

TIC-FEP-VPX3a - Xilinx Virtex-6 FPGA Front End Processing Board

Module Profile: MOD3-1F2F2U-16.2.2-4

Elma's Target Application System Guides identify the building blocks necessary to design an OpenVPX system targeted for use in compute intensive applications requiring high bandwidth signal processing and data distribution.

This guide addresses Elma's TIC-FEP-VPX3b 3U VPX Front End Processor and FPGA Mezzanine Card (FMC) Carrier board. The FEP board is designed to handle the upfront processing of incoming high definition video, electro-optical, infrared, radar and other extremely high data rate signals. When used in conjunction with a dual cluster system, single or multiple TIC-FEP-VPX3b boards form the basis of a highly efficient front end processing system with configurable signal input options via a selection of FMC modules.

VPX Target Application System Guides take the guess work out of VPX system integration by helping you define a system optimized for your application. From initial board selection to final chassis level solution, our Application Guides walk you through the component selection process while ensuring complete interoperability.

Elma's VPX Target Application System Guides:

- Identify the optimal starting board and its applicable slot profiles
- Recommend supporting boards based on their profiles and function
- Determine the backplane topology for data flow and application
- Identify a standard OpenVPX backplane profile, based on standard backplane profiles
- Identify standard OpenVPX chassis profile ready for development or deployment

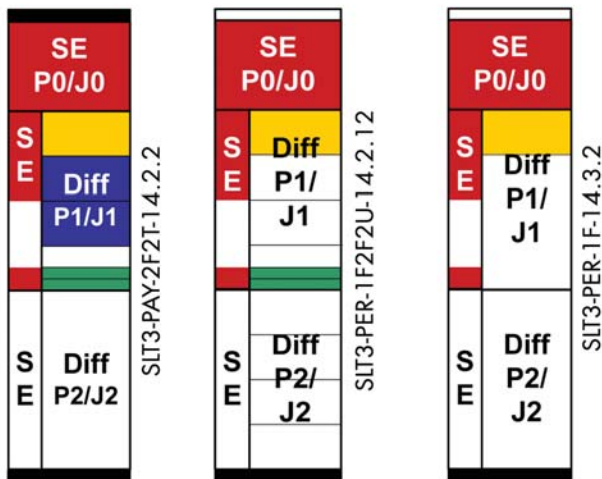
The following Slot Profiles are compliant with the TIC-FEP-VPX3b PCIe and Gigabit Ethernet Switch:

Module Profiles:

MOD3-PAY-1F2U-16.2.11-2
 MOD3-PAY-1F2F2U-16.2.2-4
 MOD3-PER-1F-16.3.2-2

Slot Profiles:

SLT3-PAY-1F2U-14.2.12
 SLT3-PAY-1F2F2U-14.2.2
 SLT3-PER-1F-14.3.2



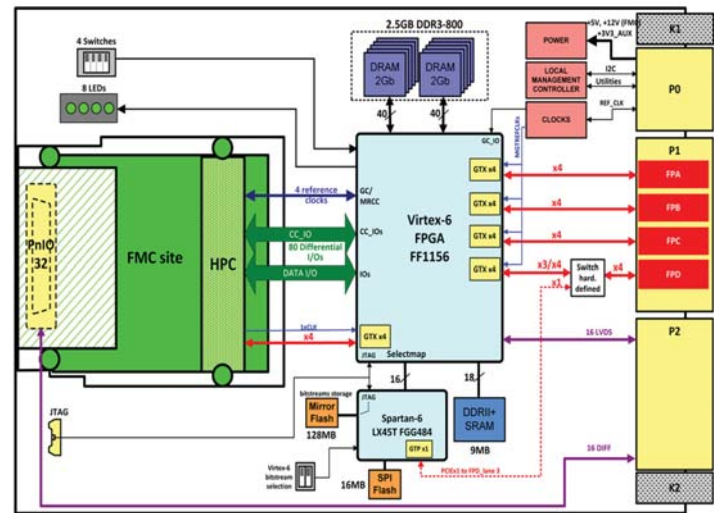
Reference:

UTP - Ultra Thin Pipe
 TP - Thin Pipe
 FP - Fat Pipe

DFP - Double Fat Pipe
 QFP - Quad Fat Pipe
 OFP - Octal Fat Pipe



Front End Processor / FPGA Carrier



Block Diagram of the TIC-FEP-VPX3b

Model Number: TIC-FEP-VPX3a

Processing Unit

- One Virtex 6 FPGA – SX315T/475T or LX365/195T
- One VITA 57 FPGA Mezzanine Card (FMC) site
- On board configuration flash – 128MB VPX Interfaces
- Four x4 data planes (PCIe or SRIIO)
- Twelve GTX x4 lanes (Aurora, PCIe, 1000 Base-X or SRIIO)
- User defined GPIO

FMC Interfaces

- One GTX x4 link
- 68 Differential pairs with LPC and HPC connections
- Four reference clocks
- Eight single ended I/O

Companion Boards - OpenVPX Slot Profiles

The supporting boards shown below allow an entire VPX system to be configured and targeted at the needs of compute intensive, high bandwidth signal processing applications. Based on their individual OpenVPX Module Profiles, their function and capabilities, and the application requirements, the following boards are recommended in support of the TIC-FEP-VPX3b Front End Processor board.

Model / Description	Compatible Module Profiles	Compatible Slot Profiles	Slot Profile Samples
 <p>T4410a 3U VPX fabric switch with PCIe & GbE ports for data and control plane communication</p> <ul style="list-style-type: none"> • Six PCIe x4 ports and One PCIe x8 • Eight Gigabit Ethernet ports 	MOD3-SWH-6F8U-16.4.10-1,2 MOD3-SWH-6F6U-16.4.1-2,3	SLT3-SWH-6F8U17*-14.4.9 <i>(per VITA 65 rule 14.4.9.4.1-1)</i> SLT3-SWH-6F6U-14-4.1	
 <p>TIC-PPC-VPX3a 3U VPX MPC8640(D) e600 PowerPC based Single Board Computer</p>	MOD3-PAY-1D-16.2.6-n MOD3-PAY-2F-16.2.7-n MOD3-PAY-1F4U-16.2.8-n MOD3-PAY-8U-16.2.9-n	SLT3-PAY-1F2U-14.2.12 SLT3-PAY-2F2T-14.2.5 SLT3-PAY-1D-14.2.6 SLT3-PAY-2F-14.2.7	
 <p>TIC-DC2-VPX3a 3U VPX Intel Core2 Duo SL9380 or SU9300 based Single Board Computer</p>	MOD3-PAY-2F2U-16.2.3-3 MOD3-PAY-2F2T-16.2.5-2 MOD3-PAY-1D-16.2.6-1 MOD3-PAY-2F-16.2.7-1 MOD3-PAY-3F2U-16.2.12-2	SLT3-PAY-2F2U-14.2.3 SLT3-PAY-2F2T-14.2.5 SLT3-PAY-1D-14.2.6 SLT3-PAY-2F-14.2.7 SLT3-PAY-3F2U-14.2.13	
 <p>TIC-XMC-VPX3a 3U VPX Carrier Card with one XMC site for multiple configuration options</p>	Multiple, depending on the XMC configuration	Multiple, depending on the XMC configuration	
 <p>VPX-5311 3U VPX storage module supports one rotating or solid state SATA drive</p>	MOD3-STO-2U-16.5.1-1,2	SLT3-STO-2U-14.5.1	

Below are samples of available FPGA Mezzanine Cards (FMCs). Please contact us for more information on the complete range of FMCs available.

200Msps to 2.5Gsps ADC



QUAD 40Msps to 550Msps ADC



QUAD 20Msps to 400Msps ADC

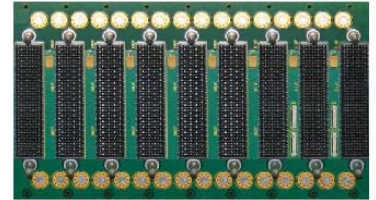


Identifying a Development Backplane

Many standard OpenVPX backplanes are useful in this next stage of system development. The following standard OpenVPX backplane profiles have been identified as applicable to the architecture described. Seldom will standard profiles meet every requirement; rather they serve as a developmental spring board to the final backplane profile design for the Target Application System.

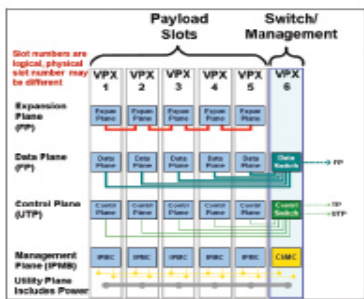
Available standard VITA 65 OpenVPX Development Backplane Profiles:

BKP3-DIS03-15.2.9-N	Distributed Switch; 1 Payload + 2 Peripheral Slots
BKP3-DIS06-15.2.10-n	Distributed Switch; 1 Payload + 5 Peripheral Slots
BKP3-CEN06-15.2.2-n	Central Switch; 1 Switch + 5 Payload or Peripheral Slots
BKP3-DIS06-15.2.12-n	Hierarchical Switch; 6 Payload or Peripheral Slots

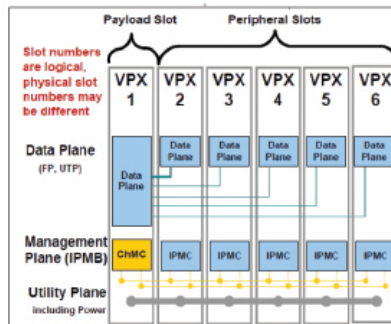


Topological Diagram of Standard OpenVPX Backplane Profiles:

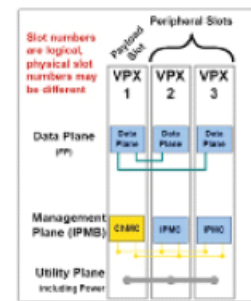
BKP3-CEN-15.2.2-n
1 Switch + 5 Payload or Peripheral



BKP3-DIS06-15.2.10-n
1 Payload + 5 Peripheral



BKP3-DIS03-15.2.9-n
1 Pay + 2 Peripheral Slots

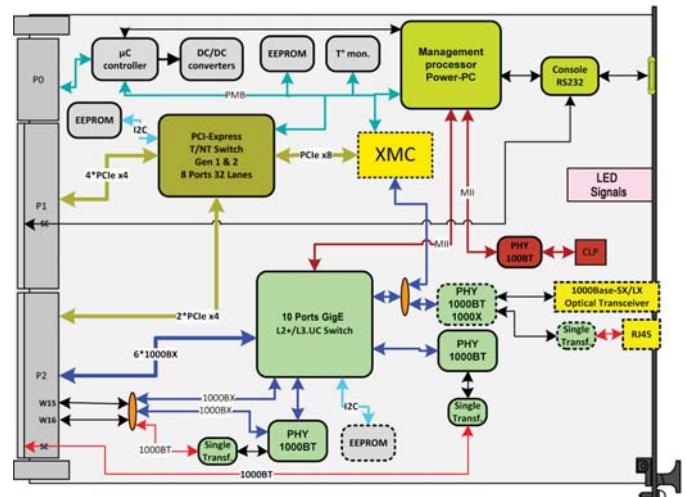
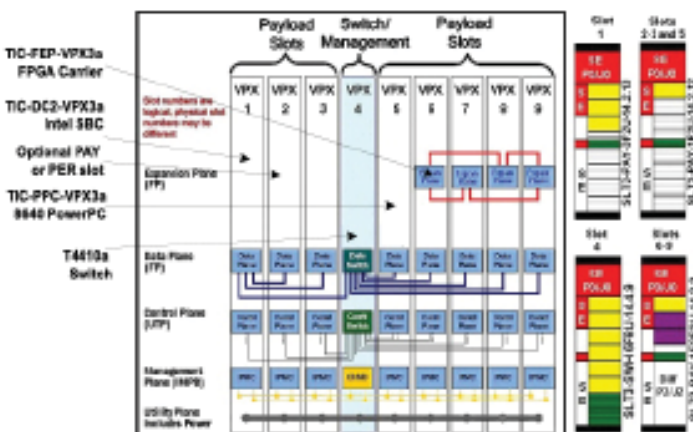


Topological Diagram of Target Application Backplane Profile BKP3-CEN09-15.2.17-n:

If the end application requires tailoring then a Target Application Profile (TAP) must be developed for the backplane. The backplane shown below is the TAP developed to address the application described. It is based on elements of the standard OpenVPX backplanes listed above and incorporates the slot profiles associated with the identified boards.

Dual cluster, central switched 9-slot backplane with a 4-slot expansion plane mesh for front end computing, and a 6-slot star architecture with 2 leaf nodes for front end computing. Both clusters share the PCIe / Gigabit switch slot.

Block diagram of the T4410 Ethernet/PCIe switch for this TAP System



Whether it's initial board selection, backplane profile design or integrating the final system, Elma has the knowledge, experience and products to manage VPX system design and provide fully integrated complete chassis level solutions. This system configuration can be adapted for use in various chassis configurations including desktop tower, E-Frame or rack-mount designs.



Description	Environment
E-Frame & Tower Development Platforms - Provides easy access to both sides of the board - Available for 3U and 6U boards - Complete access to rear of the backplane for I/O implementation	Lab, desktop use
19" Rackmount Platforms - 19" rackmount chassis in a wide selection of configurations - Vertical or horizontal board layouts	Standard environmental conditions, such as IT Rooms
Rugged Conduction or Convection Cooled Boxes (ATR) - Available in standard sizes per ATR convection (1/4, 1/2, 3/4, 1) - Accommodates 3U and 6U VPX cards - Supports AC and DC power configurations - Configurable I/O panel for external circular connector	MIL STDs Environments (shock, vibration, heat/cold, etc.); avionics, vetronics, shipboard

OpenVPX Target Application System Order Information

Your application may require variations from the system described. Consult Elma regarding other configurations options. To get started, order from the following chassis and board options or move to a solution.

Integrated Chassis Model Number: SEFV3PXCNICXNVN

Description: Nine slot E-frame development chassis with BKP3-CEN09-15.2.17-n backplane, TIC-DC2-VPX3a SBC, T4410 Ethernet/PCIe Switch, TIC-FEP-VPX3a with SX315T Virtex 6 FPGA, and TIC-PPC-VPX3a PowerPC SBC. Includes Linux 2.6.35 Kernel CentOS chassis software development kit.



Chassis Model Number: 39E09BWX98Y2VCHX

84HP wide E-Frame development chassis with a 9-slot, 3U OpenVPX backplane designed to Profile BKP3-CEN09-15.2.17-n

Convection Cooled Switch Model Number: TIC-FEP-VPX3b (LX365T) 887-011-740 or TIC-FEP-VPX3b (SX315T) 887-020-740

Conduction Cooled Switch Model Number: TIC-FEP-VPX3b (LX365T) 887-011-795 or TIC-FEP-VPX3b (SX315T) 887-020-795

Software Development Kit Order Number: TIC-FEP-VPX3b

Engineering Kit: 887-011-eng

