g, 11ms saw-tooth, three axes [OS1]</td>
</tr>
<tr>
<td>C4</td>
<td>Extended range CC</td>
<td>Conduction</td>
<td>-40°C to 85°C [CC4]</td>
<td>5-100 Hz: increase at 3 dB/octave, 100-1000 Hz: 0.1 g²/Hz, 1000-2000Hz: decrease at 6 dB/octave</td>
<td>40g, 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</td>
<td>-55°C to 105°C [C4]</td>
<td>Non-operating temperature</td>
</tr>
<tr>
<td>Humidity</td>
<td>95%</td>
<td></td>
</tr>
<tr>
<td>Altitude</td>
<td>-1,500 to 60,000 feet</td>
<td>May require conformal coating</td>
</tr>
<tr>
<td>Fungus resistance</td>
<td>No nutrient materials</td>
<td></td>
</tr>
<tr>
<td>Workmanship</td>
<td>IPC-A-610 class 3</td>
<td></td>
</tr>
<tr>
<td>Soldering</td>
<td>IPC J-STD-001 class 3</td>
<td></td>
</tr>
<tr>
<td>PCB Manufacturing</td>
<td>IPC-A-600 class 3</td>
<td></td>
</tr>
<tr>
<td>Conformal coating</td>
<td>IPC-CC-830 Optional</td>
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</tr>
<tr>
<td>Materials</td>
<td>REACH compliant ROHS variants as an option</td>
<td></td>
</tr>
<tr>
<td>Flammability</td>
<td>UL 94 Class V-0</td>
<td></td>
</tr>
<tr>
<td>Quality</td>
<td>EN 9100:2008</td>
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</table>

### Less space for more functions

Mission computer featuring stacked XMCs for low-SWaP

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*The required air-flow is defined separately for each product.*