RUGGED VPX
MEDIA & PROTOCOL CONVERSION MODULES

DESCRIPTION
Amphenol Aerospace is the world’s leader in high-end performance interconnect products for rugged environment markets. Media and protocol conversion is an important capability enabling system connectivity from commercial off-the-shelf switches, processors, and I/O boards. This new line of VPX media conversion products provides the sweet spot of conversion from both backplane and Base-T connections, as well as backplane and high-end fiber connections. The product suite includes the components needed to quickly integrate this unit into a new sub-system, as well as install and field in rugged environments. By utilizing this architecture as a starting point, new derivatives that support specific requirements can easily be made, ensuring high-technology readiness and low-development costs.

FEATURES AND BENEFITS
• Embedded and integrated set of media and protocol conversion VPX boards for open systems architectures in the military rugged market
• Providing connectivity for 1G, 10G, and up to 40G Ethernet with Base-T and Fiber Base-SR conversion circuitry
• 3U and 6U VPX modules have corresponding internal sub-system connectors/cables as well as full test and integration set of products
• For plug and play integration with COTS VPX CPUs, Switches, and other devices
• New derivatives can be formed to meet new customer requirements
• Full diagnostics and control interfaces for built in test and alternate configurations
SUITE OF PRODUCTS

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF-020010-57X</td>
<td>6U VPX converter with 4X XAUI/10G-Base-T, 4X SGMII/1G-Base-T, 32X 10G-Base-SR, 12C, MDIO, LEDs</td>
</tr>
<tr>
<td>CF-020010-58X</td>
<td>6U VPX converter with 2X XAUI/10G-Base-T, 4X SGMII/1G-Base-T, MDIO, LEDs</td>
</tr>
<tr>
<td>CF-020010-721</td>
<td>6U VPX converter with 6X XAUI/10G-Base-T, 4X SGMII/1G-Base-T, MDIO, LEDs</td>
</tr>
<tr>
<td>CF-020011-438</td>
<td>6U VPX converter with 8X XAUI/10G-Base-T, 8X SGMII/1G-Base-T, MDIO, LEDs, Dual Redundant Power Supplies, 2X XMC sites for expansion</td>
</tr>
<tr>
<td>CF-020011-433</td>
<td>6U VPX converter with 8X XAUI/10G-Base-SX, 8X SGMII/1G-Base-SX, MDIO, I2C, LEDs</td>
</tr>
<tr>
<td>CF-020010-720</td>
<td>3U VPX converter with 2X XAUI/10G-Base-T, 8X SGMII/1G-Base-T, 24X 10G-Base-KR/SR, 12C, MDIO, LEDs</td>
</tr>
<tr>
<td>10-646402-272X</td>
<td>MIL-DTL-38999 size 19 receptacle with 4X Octonet contacts and mating PC board for Samtec connectivity to VPX boards</td>
</tr>
<tr>
<td>10-646402-273X</td>
<td>MIL-DTL-38999 size 25 receptacle with 8X Octonet contacts and mating PC board for Samtec connectivity to VPX boards</td>
</tr>
<tr>
<td>CA-628485-C00</td>
<td>MIL-DTL-38999 plug cable assembly for the 272X which breaks out Octonet contacts into RJ-45s</td>
</tr>
<tr>
<td>CA-628485-C01</td>
<td>MIL-DTL-38999 plug cable assembly for the 272X which breaks out Octonet contacts into RJ-45s</td>
</tr>
<tr>
<td>CF-901201-016</td>
<td>MIL-DTL-38999 dual receptacle MT cable assembly for connection to 57X fiber ports. Each MT has 16 channels of 10G-BASE-SR,</td>
</tr>
<tr>
<td>CF-901200-017</td>
<td>MIL-DTL-38999 plug MT cable assembly for connection to each receptacle on the CF-901201-016 and breakouts to MTP contacts</td>
</tr>
<tr>
<td>CF-980062-061</td>
<td>Quad RJ45 breakout board for the Samtec headers on the 57X and 58X VPX modules</td>
</tr>
</tbody>
</table>
VPX MEDIA CONVERTER MODULE SUMMARY
CF-020010-57X

VITA 48.2 conduction cooled 6U VPX module with 1 inch pitch:
- 6Ux160mm form factor as defined by IEEE 1101.2 for conduction cooling
- VITA 46 board connectors
- IEEE 1101.2 extraction levers and performance wedge locks
- 3X - Samtec HQDP connectors for 1G-Base-T, 10G-Base-T
- 2X - 48 pin MT contacts for 40G-Base-SR4 / 10G-Base-SR

Copper Conversion formats:
- 4X Channels – XAUI to 10G-Base-T Conversion
- 4X Channels – SGMII to 1G-Base-T Conversion
- 4X Channels – 1G-Base-T pass through from VPX to Samtec
- Diagnostics interface is MDIO interface as well as LEDs per each channel

Fiber Conversion formats:
- 32X Channels – 10G-Base-KR to 10G-Base-SR
- Can be ganged together for 8X channels – 40G-Base-KR4 to 40G-Base-SR4
- Diagnostics interface is I2C interface as well as LEDs per each channel
- 10.3 (25 Gbps transceivers 850nm multimode optics

Environmental Performance:
- Rugged storage and operating temperature range
- Typical vibration specifications in accordance with MIL-STD-810
- Typical power level is 36 Watts on 12Volts or 5Volts
- Integrated system reset function

57X Block Diagram

J1, 2, 3 HQDP Samtec headers

32 Ports of 10G-Base-SR or 8 ports of 40G-Base-SR4
4 Ports of 1GBase-T Pass-through
4 Ports of 10GBase-T
4 Ports of 1GBase-T

32 Ports of 10G-Base-KR or 8 ports of 40G-Base-KR4
4 Ports of 1GBase-T Pass-through
4 Ports of 10G XAUI
4 Ports of 1GBase-KX/SGMI1
VPX MEDIA CONVERTER MODULE SUMMARY
CF-020010-57X

57X Drawing

* Pinout data available in drawings by request
**COMPLIMENTARY PRODUCT:**

10-646402-272X

**CONNECTOR J1**

- 4PAIR QUAD CONTACT
- (21-032907-001) 4 PLACES

**PROTECTION CAP**

- (.841)

**CONNECTOR J2**

- SAMTEC CONNECTOR P/N: QSH-020-01-C-D-DP
- MS51957-13 SCREW NAS620C4 WASHER 4 PLACES

**DETAIL A**

- SEE DETAIL A
- 2.075 ± .010
- 1.825 ± .010
- .663 ± .005
- SAMTEC MOUNTING BUSHING

**Pinout data available in drawings by request**
COMPLIMENTARY PRODUCT:

10-646402-273X

4PAIR QUAD CONTACT (21-032907-001) 8 PLACES

CONNECTOR J1

PROTECTION CAP

SEE DETAIL A

CONNECTOR J2

SAMTEC CONNECTOR
P/N: QSH-020-01-C-D-DP

MS51957-13 SCREW
NAS620C4 WASHER
4 PLACES

CONNECTOR J3

SAMTEC MOUNTING BUSHING

3.224 ± .010

2.000 ± .010

1.613 ± .005

SEE DETAIL B

* Pinout data available in drawings by request
COMPLIMENTARY PRODUCT:

Octonet Contacts

Description:
Superior Ethernet contact system for MIL-DTL-38999, Series III. Eight strategically spaced inner contacts form four 100 Ohm matched impedance differential pairs.

Features and Benefits:
- Available in size 8 crimp termination style
- Also available in PC Tails
- Can be installed in existing size 8 Quadrax cavities
- Meets performance specifications of CAT-6A cable
- 10G Ethernet compliant
- Overall higher bandwidth than standard CAT5E Quadrax—supports up to 4.0 Gbps per pair
- Enhanced crosstalk performance (compared to standard Quadrax)
- Supports wire ranges 26 to 24 gauge
- Requires modification of MIL-DTL-38999 connector to accommodate keyed contacts
- Operating Temp -65°C to 175°C
- Easy drop-in replacement to installed connectors no need to redesign
- Self removing contact feature - no extra contact extraction tool needed (24 Gauge only)

Part Numbers:

<table>
<thead>
<tr>
<th>Pin</th>
<th>Socket</th>
<th>*Cable</th>
<th>AWG</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-032904-001</td>
<td>21-032905-001</td>
<td>Thermax MX10G-24HP</td>
<td></td>
</tr>
<tr>
<td>21-032904-021</td>
<td>21-032905-021</td>
<td>PIC E6A3824, Harbour E10024066, E10024064</td>
<td></td>
</tr>
<tr>
<td>21-032904-031</td>
<td>21-032905-031</td>
<td>W.L.Gore: GSC-03-840430-01</td>
<td>24</td>
</tr>
<tr>
<td>21-032904-041</td>
<td>21-032905-041</td>
<td>Axon P542810</td>
<td></td>
</tr>
<tr>
<td>21-032904-051</td>
<td>21-032905-051</td>
<td>PIC E6A6826</td>
<td></td>
</tr>
<tr>
<td>21-032904-061</td>
<td>21-032905-061</td>
<td>Thermax MX10G-24FLX4</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PCB Pin</th>
<th>PCB Socket</th>
<th>L Dimension + or - 15</th>
<th>AWG</th>
</tr>
</thead>
<tbody>
<tr>
<td>21-032906-001</td>
<td>21-032907-001</td>
<td>Pin .884 / Socket 1.024</td>
<td></td>
</tr>
<tr>
<td>21-032906-011</td>
<td>21-032907-011</td>
<td>.884</td>
<td></td>
</tr>
<tr>
<td>21-032906-021</td>
<td>21-032907-021</td>
<td>.884</td>
<td></td>
</tr>
<tr>
<td>21-032906-031</td>
<td>21-032907-031</td>
<td>.950</td>
<td></td>
</tr>
<tr>
<td>21-032906-041</td>
<td>21-032907-041</td>
<td>.859</td>
<td></td>
</tr>
<tr>
<td>21-032906-051</td>
<td>21-032907-051</td>
<td>.518</td>
<td></td>
</tr>
<tr>
<td>21-032906-061</td>
<td>21-032907-061</td>
<td>.788</td>
<td></td>
</tr>
</tbody>
</table>

* Not limited to cables shown
COMPLIMENTARY PRODUCTS:

Internal Fiber Cable: CF-020010-016

* Pinout data available in drawings by request
COMPLIMENTARY PRODUCTS:

External Fiber Cable: CF-901200-917

* Pinout data available in drawings by request
COMPLIMENTARY PRODUCTS:

Test and De-bug RJ45 Adapter:

CF-980062-061
1G-Base-T and 10G-Base-T:

HQDP Samtec Ribbons

4X Channels
XAU1

4X Channels
1G-Base-T

4X Channels
SGMII

32X Channels
10G-Base-KR

57X

4X Channels
10G-Base-T

8X Channels
1G-Base-T

32X Channels
10G-Base-SR

Breakout to LCs or MTPs

PORT 1
PORT 2
PORT 3
PORT 4

PORT 1
PORT 2
PORT 3
PORT 4

(5.000)

(4.400)

(2.900)

(3.500)

(6.128)
MOUNTING HOLES
4 PLACES

(0.063)
SPECIFICATIONS:

1G-Base-T/ SGMII Conversion Specs:
- Highly integrated four channel 1GBASE-T Ethernet transceiver
- The MDI twisted-pair transceiver consists of four triple-speed 10/100/1000BASE-T Ethernet transceivers
- IEEE 802.3az Compliant (Energy Efficient Ethernet): support for native EEE MACs, support for legacy non-EEE MACs using AutoEEEn® mode
- SyncE, IEEE 1588v2 PTP and ITU-T Y.1731 delay measurement support
- Cable plant diagnostics

10G-Base-T/ XAUI Conversion Specs:
- Highly integrated four channel 10GBASE-T Ethernet transceiver
- Supports multiple speeds: 100BASE-TX, 1000BASE-T, and 10G-Base-T
- XAUI™, XFI, and SGMII MAC interface options
- Compliant with IEEE 802.3™, IEEE 802.3an, IEEE 802.3ab, IEEE 802.3u, and IEEE 802.3az standards
- Synchronous Ethernet support
- Line-side XAUI enables dual-media applications
- Cable plant diagnostics
- IEEE standard 1588-2008 (version 2) support

10G-Base-SR4 Fiber Conversion Specs:
- 32 channels (32 transmit, 32 receive) of fiber/copper conversion
- Speeds from 100Mbps to 10.3125Gb ps
- Encoded protocol support for Ethernet, PCI Express, Fiber Channel, and others
- Optical specifications

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum bit rate</td>
<td>BR</td>
<td></td>
<td>10.3125</td>
<td>GBps</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average Optical Power (per channel)</td>
<td>$P_{OUT}$</td>
<td>-1.5</td>
<td>+3.5</td>
<td>dBm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crimp Pin</td>
<td>$P_{OFF}$</td>
<td></td>
<td>-30</td>
<td>dBm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crimp Socket</td>
<td>ER</td>
<td>3</td>
<td>4.5</td>
<td>dB</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crimp Pin</td>
<td>$\lambda_c$</td>
<td>830</td>
<td>850</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crimp Socket</td>
<td>$\lambda$</td>
<td>0.5</td>
<td>0.65</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PCB Pin</td>
<td>TJ</td>
<td>35</td>
<td></td>
<td>ps</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Based on recommended register settings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical Power Sensitivity (per channel)</td>
<td>$P_{IN_MAX}$</td>
<td>-9.0</td>
<td></td>
<td>dBm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Optical Power Saturation (per channel)</td>
<td>$P_{IN_MAX}$</td>
<td>+4</td>
<td></td>
<td>dBm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Crimp Pin</td>
<td>$\lambda_c$</td>
<td>830</td>
<td>870</td>
<td>nm</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

1. Defined as the average optical power necessary to produce a BER of $10^{-15}$ at the center of the baud interval using a 10.3125 Gbps PRBS of length $2^{31}-1$ or equivalent. Input power is provided as an ideal source and all receiver channels are operating.