EXC-8000ccXMC

Test and Simulation board for XMC Compatible Slots

User's Manual

EXCALIBUR SYSTEMS

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1 Introduction

The following topics are covered:

1.1 Overview

The *EXC-8000ccXMC* board is a multiprotocol, conduction cooled, XMC avionics communication interface board. The board holds up to eight onboard modules, of the types listed below. All modules come with Windows drivers, including source code.

Note: Not all modules can be placed in all module location. See **1.1.3 Block Diagram** on page 1-5 and **Chapter 4 Ordering Information** for the available options.

M8K1553Px	MIL-STD-1553 interface module. This module operates as a Bus Controller, up to 32 Remote Terminals and as a Bus Monitor. It supports an Internal Concurrent Monitor in RT and BC/RT modes.
M8K1553PxS	Same as the M8K1553Px, but for only one Remote Terminal at a time (single function) and one mode at a time (no BC/RT mode) and no error injection.
M8K1553PxM	Monitor-only version of the M8K1553Px.
M8K1553PxSM	Monitor-only version of the M8K1553PxS.
M8K1760Px	MIL-STD-1760 interface module. This module operates as a Bus Controller, up to 32 Remote Terminals and as a Bus Monitor. It supports an Internal Concurrent Monitor in RT and BC/RT modes.
M8K1760PxS	Same as the M8K1760Px, but for only one Remote Terminal at a time (single function) and one mode at a time (no BC/RT mode) and no error injection.
M8K1760PxM	Monitor-only version of the M8K1760Px.
M8K1760PxSM	Monitor-only version of the M8K1760PxS.
M8K708	ARINC 708/453 interface module. This module supports up to two ARINC 708/453 channels for the Weather Radar Display Databus. Each channel is selectable as transmit or receive and implements a 64K-word FIFO and supports polling and/or interrupt driven operation.
M8K429RT5	ARINC 429 multi-channel interface module. This module supports five ARINC 429 channels each of which can be configured in real time as a receive or transmit channel.
M8K717-Nx	ARINC 717 interface module. This module supports two ARINC 717 channels; one receive channel and one transmit channel.
M8KSerial-Jx	Serial communications interface module. This module supports two independent channels of serial communications, each of which can be ordered as RS485, RS422 or RS232.
M8KDiscrete	Discrete I/O interface module. This module supports 10 bi-directional Discretes with TTL (0 to 5 volts) or avionics (0 to 32 volts) voltage levels.

1.1.1 Additional Documents

This manual describes the *EXC-8000ccXMC* board itself. Each onboard module is described in its own user's manual. Refer to the following manuals. (The **Mechanical and Electrical** chapter of these manuals are not relevant to the *EXC-8000ccXMC*.)

- *M8K1553Px & M8K1760Px Modules User's Manual*
- *M8K708 Module User's Manual*
- *M8K429RT5 Module User's Manual*
- *M8K717 Module User's Manual*
- *M8KSerial Module User's Manual*
- *M8KDiscrete Module User's Manual*

1.1.2 Board Features

General Features

- Supported protocols:
  - MIL-STD-1553 (1 ch. per module)
  - MIL-STD-1760 (1 ch. per module)
  - ARINC 429/575 (5 ch. per module)
  - ARINC 708/453 (2 ch. per module)
  - ARINC 717 (2 ch. per module)
  - Serial RS-232/485/422 (2 ch. per module)
  - Discrete I/O (10 ch. per module)
- 16-bit Count Down Timer
  - 1–65,635 µs resolution
  - Interrupt or global reset upon count down
- Ruggedized option
- Meets the following standards:
  - ANSI/VITA 42.0-2021 XMC Switched Mezzanine Card (XMC)
  - ANSI/VITA 42.3-2020 XMC PCI Express Protocol Layer Standard
  - ANSI/VITA 20-2005-S2018 Conduction Cooled PMC
- Supports VPWR at +5V or +12V

IRIG B Time Code Input

- Carrier wave:
  - 1KHz Amplitude modulated sine wave
- Rate Designation: 100 peaks per second
- Modulation ratio: 3:1
- Input Amplitude: 0.8–3.5 Vpp (3 Vpp Typ)
- Coded Expressions supported:
  - BCD time-of-year code word
  - Control Functions
  - Straight Binary Seconds (SBS) time-of-day
- Application:
  - Synchronization of Time Tags, display and IRIG B time

Physical Characteristics

- Dimensions: Standard single-width XMC mezzanine card (143.75 mm x 74.0 mm)
- Weight: 84g (with all modules occupied)

Operating Environment

- Temperature: -40° to +85°C
- Humidity: 5%–90% noncondensing

Host Interface

- PCI Express compliance: x1 lane PCIe v1.1
- ANSI/VITA 46.9-2018 compatible XMC to VPX Signal Mapping profiles:
  P2w7-X8d+X12d
  P2w3-X38s+X8d
  P1w9-X12d+P2w3-X38s+X8d
  P1w13-X38s+P2w7-X8d+X12d (or P1w13-X38s+X8d+X12d)
  P1w9-X12d
  P1w9-X12d+P2w1-X8d
- Memory space occupied: 64 MB
- Interrupts: INTA# virtual wire
- Power: Depends on configuration. For more details, see **3.4 Power Requirements** on page 3-14.

Software Support

- *Excalibur Carrier Board Software Tools*:
  Intuitive and flexible API with source code
  Compatible with 32/64-bit Windows 7/8/10/11 & Linux kernel 3.x/4.x/5.x
  Includes application interface for NI LabView & CVI
- *Exalt Plus*: Excalibur Analysis Laboratory Tools for Windows (optional)
- GUI driven software for many of our supported protocols

1.1.3 Block Diagram

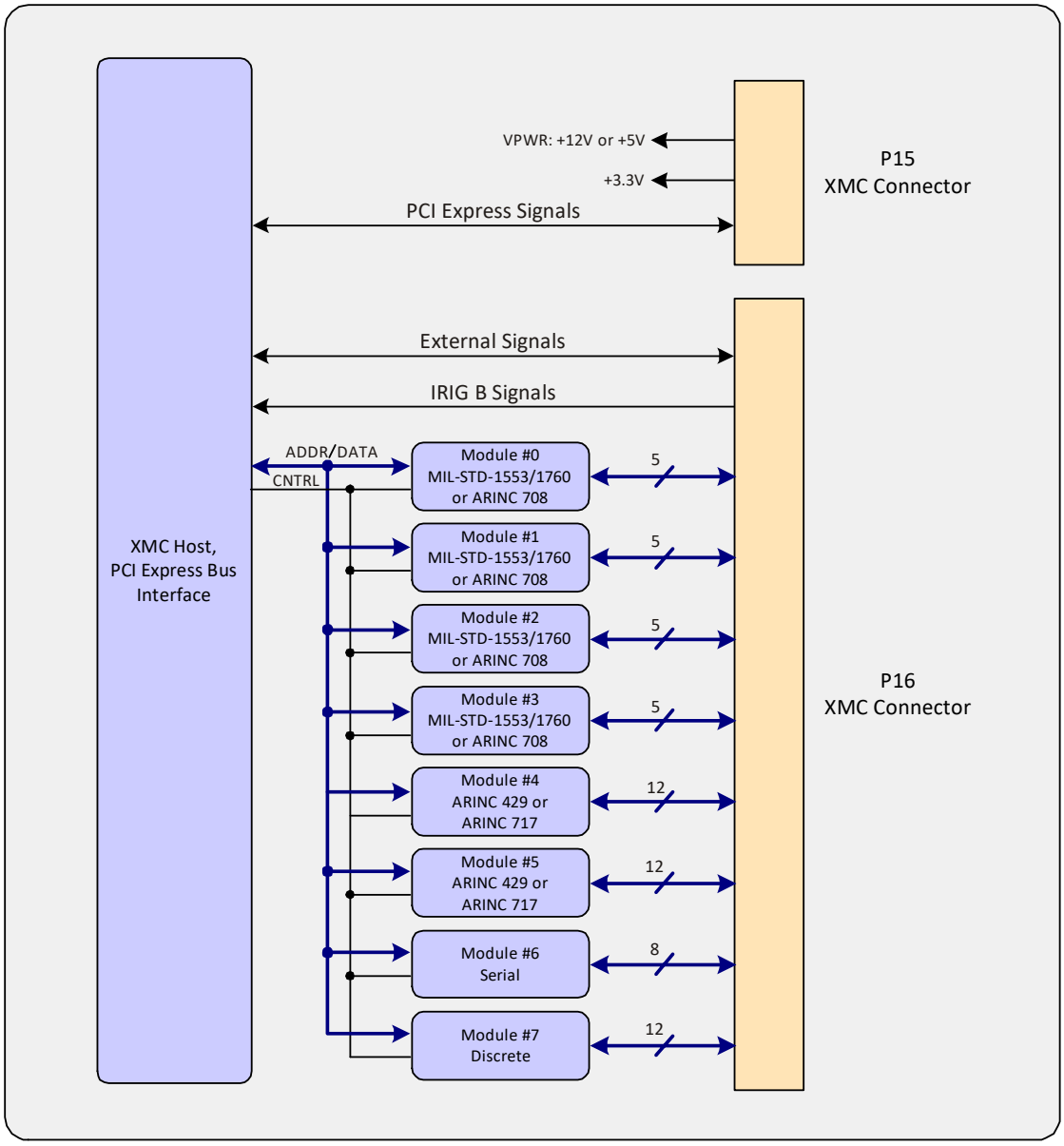

Figure 1-1 Block Diagram

1.2 Installation

For hardware and software installation instructions, see **Installation Instructions.pdf** in the root folder of the installation CD. When downloading new software from the Excalibur website, **Installation Instructions.pdf** is contained in the zip file.

The *Excalibur Installation CD* you received with your package is the most recent release of the CD as of the date of shipping. Software and documentation updates can be found and downloaded from our website: www.mil-1553.com.

The standard software provided with Excalibur boards and modules is for Windows operating systems. For more details, see **Installation Instructions.pdf**. Software for other operating systems may be available. Check on our website or write to excalibur@mil-1553.com.

1.3 Technical Support

Excalibur Systems is ready to assist you with any technical questions you may have. For technical support, visit the Technical Support page of our website (www.mil-1553.com). You can also contact us by phone. To find the location nearest you, visit to the Contact Us page of our website. Before contacting Technical Support, please see Information Required for Technical Support.

2 PCI Architecture

Chapter 2 describes the PCI Express architecture. The following topics are covered:

2.1 Memory Structure

The *EXC-8000ccXMC* requests the following memory blocks:

- The first memory block (Base Address Register 0) is 64 MB and contains the memory space for the modules on the board. For more information, see **2.8 Module Memory Space Map** on page 2-18.
- The second memory block (Base Address Register 1) is 32 KB in size and contains the DMA registers. DMA functionality is described in the software tools programmer's reference of each of your board's modules.
- The third memory block (Base Address Register 2) is 8 KB in size and contains the Global registers. For more information, see **2.5 Global Registers Map** on page 2-9.

2.2 PCI Configuration Space Header

The board includes a PCI Configuration Space Header, as required by the PCI specification. The registers contained in this header enable software to set up the Plug and Play operation of the board, and set aside system resources.

The following figure shows the PCI Express Configuration Space Header for PCI Express:

MAX_LAT	MIN_GNT	Interrupt Pin	Interrupt Line	3C H
Reserved = 0s				38 H
Reserved = 0s			Cap. pointer	34 H
Expansion ROM Base Address (Not Used)				30 H
Subsystem ID		Subsystem Vendor ID		2C H
Cardbus CIS Pointer – Not Used = 0s				28 H
Base Address Register #5 – Not Used				24 H
Base Address Register #4 – Not Used				20 H
Base Address Register #3 – Reserved				1C H
Base Address Register #2 – Global Registers				18 H
Base Address Register #1 – DMA Registers				14 H
Base Address Register #0 – Module Memory Space				10 H
BIST	Header Type = 0	Latency Timer	Cache Line Size	0C H
Class Code			Rev ID	08 H
Status Register		Command Register		04 H
Device ID		Vendor ID		00 H
31 24	**23 16**	**15 08**	**07 00**	

Figure 2-1 PCI Configuration Space Header

2.3 PCI Configuration Registers

2.3.1 Vendor Identification Register (VID) Address: 00–01 (H)

Power-up value 1405 H

Size: 16 bits

The Vendor Identification register contains the PCI Special Interest Group vendor identification number assigned to Excalibur Systems.

2.3.2 Device Identification Register (DID) Address: 02–03 (H)

Power-up value: E810 H

Size: 16 bits

The Device Identification register contains the board's device identification number.

2.3.3 PCI Command Register (PCICMD) Address: 04–05 (H)

Power-up value: 0000 H

Size: 16 bits

The PCI Command register contains the PCI Command.

Bit	Bit Name	Description
10-15	**Reserved**	Set to 0s
09	**Fast Back-to Back Enable**	Always set to 0
08	**System Error Enable**	Always set to 0
07	**Address Stepping Support**	Always set to 0
06	**Parity Error Enable**	Always set to 0
05	**VGA Palette Snoop Enable**	Always set to 0
04	**Memory Write and Invalidate Enable**	Always set to 0
03	**Special Cycle Enable**	Always set to 0
02	**Bus Master Enable**	Always set to 1
01	**Memory Access Enable**	Always set to 1
00	**I/O Access Enable**	Since the board does not use I/O space, the value of this register is ignored.

Table 2-1 PCI Command Register

2.3.4 PCI Status Register (PCISTS) Address: 06–07 (H)

Power-up value: 0080 H

Size: 16 bits

The PCI Status register contains the PCI status information for PCI Express.

Bit	Bit Name	Description
15	**Detected Parity Error**	This bit is set whenever a parity error is detected. It functions independently from the state of Command Register Bit 6. This bit may be cleared by writing a 1 to this location.
14	**Signaled System Error**	Not used
13	**Received Master Abort**	This bit is set when the device receives a master abort to terminate a transaction. This bit can be reset by writing a 1 to this location.
12	**Received Target Abort**	Not used
11	**Signaled Target Abort**	Not used
09-10	**Device Select (DEVSEL#) Timing Status**	Set to 00 (fast timing)
08	**Data Parity Reported**	Not used
07	**Fast Back-to-Back Capable**	Set to 0
06	**UDF Supported**	Set to 0
05	**66MHz capable**	Set to 0
04	**Capability List enable**	Set to 1
03	**Interrupt Status**	This bit is set when an interrupt is received.
00-02	**Reserved**	

Table 2-2 PCI Status Register

2.3.5 Revision Identification Register (RID) Address: 08 (H)

Power-up value: 01 H

Size: 8 bits

The Revision Identification register contains the revision identification number of the board.

2.3.6 Class Code Register (CLCD) Address: 09–-0B (H)

Power-up value: FF0000 H

Size: 24 bits

The Class code Register value indicates that the board does not fit into any of the defined class codes.

2.3.7 Cache Line Register Size Register (CALN) Address: 0C (H)

Power-up value: 10 H

Size: 8 bits

Not used

2.3.8 Latency Timer Register (LAT) Address: 0D (H)

Power-up value: 00 H

Size: 8 bits

Not used

2.3.9 Header Type Register (HDR) Address: 0E (H)

Power-up value: 00 H

Size: 8 bits

The board is a single function PCI device.

2.3.10 Built-In Self-Test Register (BIST) Address: 0F (H)

Power-up value: 00 H

Size: 8 bits

The Built-In Self-Test register is not implemented in the board.

2.3.11 Base Address Registers (BADR) Address: 10, 14, 18, 1C, 20, 24 (H)

Power-up value: 00000000 H for each

Size: 32 bits

The Base Address Registers are used by the system BIOS to determine the number, size and base addresses of memory pages required by the board, within host address space.

Three memory pages are required by the board: one for the module memory space, one for the Global Registers and one for the DMA registers.

Register	Offset	Size	Function
Base Address 0	10 H	64 MB	Module memory space
Base Address 1	14 H	32 KB	DMA registers
Base Address 2	18 H	8 KB	Global registers

Table 2-3 Base Address Registers Definition

Note: Each Base Address Register contains 32 bits. Since the PCI Express board uses 64-bit address space, each memory page covers two base addresses (0 – 1, 2 – 3, 4 – 5).

The following table describes the bits of the Base Address Register.

Bit	Description
04-31	Address of memory region (with lower 4 bits removed)
03	Always 1 – memory is prefetchable
01-02	Always 2 – memory may be mapped anywhere within the 64 bit memory space
00	Always 0 – indicates memory space

Table 2-4 Base Address Register

2.3.12 Cardbus CIS Pointer

Address: 28 (H)

Power-up value: 00000000 H

Size: 32 bits

The Cardbus Pointer is not implemented on the board.

2.3.13 Subsystem ID

Address: 2C (H)

Power-up value: 0000 H

Size: 16 bits

2.3.14 Subvendor ID

Address: 2E (H)

Power-up value: 0000 H

Size: 16 bits

2.3.15 Expansion ROM Base Address Register (XROM)

Address: 30 (H)

Power-up value: 00000000 H

Size: 32 bits

The Expansion ROM Space is not implemented on the board.

2.3.16 PCI Capabilities Pointer — Address: 34 (H)

Power-up value: 50 H

Size: 8 bits

The PCI Capabilities Pointer (Cap. Pointer) indicates the location of the PCI Capabilities Identification (ID) Register. The Capabilities ID Register stores a pointer to a structure within the configuration space. With a known Capabilities ID value, the associated structure can be found during the scanning process.

2.3.17 Interrupt Line Register (INTLN) — Address: 3C (H)

Power-up value: 00 H

Size: 8 bits

The Interrupt Line register indicates the interrupt routing for the PCI Controller. The value of this register is system-architecture specific. For *x*86-based PCs, the values in this register correspond with the established interrupt numbers associated with the dual 8259 controllers used in those machines; the values of 1 to F (H) correspond with the IRQ numbers 1 through 15, and the values from 10(H) to FE (H) are reserved. The value of 255 signifies either "unknown" or "no connection" for the system interrupt.

2.3.18 Interrupt Pin Register (INTPIN) — Address: 3D (H)

Power-up value: 01 H

Size: 8 bits

Set to INTA#

2.3.19 Minimum Grant Register (MINGNT) — Address: 3E (H)

Power-up value: 00 H

Size: 8 bits

The Minimum Grant register is not implemented on the board.

2.3.20 Maximum Latency Register (MAXLAT) — Address: 3F (H)

Power-up value: 00 H

Size: 8 bits

The Maximum Latency register is not implemented on the board.

2.4 Global and DMA Registers Memory Space Map

The DMA Registers are mapped as follows.

Figure 2-2 DMA Registers Memory Space Map

The Global Registers are mapped as follows.

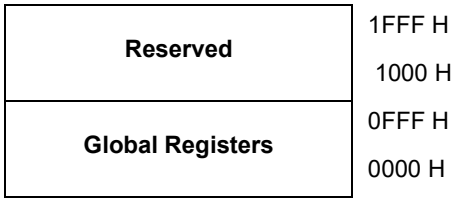

Figure 2-3 Global Registers Memory Space Map

2.5 Global Registers Map

The board global registers reside in the second memory block.

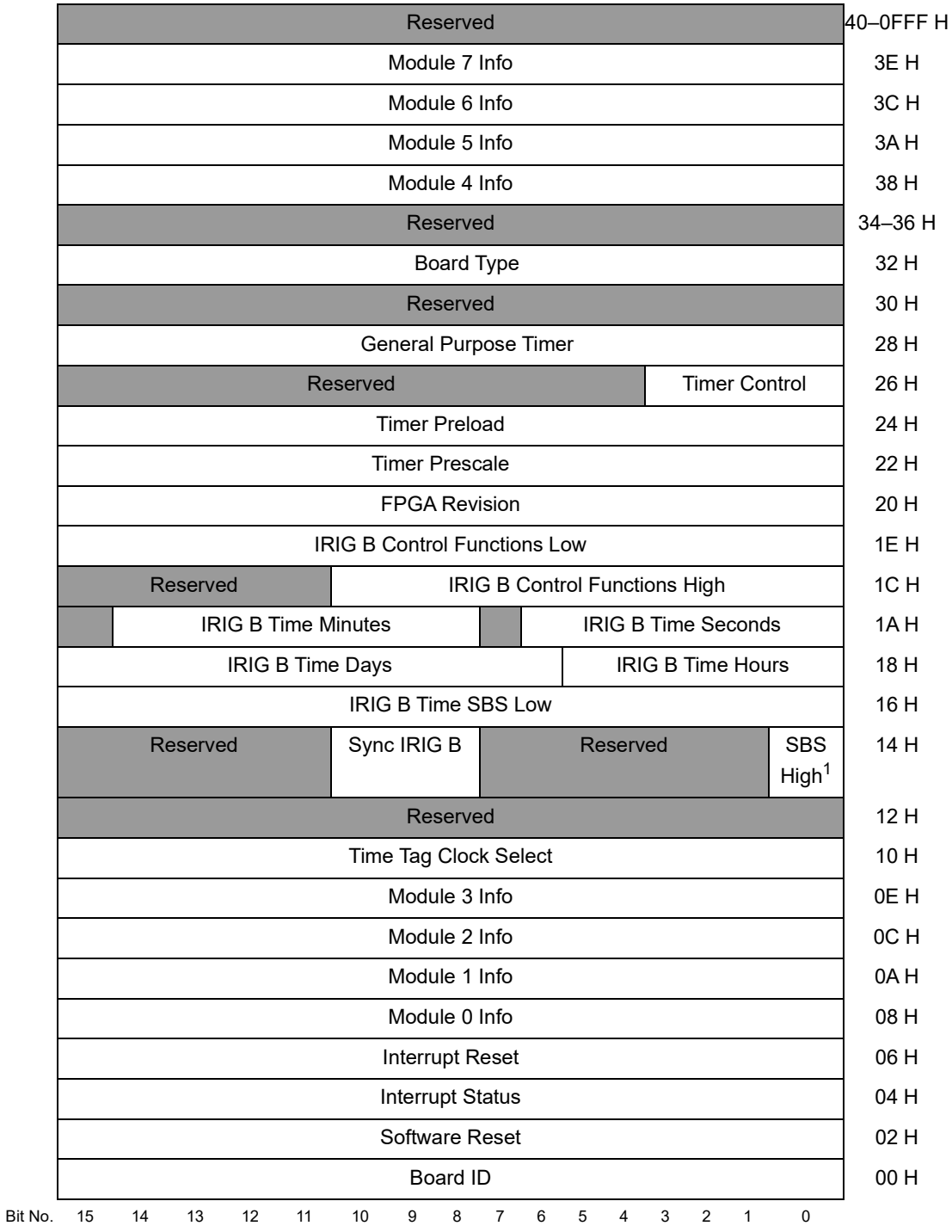

Figure 2-4 Global and IRIG B Registers Map

1. IRIG B Time SBS High Register

2.5.1 Board Identification Register

Address: 00 (H)
Length 16 bits

Read only The Board Identification register comprises the following identification items.

Bit	Description
04-15	Hard coded to the value 8E0 H
00-03	Selected ID – set to 0 by default. If you require more than one *EXC-8000ccXMC* board on the same system, contact Excalibur to order a board with a custom Selected ID.

Table 2-5 Board Identification Register

2.5.2 Software Reset Register

Address: 02 (H)
Length 16 bits

Read/Write The Software Reset register performs reset operations of the modules. Individual modules may be reset.

Bit 04, the Global Time Tag reset bit, resets all the module's Time Tag counters.

Bit	Description	
09-15	Reserved – set to 0	
08	Module 7 reset	1 = reset module 0 = no effect
07	Module 6 reset	1 = reset module 0 = no effect
06	Module 5 reset	1 = reset module 0 = no effect
05	Module 4 reset	1 = reset module 0 = no effect
04	Global time tag reset	1 = reset all time tag counters 0 = no effect
03	Module 3 reset	1 = reset module 0 = no effect
02	Module 2 reset	1 = reset module 0 = no effect
01	Module 1 reset	1 = reset module 0 = no effect
00	Module 0 reset	1 = reset module 0 = no effect

Table 2-6 Software Reset Register

2.5.3 Interrupt Status Register

Address: 04 (H)
Length 16 bits

Read only The Interrupt Status register indicates which modules are currently interrupting or if the General Purpose Timer has produced an interrupt.

Bit	Description
09-15	Reserved – set to 0
08	1 = indicates that module 7 is interrupting
07	1 = indicates that module 6 is interrupting
06	1 = indicates that module 5 is interrupting
05	1 = indicates that module 4 is interrupting
04	1 = indicates that an interrupt was generated by the General Purpose Timer (See **2.7 Global Timer Registers** on page 2-16.)
03	1 = indicates that module 3 is interrupting
02	1 = indicates that module 2 is interrupting
01	1 = indicates that module 1 is interrupting
00	1 = indicates that module 0 is interrupting

Table 2-7 Interrupt Status Register

2.5.4 Interrupt Reset Register

Address: 06 (H)
Length 16 bits

Write only The Interrupt Reset register resets the interrupting modules by writing to the relevant bits of the register.

Bit	Description
09-15	Reserved – set to 0
08	1 = Resets module 7 interrupt 0 = No effect
07	1 = Resets module 6 interrupt 0 = No effect
06	1 = Resets module 5 interrupt 0 = No effect
05	1 = Resets module 4 interrupt 0 = No effect
04	1 = Resets General Purpose Timer interrupt 0 = No effect
03	1 = Resets module 3 interrupt 0 = No effect
02	1 = Resets module 2 interrupt 0 = No effect
01	1 = Resets module 1 interrupt 0 = No effect
00	1 = Resets module 0 interrupt 0 = No effect

Table 2-8 Interrupt Reset Register

2.5.5 Module Info Registers for Modules 0 – 3

Address: 08, 0A, 0C, 0E (H)
Length 16 bits each

Read only The Module Info Registers provide identification information for each of the modules.

Bit	Description	
12-15	Module number	00 H = Module 0 Info register 01 H = Module 1 Info register 02 H = Module 2 Info register 03 H = Module 3 Info register
08-11	Reserved – set to 0	
00-07	Module type	25 H = *M8K1553Px* or *M8K1760Px* module 27 H = *M8K708* module

Table 2-9 Module Info Registers

2.5.6 Module Info Register for Modules 4 – 5

Address: 38, 3A (H)
Length 16 bits each

Read only The Module Info Registers provide identification information for each of the modules.

Bit	Description	
12-15	Module number	04 H = Module 4 Info register 05 H = Module 5 Info register
08-11	Reserved – set to 0	
00-07	Module type	24 H = *M8K429RT5* module 37 H = *M8K717* module

Table 2-10 Module Info Register

2.5.7 Module Info Register for Module 6

Address: 3C (H)
Length 16 bits

Read only The Module Info Register provides identification information for module 6.

Bit	Description	
12-15	Module number	06 H = Module 6 Info register
08-11	Reserved – set to 0	
00-07	Module type	32 H = *M8KSerial* module

Table 2-11 Module Info Register

2.5.8 Module Info Register for Module 7

Address: 3E (H)
Length 16 bits

Read only The Module Info Register provides identification information for module 7.

Bit	Description	
12-15	Module number	07 H = Module 7 Info register
08-11	Reserved – set to 0	
00-07	Module type	2D H = *M8KDiscrete* module

Table 2-12 Module Info Register

2.5.9 Time Tag Clock Select Register

Address: 10 (H)
Length 16 bits

Read/Write The Time Tag Clock Select Register is used to set either an internal (1 MHz) or external source for the board's Global Time Tag Clock. When using an External Time Tag, it is received via the EXTTCLKI pin of connector P16. See **3.3.2 Connector P16** on page 3-7.

Bit	Description	
01-15	Reserved – set to 0	
00	Time Tag Clock Select	1 = External Source 0 = Internal Source [**Default**]

Table 2-13 Time Tag Clock Select Register

2.5.10 FPGA Revision Register

Address: 20 (H)
Length 16 bits

Read only The FPGA Revision register contains the FPGA revision of the board.For example, for FPGA revision 1.5, the register would contain the value 0015 (H).

2.5.11 Board Type Register

Address: 32 (H)
Length 16 bits

Read only The Board Type register comprises the following items.

Bit	Description
00-15	Hard coded to: E810 H

Board Type Register

2.6 Global IRIG B Registers

The *EXC-8000ccXMC* is able to receive and decode standard serial IRIG B time code format signals via connector J1. The signals are 1 KHz carrier wave, sine wave, amplitude modulated, 100 peaks per second. See the IRIG B signals in **3.3.2 Connector P16** on page 3-7.

The IRIG B signal, which contains 3 types of words within each Time Code Frame, can be used to synchronize the Time Tags of the modules on the board.

1st Word	Time-of-year in binary coded decimal (BCD) notation in hours, minutes and seconds.
2nd Word	Set of bits reserved for decoding various control, identification and other special purpose functions.
3rd Word	Seconds-of-day weighted in straight binary seconds (SBS) notation

These three words can be stored and displayed in the IRIG B global registers 14 - 1E (H).

See **Figure 2-4 Global and IRIG B Registers Map** on page 2-9 for the location of the registers on the memory map.

Note: The synchronization of IRIG B time can take up to two seconds. IRIG B functions are meant to be used on an occasional basis, not on a constant basis.

2.6.1 Sync IRIG B Register

Address: 14 (H)
Bits 08 – 10

Read/Write The 3-bit Sync IRIG B register controls the synchronization of a module's Time Tags relative to the IRIG B input signal and the display of the IRIG B time within the IRIG B time registers.

Bit		Description
10	1	Set by board to indicate that the current IRIG B time has been stored in the IRIG B registers
	0	No IRIG B time has been stored in the IRIG B registers. This bit must be reset by the user after the board has written a '1'.
09	1	Stores and displays the IRIG B time and Control Functions into the 6 IRIG B registers (14-1E [H]) corresponding to the previous valid IRIG B message. If bit 08 is set, then the IRIG B time will be stored at the same time that the Time tags are reset. To calculate the realtime to which the Time tags are synchronized the user will need to **add** '1' to the value of the IRIG B time stored into these registers.
	0	The previous valid IRIG B message should not be stored in the IRIG B registers. This bit will be automatically reset by the board after the storage of the IRIG B time.
08	1	Resets and synchronizes Time Tags of all the modules to the next rising edge of the on-time Reference Point **Pr** of the IRIG B signal. Also sets Bit 09 to a value of '1' in order to store and display the IRIG B time and Control Functions into the 6 IRIG B registers.
	0	No reset/synchronization of Time tags relative to the **Pr** of the IRIG B signal. This bit will be automatically reset by board after reset of time tags

Table 2-14 Sync IRIGB Register

Note: All bits are read and write.

2.6.2 IRIG B Time SBS High Register

Address: 14 (H)
Bit 0

Read only The IRIG B Time SBS High register contains the MSB of the 17 bit straight binary representation of the seconds-of-day code word within the IRIG B message.

2.6.3 IRIG B Time SBS Low Register

Address: 16 (H)
Bits 15 – 0

Read only The IRIG B Time SBS Low register contains the lower 16 bits of the 17 bit straight binary representation of the seconds-of-day code word within the IRIG B message.

2.6.4 IRIG B Time Days Register

Address: 18 (H)
Bits 15 – 6

Read only The IRIG B Time Days register contains the days value of the BCD time-of-year subword within the IRIG B coded message.

2.6.5 IRIG B Time Hours Register

Address: 18 (H)
Bits 5 – 0

Read only The IRIG B Time Hours register contains the hours value of the BCD time-of-year subword within the IRIG B coded message.

2.6.6 IRIG B Time Minutes Register

Address: 1A (H)
Bits 14 – 8

Read only The IRIG B Time Minutes register contains the minutes value of the BCD time-of-year subword within the IRIG B coded message.

2.6.7 IRIG B Time Seconds Register

Address: 1A (H)
Bits 6 – 0

Read only The IRIG B Time Seconds register contains the seconds value of the BCD time-of-year subword within the IRIG B coded message.

2.6.8 IRIG B Control Functions Registers

High Register Address: 1C (H) / Bits 10 – 0
Low Register Address: 1E (H) / Bits 15 – 0

Read only The IRIG B time code formats reserve 27 bits known as Control Functions. The Control Functions are for user-defined encoding of various control, identification or other special purpose functions. No standard coding system exists. The control bits may be programmed in any predetermined coding system.

2.7 Global Timer Registers

See **Figure 2-4 Global and IRIG B Registers Map** on page 2-9 for location of the registers on the memory map.

2.7.1 Timer Prescale Register

Address: 22 (H)
Bits 15 – 0

Read/Write The Timer Prescale Register defines the resolution of the General Purpose Timer. It is based on the Global Time Tag Clock (nominally 1 MHz) and thus will give the General Purpose Timer resolution as follows:

Timer Prescale Register Value (DEC)	General Purpose Time Resolution (μsec)
0 or 1	1 (default)
2	2
3	3
•	•
•	•
•	•
10	10
•	•
•	•
•	•
65535	65535

Table 2-15 Timer Prescale/General Purpose Timer Resolution

Note: The Timer Prescale register can only be changed when the timer has been stopped.

2.7.2 Timer Preload Register

Address: 24 (H)
Bits 15 – 0

Read/Write The value stored in the Timer Preload Register sets the starting count value for the General Purpose Timer from which it will start to count down. The Timer Preload Register can only be changed while the timer is stopped and has a maximum count value of 65535.

Note: The General Purpose Timer will not start counting if a value of zero is stored into the Timer Preload Register.

Default value: 00 00

2.7.3 Timer Control Register

Address: 26 (H)
Bits 3 – 0

Read/Write The Timer Control Register is used to control the General Purpose Timer register. The value stored in bits 01 to 03 take effect when the General Purpose timer reaches a value of zero. Bit 00 is used to start and stop the General Purpose

Timer. The values of bits 01 – 03 can only be changed when the General Purpose Timer register is stopped.

Default value: 00 00

Bit	Description		
04-15	Reserved - set to 0		
03	Global reset on count completed	1	Causes global reset of all installed modules
		0	No effect
02	Interrupt on count completed	1	Output an interrupt (See **2.5.3 Interrupt Status Register** on page 2-11.)
		0	No effect
01	Reload mode	1	Reload mode
		0	Non-reload/One-shot mode
00	Start/Stop	1	Start
		0	Stop

Table 2-16 Timer Control Register

2.7.4 General Purpose Timer Register

Address: 28 (H)
Bits 15 – 0

Read Only

The General Purpose Timer Register stores the current count value of the General Purpose Timer. The General Purpose Timer is controlled by the Timer Control Register. When the General Purpose Timer is started it will count down to zero, at which point either an interrupt can be generated and or all installed modules can be reset.

If the General Purpose Timer is in reload mode then the current value in Timer Preload Register will be stored into the General Purpose Timer and the timer will start to count down from this value.

If the General Purpose Timer is in non-reload / one shot mode, when it reaches zero it will stop and a value of zero will be displayed in the General Purpose Timer Register. In this case bit 00 (Start/Stop bit) of the Timer Control Register will automatically be set to zero in this case. If the General purpose Timer Register is then started it will start to count from the current Timer Preload Register value automatically (without the need to do a write to the Timer Preload Register).

At any point in time, the General Purpose Timer can be stopped at the current count value. When a start is then issued, the General purpose Timer will start to count down from this current count value. If the user wishes to stop the counter and start from the original preload value or from a new preload value, this value will need to be rewritten into the Timer Preload register prior to the restarting of the General Purpose Timer register.

Note: The maximum clock period of the General Purpose Timer is 4295 seconds (1 hour, 11min & 35 Seconds).

2.8 Module Memory Space Map

The module memory space map resides in the first memory block. Each module is allocated a space of 128 KB which is mapped as shown in **Figure 2-5 Module Memory Space Map**.

For details on each module, refer to the user's manual of each module.

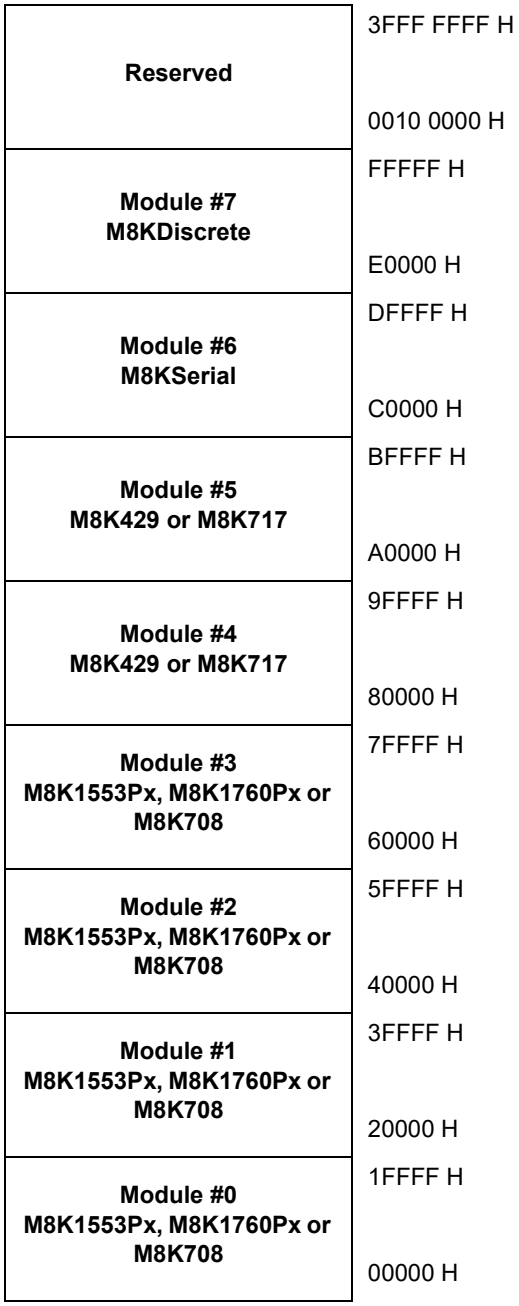

Figure 2-5 Module Memory Space Map

3 Mechanical and Electrical Specifications

Chapter 3 describes the mechanical and electrical specifications of the *EXC-8000ccXMC* board. The following topics are covered:

3.1 Board Layout

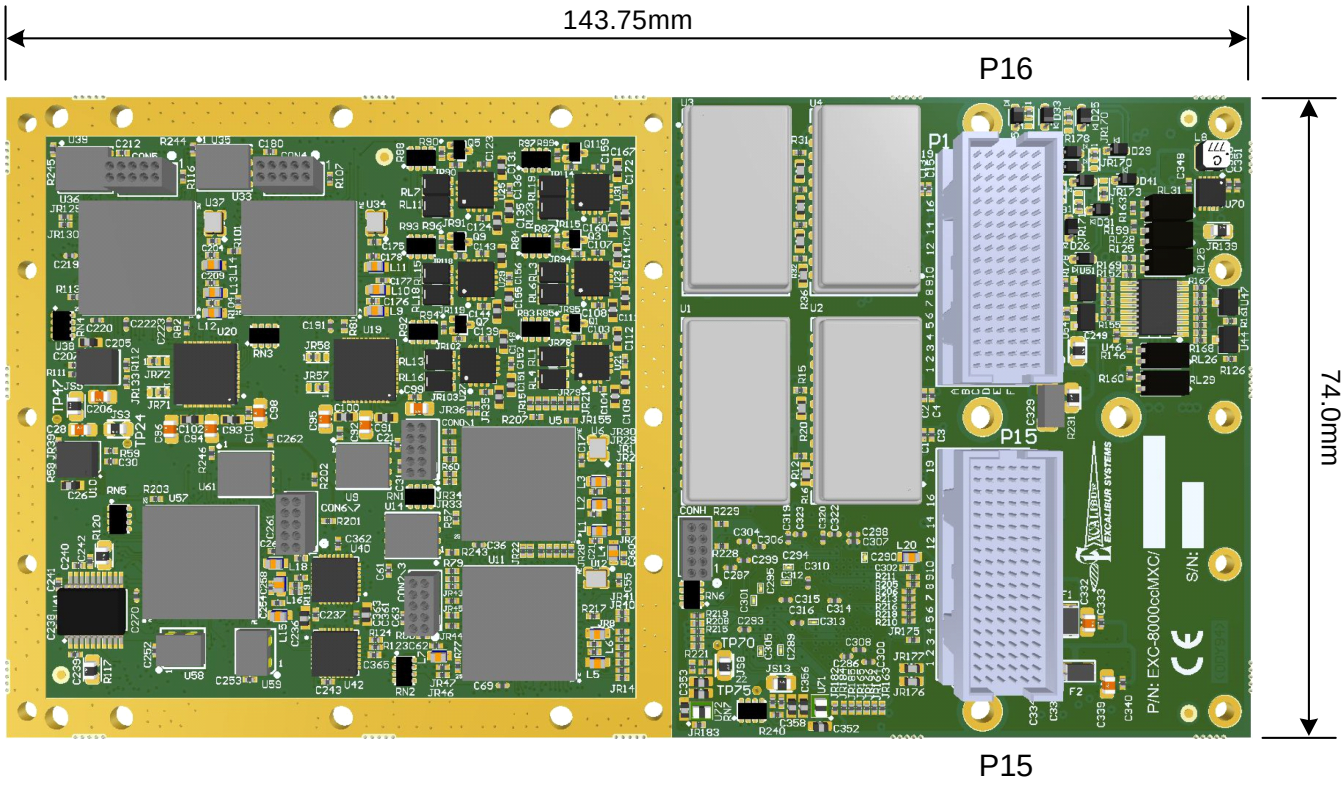

Figure 3-1 Board Layout – Top View

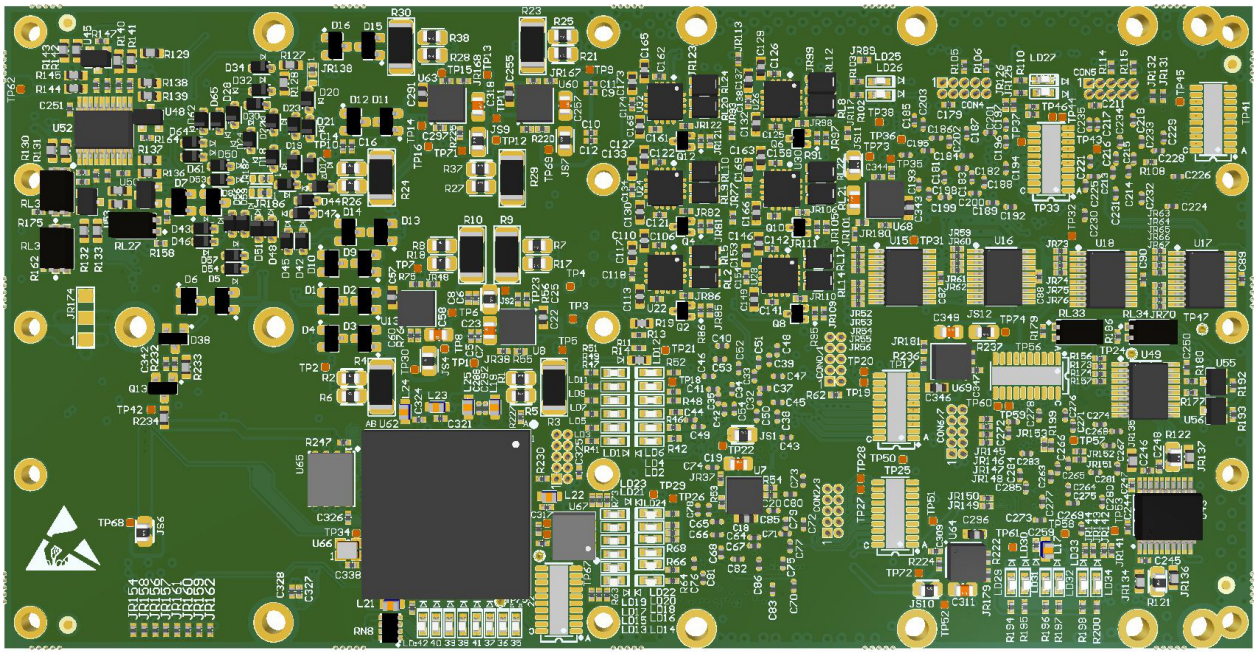

Figure 3-2 Board Layout – Bottom View

Note: The LEDs are on the bottom side of the board.

3.2 LED Indicators

The board contains the following LEDs.

LED	Color	Indication
Module 0 LEDs – MIL-STD-1553/1760 or ARINC 708		
LD2	Red	Ready
LD4	Green	BC/Concurrent-RT Mode active
LD6	Green	RT Mode active
LD8	Yellow	Monitor Mode active
LD10	Green	Bus A or Channel 0 active
LD12	Yellow	Bus B or Channel 1 active
Module 1 LEDs – MIL-STD-1553/1760 or ARINC 708		
LD1	Red	Ready
LD3	Green	BC/Concurrent-RT Mode active
LD5	Green	RT Mode active
LD7	Yellow	Monitor Mode active
LD9	Green	Bus A or Channel 0 active
LD11	Yellow	Bus B or Channel 1 active
Module 2 LEDs – MIL-STD-1553/1760 or ARINC 708		
LD14	Red	Ready
LD16	Green	BC/Concurrent-RT Mode active
LD18	Green	RT Mode active
LD20	Yellow	Monitor Mode active
LD22	Green	Bus A or Channel 0 active
LD24	Yellow	Bus B or Channel 1 active
Module 3 LEDs – MIL-STD-1553/1760 or ARINC 708		
LD13	Red	Ready
LD15	Green	BC/Concurrent-RT Mode active
LD17	Green	RT Mode active
LD19	Yellow	Monitor Mode active
LD21	Green	Bus A or Channel 0 active
LD23	Yellow	Bus B or Channel 1 active
Module 4 LEDs – ARINC 429/717		
LD25	Yellow	ON – Module ready
		Flashing – Receive activity on channels 0–4
LD26	Green	ON – Module ready
		Flashing – Transmit activity on channels 0–4

Table 3-1 LED Indicators

LED	Color	Indication
Module 5 LEDs – ARINC 429/717		
LD27	Yellow	ON – Module ready
		Flashing – Receive activity on channels 0–4
LD28	Green	ON – Module ready
		Flashing – Transmit activity on channels 0–4
Module 6 LEDs – Serial		
LD29	Green	Transmit activity on Channel 0
LD30	Yellow	Receive activity on Channel 0
LD31	Green	Transmit activity on Channel 1
LD32	Yellow	Receive activity on Channel 1
Module 7 LEDs – Discrete		
LD33	Green	ON – Module ready
		OFF – Module started
LD34	Red	ON – Module ready
		OFF – Trigger received
Board LEDs		
LD35	Green	Module 0 Ready
LD36	Green	Module 1 Ready
LD37	Green	Module 2 Ready
LD41	Green	Module 3 Ready
LD38	Green	Module 4 Ready
LD39	Green	Module 5 Ready
LD40	Green	Module 6 Ready
LD42	Green	Module 7 Ready

Table 3-1 LED Indicators (Continued)

3.3 Connectors

The *EXC-8000ccXMC* contains the following connectors:

- Connector P15 for PCI Express and power signals, on page 3-5
- Connector P16 for passing all module I/O and External Signals, on page 3-7

3.3.1 Connector P15

Connector P15 is a 114-pin XMC SMD male differential connector array for PCI Express and power signals.

P/N: Samtec ASP-103614-01 114-pin XMC Male Array (6x19) Plug Connector, 1.27mm pitch

The mating connector (on the carrier board) is:

P/N: Samtec ASP-103612-01 114-pin XMC Female Array (6x19) Socket Connector, 1.27mm pitch

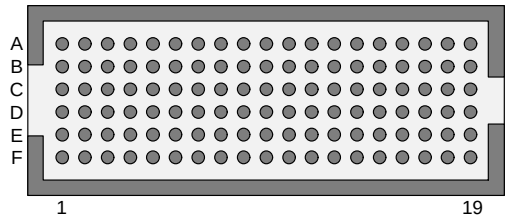

Figure 3-3 Connector P15 – Component Side View

Table 3-2 lists the connector P15 pinouts and Table 3-3 describes the signals.

	A	B	C	D	E	F
1	PCIe_Tx0_p	PCIe_Tx0_n	+3.3V	N/C	N/C	VPWR
2	GND	GND	N/C	GND	GND	SYSRESETn
3	N/C	N/C	+3.3V	N/C	N/C	VPWR
4	GND	GND	N/C	GND	GND	Reserved
5	N/C	N/C	+3.3V	N/C	N/C	VPWR
6	GND	GND	N/C	GND	GND	N/C
7	N/C	N/C	+3.3V	N/C	N/C	VPWR
8	GND	GND	TDI	GND	GND	N/C
9	N/C	N/C	N/C	N/C	N/C	VPWR
10	GND	GND	TDO	GND	GND	Reserved
11	PCIe_Rx0_p	PCIe_Rx0_n	Reserved	N/C	N/C	VPWR
12	GND	GND	Reserved	GND	GND	MPRESENTn
13	N/C	N/C	N/C	N/C	N/C	VPWR
14	GND	GND	Reserved	GND	GND	Reserved
15	N/C	N/C	N/C	N/C	N/C	VPWR
16	GND	GND	N/C	GND	GND	Reserved
17	N/C	N/C	N/C	N/C	N/C	N/C
18	GND	GND	N/C	GND	GND	N/C
19	PCIe_REF_CLK+	PCIe_REF_CLK-	N/C	N/C	N/C	N/C

Table 3-2 Connector P15 Pinouts

Note: The suffix 'n' represents an active low signal.

Signal Name	Description
+3.3V	+3.3 power supply (input).
GND	Ground.
MPRESENTn	XMC module present; this signal is connected to Ground on the board (output)
N/C	Not connected.
PCIe_REF_CLK+/-	PCI Express 100 MHz Differential reference clock (input).
PCIe_Rx0_n	PCI Express x1 lane receive input differential pair negative signal (input).
PCIe_Rx0_p	PCI Express x1 lane receive input differential pair positive signal (input).
PCIe_Tx0_n	PCI Express x1 lane transmit output differential negative signal (output).
PCIe_Tx0_p	PCI Express x1 lane transmit output differential positive signal (output).
Reserved	Reserved for future use.
SYSRESETn	Global reset signal (input).
TDO/I	JTAG TDO/TDI; the TDO and TDI signals are not used on this board, and are connected directly together.
VPWR	VPWR power supply (input), either +12V or +5V.

Table 3-3 Connector P15 Signal Descriptions

Note: The suffix ‘n’ represents an active low signal.

3.3.2 Connector P16

Connector P16 is a 114-pin XMC SMD male differential connector array for passing signals for all module I/O and External Signals.

P/N: Samtec ASP-103614-01 114-pin XMC Male Array (6x19) Plug Connector, 1.27mm pitch

The mating connector (on the carrier board) is:

P/N: Samtec ASP-103612-01 114-pin XMC Female Array (6x19) Socket Connector, 1.27mm pitch

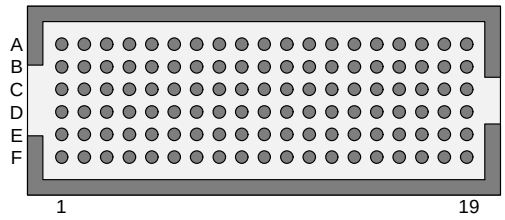

Figure 3-4 Connector P16 – Component Side View

Table 3-4 lists the connector P16 pinouts in order of pin number and Table 3-5 describes the signals. Table 3-5 is organized by module.

In addition to these pinout tables, there are tables that list the pinouts for each of the supported VITA profiles. See **Appendix A VITA XMC to VPX Signal Mapping Profiles** on page A-1.

	A	B	C	D	E	F
1	M0BUSA_p	M0BUSA_n	SHIELD	M0BUSB_p	M0BUSB_n	SHIELD
2	GND	GND	M1BUSA_p	GND	GND	M5CH0_p
3	SHIELD	SHIELD	M1BUSA_n	GND	GND	M5CH0_n
4	GND	GND	M1BUSB_p	GND	GND	M5CH1_p
5	M4CH0_p	M4CH0_n	M1BUSB_n	M4CH1_p	M4CH1_n	M5CH1_n
6	GND	GND	M2BUSA_p	GND	GND	M5CH2_p
7	M4CH2_p	M4CH2_n	M2BUSA_n	M4CH3_p	M4CH3_n	M5CH2_n
8	GND	GND	M2BUSB_p	GND	GND	M5CH3_p
9	M4CH4717TX_p	M4CH4717Tx_n	M2BUSB_n	Reserved/ M4CH5717Rx_p	Reserved/ M4CH5717Rx_n	M5CH3_n
10	GND	GND	SHIELD	GND	GND	M5CH4717TX_p
11	M6_485_422T0	M6_232T_485n_422Tn0	SHIELD	M6_232R_422R0	M6_422Rn0	M5CH4717Tx_n
12	GND	GND	M3BUSA_p	GND	GND	Reserved/ M5CH5717Rx_p
13	M6_485_422T1	M6_232T_485n_422Tn1	M3BUSA_n	M6_232R_422R1	M6_422Rn1	Reserved/ M5CH5717Rx_n
14	GND	GND	M3BUSB_p	GND	GND	SHIELD
15	M7GNDDS04	M7IO0_IRIGBIN	M3BUSB_n	M7IO5	M7IO6	EXTTRSTn
16	GND	GND	SHIELD	GND	GND	EXTTRSOn
17	M7IO1_EXTTCLKI	M7IO2_EXTTCLKO	EXTTCLKI	M7IO7	M7IO8	Reserved
18	GND	GND	EXTTCLKO	GND	GND	IRIGBIN
19	M7IO3_EXTTRSTn	M7IO4_EXTTRSOn	SHIELD	M7IO9	M7GNDDS59	SHIELD

Table 3-4 Connector P16 Pinouts

Note: The suffix 'n' represents an active low signal.

Table 3-5 describes the connector P16 signals. This table is organized by module number, with External Signals at the end of the table.

Note:

- For many pins, the signal varies depending on the modules ordered and whether there are External Signals. For example, when the *EXC-8000ccXMC* is ordered with a Discrete module, Pin A17 of connector P16 is either Module 7 Discrete 0 or External Time Tag Clock Input, depending on whether it was ordered with External Signals.
- The suffix 'n' represents an active low signal.

Signal Name	P16 Pin #	Description
Module 0 – MIL-STD-1553/1760 or ARINC 708		
M0BUSA_p	A1	Module 0 MIL-STD-1553/1760 Bus A High connection/ Module 0 ARINC 708 Channel 0 High connection
M0BUSA_n	B1	Module 0 MIL-STD-1553/1760 Bus A Low connection/ Module 0 ARINC 708 Channel 0 Low connection
M0BUSB_p	D1	Module 0 MIL-STD-1553/1760 Bus B High connection/ Module 0 ARINC 708 Channel 1 High connection
M0BUSB_n	E1	Module 0 MIL-STD-1553/1760 Bus B Low connection/ Module 0 ARINC 708 Channel 1 Low connection
Module 1 – MIL-STD-1553/1760 or ARINC 708		
M1BUSA_p	C2	Module 1 MIL-STD-1553/1760 Bus A High connection/ Module 1 ARINC 708 Channel 0 High connection
M1BUSA_n	C3	Module 1 MIL-STD-1553/1760 Bus A Low connection Module 1 ARINC 708 Channel 0 Low connection
M1BUSB_p	C4	Module 1 MIL-STD-1553/1760 Bus B High connection Module 1 ARINC 708 Channel 1 High connection
M1BUSB_n	C5	Module 1 MIL-STD-1553/1760 Bus B Low connection Module 1 ARINC 708 Channel 1 Low connection
Module 2 – MIL-STD-1553/1760 or ARINC 708		
M2BUSA_p	C6	Module 2 MIL-STD-1553/1760 Bus A High connection/ Module 2 ARINC 708 Channel 0 High connection
M2BUSA_n	C7	Module 2 MIL-STD-1553/1760 Bus A Low connection Module 2 ARINC 708 Channel 0 Low connection
M2BUSB_p	C8	Module 2 MIL-STD-1553/1760 Bus B High connection Module 2 ARINC 708 Channel 1 High connection
M2BUSB_n	C9	Module 2 MIL-STD-1553/1760 Bus B Low connection Module 2 ARINC 708 Channel 1 Low connection
Module 3 – MIL-STD-1553/1760 or ARINC 708		
M3BUSA_p	C12	Module 3 MIL-STD-1553/1760 Bus A High connection/ Module 3 ARINC 708 Channel 0 High connection
M3BUSA_n	C13	Module 3 MIL-STD-1553/1760 Bus A Low connection Module 3 ARINC 708 Channel 0 Low connection

Table 3-5 Connector P15 Signal Descriptions

Signal Name	P16 Pin #	Description
M3BUSB_p	C14	Module 3 MIL-STD-1553/1760 Bus B High connection Module 3 ARINC 708 Channel 1 High connection
M3BUSB_n	C15	Module 3 MIL-STD-1553/1760 Bus B Low connection Module 3 ARINC 708 Channel 1 Low connection
Module 4 – ARINC 429/717		
M4CH0_p	A5	Module 4 Channel 0 ARINC 429 High Line connection
M4CH0_n	B5	Module 4 Channel 0 ARINC 429 Low Line connection
M4CH1_p	D5	Module 4 Channel 1 ARINC 429 High Line connection
M4CH1_n	E5	Module 4 Channel 1 ARINC 429 Low Line connection
M4CH2_p	A7	Module 4 Channel 2 ARINC 429 High Line connection
M4CH2_n	B7	Module 4 Channel 2 ARINC 429 Low Line connection
M4CH3_p	D7	Module 4 Channel 3 ARINC 429 High Line connection
M4CH3_n	E7	Module 4 Channel 3 ARINC 429 Low Line connection
M4CH4717TX_p	A9	Module 4 Channel 4 ARINC 429 High Line connection/ Module 4 ARINC 717 Transmit Channel High Line connection
M4CH4717Tx_n	B9	Module 4 Channel 4 ARINC 429 Low Line connection/ Module 4 ARINC 717 Transmit Channel Low Line connection
Reserved/ M4CH5717Rx_p	D9	Module 4 Reserved for ARINC 429 module/ Module 4 ARINC 717 Receive Channel High Line connection
Reserved/ M4CH5717Rx_n	E9	Module 4 Reserved for ARINC 429 module/ Module 4 ARINC 717 Receive Channel Low Line connection
Module 5 – ARINC 429/717		
M5CH0_p	F2	Module 5 Channel 0 ARINC 429 High Line connection
M5CH0_n	F3	Module 5 Channel 0 ARINC 429 Low Line connection
M5CH1_p	F4	Module 5 Channel 1 ARINC 429 High Line connection
M5CH1_n	F5	Module 5 Channel 1 ARINC 429 Low Line connection
M5CH2_p	F6	Module 5 Channel 2 ARINC 429 High Line connection
M5CH2_n	F7	Module 5 Channel 2 ARINC 429 Low Line connection
M5CH3_p	F8	Module 5 Channel 3 ARINC 429 High Line connection
M5CH3_n	F9	Module 5 Channel 3 ARINC 429 Low Line connection
M5CH4717TX_p	F10	Module 5 Channel 4 ARINC 429 High Line connection/ Module 5 ARINC 717 Transmit Channel High Line connection
M5CH4717Tx_n	F11	Module 5 Channel 4 ARINC 429 Low Line connection/ Module 5 ARINC 717 Transmit Channel Low Line connection
Reserved/ M5CH5717Rx_p	F12	Module 5 Reserved for ARINC 429 module/ Module 5 ARINC 717 Receive Channel High Line connection
Reserved/ M5CH5717Rx_n	F13	Module 5 Reserved for ARINC 429 module/ Module 5 ARINC 717 Receive Channel Low Line connection

Table 3-5 Connector P15 Signal Descriptions (Continued)

Signal Name	P16 Pin #	Description
Module 6 – Serial		
M6_485_422T0	A11	Not connected for RS-232 channel/ Module 6 Channel 0 RS-485 High Line connection/ Module 6 Channel 0 RS-422 Transmit High Line connection
M6_232T_485n_422Tn0	B11	Module 6 Channel 0 RS-232 Transmit Line connection/ Module 6 Channel 0 RS-485 Low Line connection/ Module 6 Channel 0 RS-422 Transmit Low Line connection
M6_485_422T1	A13	Not connected for RS-232 channel/ Module 6 Channel 1 RS-485 High Line connection/ Module 6 Channel 1 RS-422 Transmit High Line connection
M6_232T_485n_422Tn1	B13	Module 6 Channel 1 RS-232 Transmit Line connection/ Module 6 Channel 1 RS-485 Low Line connection/ Module 6 Channel 1 RS-422 Transmit Low Line connection
M6_232R_422R0	D11	Module 6 Channel 0 RS-232 Receive Line connection/ Module 6 Channel 0 RS-422 Receive High Line connection/ Not connected for RS-485 channel
M6_422Rn0	E11	Module 6 Channel 0 RS-422 Receive Low Line connection
M6_232R_422R1	D13	Module 6 Channel 1 RS-232 Receive Line connection/ Module 6 Channel 1 RS-422 Receive High Line connection/ Not connected for RS-485 channel
M6_422Rn1	E13	Module 6 Channel 1 RS-422 Receive Low Line connection
Module 7 – Discrete		
M7GNDDS04	A15	Module 7 ground reference for input and output Discretes 0–4
M7GNDDS59	E19	Module 7 ground reference for input and output Discretes 5–9
M7IO0_IRIGBIN	B15	Module 7 Discrete 0/ IRIG B120 Input (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
M7IO1_EXTTCLKI	A17	Module 7 Discrete 0/ External Time Tag Clock Input (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
M7IO2_EXTTCLKO	B17	Module 7 Discrete 2/ Global Time Tag Clock TTL Output (1 MHz) (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
M7IO3_EXTTRSTn	A19	Module 7 Discrete 3/ External Time Tag Reset TTL Input (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
M7IO4_EXTTRSOn	B19	Module 7 Discrete 4/ Global Time Tag Reset TTL Output (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
M7IO5	D15	Module 7 Discrete 5
M7IO6	E15	Module 7 Discrete 6
M7IO7	D17	Module 7 Discrete 7

Table 3-5 Connector P15 Signal Descriptions (Continued)

Signal Name	P16 Pin #	Description
M7IO8	E17	Module 7 Discrete 8
M7IO9	D19	Module 7 Discrete 9
External Signals		
EXTTCLKI	C17	External Time Tag Clock Input. This signal supplies an external global clock for the Time Tags of all the modules. Use this signal to synchronize the Time Tags that are implemented on the modules[1] to other boards or systems.[2] See **2.5.9 Time Tag Clock Select Register** on page 2-13. This signal is a standard TTL input (Vih_min = 2.0V) with a nominal 1 MHz clock of 50% duty cycle (+/-10%) in reference to the ground pin. Our internal Time Tag clock source has a 50 ppm stability.
EXTTCLKO	C18	Global Time Tag Clock TTL Output (1 MHz). This signal is the Global Clock that is supplied to all the modules for their Time Tags. Use the signal to synchronize other boards or systems to the Time Tags that are implemented on the modules.[1] The source of this clock is either the External Time Tag Clock EXTTCLKI[2] or the Internal Time Tag Clock. See **2.5.9 Time Tag Clock Select Register** on page 2-13.
EXTTRSTn	F15	External Time Tag Reset TTL Input. Use this low active pulsed signal (minimum 100 nsec.wide) to simultaneously reset the Time Tags of all the modules from an external source. Use the signal to synchronize these Time Tags to other boards or systems.[2]
EXTTRSOn	F16	Global Time Tag Reset TTL Output. This low active signal is activated by either the internal Global Time Tag signal (see **2.5.2 Software Reset Register** on page 2-10) or from the External Time Tag signal (EXTTRSOn).[2] Use the signal to synchronize other boards or systems to the Time Tags that are implemented on the modules.[1]
IRIGBIN	F18	IRIG B120 Input. The signal should have the following specifications: B = 100 pulses per second (PPS), 10 msec count 1 = Sine wave carrier, amplitude modulated, with a 3:1 modulation ratio at 3Vpp typical amplitude 2 = 1 kHz carrier wave (1 msec resolution) 0 = Binary Coded Decimal (BCD) time-of-year code word Control Functions (CF) depending on the user application Straight Binary Second (SBS) of day (0 – 86400)
Other		
GND		Ground
SHIELD		Provided for cables shield connection. This signal is connected to the case of the computer/system through the board's mechanical mountings.

Table 3-5 Connector P15 Signal Descriptions (Continued)

1. See the manual for each module for a description of how the Time Tag clock is implemented, if used, for that module.
2. See **3.3.2.1 Synchronizing with an External Source** on page 3-12.

3.3.2.1 Synchronizing with an External Source

This section describes how to synchronize the clock to and from an external system, or between Excalibur boards.

Synchronizing an Excalibur Board to an External System

To synchronize an Excalibur Board to an external system, the external clock source and the external reset must be connected to the EXTTCLKI and the EXTTRSTIn signals respectively.

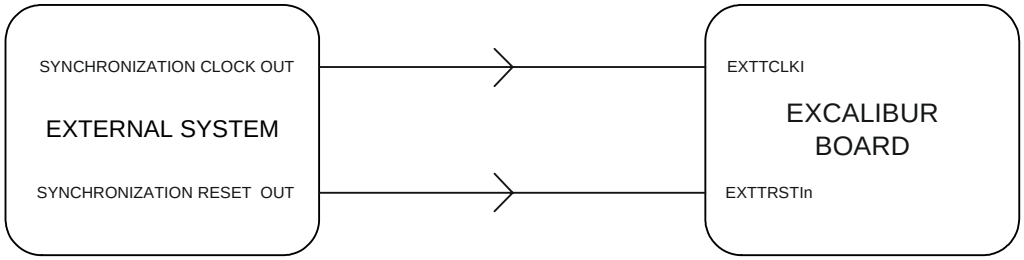

Figure 3-5 Synchronizing an Excalibur Board to an External System

Synchronizing an External System to an Excalibur Board

To synchronize an external system to an Excalibur board, the EXTTCLKO and the EXTTRSOn signals need to be connected to the external clock source and the external reset respectively.

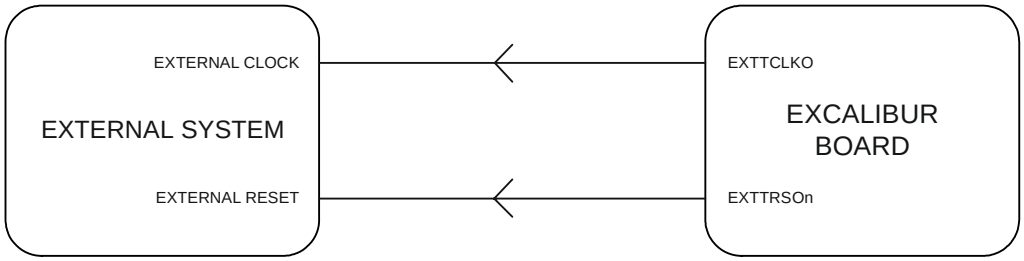

Figure 3-6 Synchronizing an External System to an Excalibur Board

Note: The synchronization clock and reset signals may be connected to multiple targets to achieve system wide synchronization.

Synchronizing Multiple Boards

To synchronize multiple boards the EXTTCLKO and the EXTTRSOn signals of one board need to be connected to all the EXTTCLKI and the EXTTRSTIn signals respectively, of the remaining boards.

Note: Contact Excalibur to order a board with a Selected ID other than 0. See **2.5.1 Board Identification Register** on page 2-10.

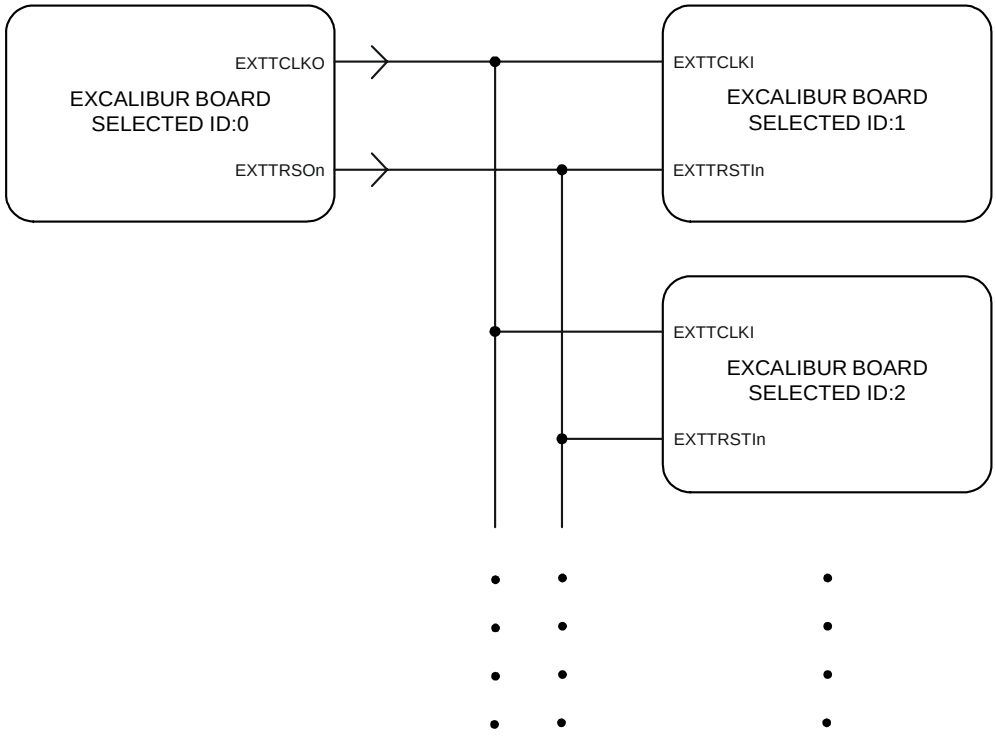

Figure 3-7 Synchronization Between Boards

3.4 Power Requirements

The maximum power requirements for the *EXC-8000ccXMC* are as follows:

- +3.3V @ 400mA
- VPWR: +12V @ 350mA (standby)
- For each MIL-STD-1553/1760 module (modules 0–3): +12V @ 200mA (transmitting maximum load and 100% duty cycle)
- For each ARINC 429 module (modules 4–5) (5 channels): +12V @ 125mA (all channels transmitting at high speed, maximum load and 100% duty cycle)

4 Ordering Information

Chapter 4 lists the part numbers to use when ordering the *EXC-8000ccXMC*. All boards come with a Serial module and a Discrete module. Table 4-1 lists all the available ordering options. For ordering examples, see **4.1 Part Number Examples** on page 4-5.

Not all module signals are wired for all VITA XMC to VPX Signal Mapping profiles. See **Appendix A VITA XMC to VPX Signal Mapping Profiles** on page A-1. Before choosing a part number, verify that the VITA XMC Signal Mapping profile you will be using can support the modules you want.

In addition, the following VITA profiles do not have External Signals by default:

- P2w7-X8d+X12d
- P1w9-X12d
- P1w9-X12d+P2w1-X8d

You can order a board with External Signals for these profiles, but it will have five less Discretes, and it requires a special part number. Contact Excalibur Sales. See **1.3 Technical Support** on page 1-6.

All boards can be ordered with conformal coating and/or ruggedized.

- Add the **-001** suffix for conformal coating.
- Add the **-R** suffix for ruggedized option (bonded components).

Part Number	Description
EXC-8000ccXMC/JxI0	Multiprotocol XMC board with: • 1 Serial module at module location 6. • 1 Discrete module at module location 7. Replace **Jx** with one of the Serial module codes. See Table 4-2.
EXC-8000ccXMC/XxXxJxI0	Multiprotocol XMC board with: • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 0. • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 1. • 1 Serial module at module location 6. • 1 Discrete module at module location 7. Replace **Xx** with one of the MIL-STD-1553, MIL-STD-1760 or ARINC 708 module codes, and replace **Jx** with one of the Serial module codes. See Table 4-2.

Table 4-1 Ordering Information

EXC-8000ccXMC/XxXxXxXxJxI0	Multiprotocol XMC board with: • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 0. • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 1. • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 2. • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 3. • 1 Serial module at module location 6. • 1 Discrete module at module location 7. Replace **Xx** with one of the MIL-STD-1553, MIL-STD-1760 or ARINC 708 module codes, and replace **Jx** with one of the Serial module codes. See Table 4-2.
EXC-8000ccXMC/XxXxXxXxA0A0JxI0	Multiprotocol XMC board with: • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 0. • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 1. • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 2. • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 3. • 2 ARINC 429 modules at module location 4 and 5. • 1 Serial module at module location 6. • 1 Discrete module at module location 7. Replace **Xx** with one of the MIL-STD-1553, MIL-STD-1760 or ARINC 708 module codes, and replace **Jx** with one of the Serial module codes. See Table 4-2.
EXC-8000ccXMC/XxXxXxXxNxNxJxI0	Multiprotocol XMC board with: • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 0. • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 1. • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 2. • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 3. • 2 ARINC 717 modules at module location 4 and 5. • 1 Serial module at module location 6. • 1 Discrete module at module location 7. Replace **Xx** with one of the MIL-STD-1553, MIL-STD-1760 or ARINC 708 module codes, replace **Nx** with one of the ARINC 717 module codes and replace **Jx** with one of the Serial module codes. See Table 4-2.

Table 4-1 Ordering Information (Continued)

EXC-8000ccXMC/XxXxA0A0JxI0	Multiprotocol XMC board with: • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 0. • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 1. • 2 ARINC 429 modules at module location 4 and 5. • 1 Serial module at module location 6. • 1 Discrete module at module location 7. Replace **Xx** with one of the MIL-STD-1553, MIL-STD-1760 or ARINC 708 module codes, and replace **Jx** with one of the Serial module codes. See Table 4-2.
EXC-8000ccXMC/XxXxNxNxJxI0	Multiprotocol XMC board with: • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 0. • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 1. • 2 ARINC 717 modules at module location 4 and 5. • 1 Serial module at module location 6. • 1 Discrete module at module location 7. Replace **Xx** with one of the MIL-STD-1553, MIL-STD-1760 or ARINC 708 module codes, replace **Nx** with one of the ARINC 717 module codes and replace **Jx** with one of the Serial module codes. See Table 4-2.
EXC-8000ccXMC/A0A0JxI0	Multiprotocol XMC board with: • 2 ARINC 429 modules at module location 4 and 5. • 1 Serial module at module location 6. • 1 Discrete module at module location 7. Replace **Jx** with one of the Serial module codes. See Table 4-2.
EXC-8000ccXMC/NxNxJxI0	Multiprotocol XMC board with: • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 0. • 1 MIL-STD-1553, MIL-STD-1760 or ARINC 708 module at module location 1. • 2 ARINC 717 modules at module location 4 and 5. • 1 Serial module at module location 6. • 1 Discrete module at module location 7. Replace **Nx** with one of the ARINC 717 module codes and replace **Jx** with one of the Serial module codes. See Table 4-2.

Table 4-1 Ordering Information (Continued)

Table 4-2 lists the module codes. Replace **Xx** in the board's part number (Table 4-1) with the module code of the desired MIL-STD-1553/1760 or ARINC 708 module. Replace **Nx** with one of the ARINC 717 module codes and replace **Jx** with one of the Serial module codes.

Protocol Type	Module Code	Description
MIL-STD-1553	**F*x***	MIL-STD-1553 multi-function module. Replace '**F*x***' with one of the following: **F1** = Transformer Coupled **F2** = Direct Coupled
MIL-STD-1553 Single Function	**T*x***	MIL-STD-1553 single function module. Replace '**T*x***' with one of the following: **T1** = Transformer Coupled **T2** = Direct Coupled
MIL-STD-1553 Monitor Only	**G*x***	MIL-STD-1553 module for monitoring only. Replace '**G*x***' with one of the following: **G1** = Transformer Coupled **G2** = Direct Coupled
MIL-STD-1553 Single Function, Monitor Only	**V*x***	MIL-STD-1553 single function module for monitoring only. Replace '**V*x***' with one of the following: **V1** = Transformer Coupled **V2** = Direct Coupled
MIL-STD-1760	**L*x***	MIL-STD-1760 multi-function module. Replace '**L*x***' with one of the following: **L1** = Transformer Coupled **L2** = Direct Coupled
MIL-STD-1760 Single Function	**H*x***	MIL-STD-1760 single function module. Replace '**H*x***' with one of the following: **H1** = Transformer Coupled **H2** = Direct Coupled
MIL-STD-1760 Monitor Only	**M*x***	MIL-STD-1760 module for monitoring only. Replace '**M*x***' with one of the following: **M1** = Transformer Coupled **M2** = Direct Coupled
MIL-STD-1760 Single Function, Monitor Only	**K*x***	MIL-STD-1760 single function module for monitoring only. Replace '**K*x***' with one of the following: **K1** = Transformer Coupled **K2** = Direct Coupled
ARINC 708/453	**C0**	ARINC 708/453 with 2 channels, software selectable as transmit or receive.
ARINC 429	**A0**	ARINC 429 module with 5 channels, software selectable as transmit or receive.
ARINC 717	**N*x***	ARINC 717 module with 2 channels, one transmit and one receive. Replace '**N*x***' with one of the following: **N1** = HBP transmit channel **N2** = BPRZ transmit channel

Table 4-2 Module Codes

Protocol Type	Module Code	Description
Serial	**J*x***	Serial module with 2 channels of RS-232/422/485. Replace '**J*x***' with one of the following: **J1** = Channel 0 is RS-232; Channel 1 is RS-232 **J2** = Channel 0 is RS-232; Channel 1 is RS-485 **J3** = Channel 0 is RS-232; Channel 1 is RS-422 **J4** = Channel 0 is RS-485; Channel 1 is RS-485 **J5** = Channel 0 is RS-485; Channel 1 is RS-422 **J6** = Channel 0 is RS-422; Channel 1 is RS-422
Discrete	**I0**	Discrete module with 10 channels, software selectable as input/output and TTL/Avionics 0–32V thresholds.

Table 4-2 Module Codes (Continued)

4.1 Part Number Examples

Example: EXC-8000ccXMC/F1T2J3I0

This is an *EXC-8000ccXMC* board with:
A MIL-STD-1553, multi-function, transformer coupled module (F1) at module location 0.
A MIL-STD-1553, single function, direct coupled module (T2) at module location 1.
A Serial module (J3) with channel 0 as RS-232 and channel 1 as RS-422 at module location 6.
A Discrete module (I0) is at module location 7.

Example: EXC-8000ccXMC/G2H1A0A0JxI0

This is an *EXC-8000ccXMC* board with:
A MIL-STD-1553, monitor only, direct coupled module (G2) at module location 0.
A MIL-STD-1760, single function, transformer coupled module (H1) at module location 1.
An ARINC 429 module (A0) at module location 4.
An ARINC 429 module (A0) at module location 5.
A Serial module (J3) with channel 0 as RS-232 and channel 1 as RS-422 at module location 6.
A Discrete module (I0) is at module location 7.

Appendix A VITA XMC to VPX Signal Mapping Profiles

When an XMC board is inserted into a VPX carrier board, the I/O signals are generally routed to the VPX P1 and P2 connectors of the VPX carrier board. The VITA specification "ANSI/VITA 46.9-2018 PMC/XMC Rear I/O Fabric Signal Mapping on 3U and 6U VPX Modules Standard" defines how these signals are to be routed from the XMC connectors to the VPX connectors of the VPX carrier board. This specification defines a number of profiles that specify these routing details.

The I/O pinouts of the *EXC-8000ccXMC* have been designed to be compatible with following VITA profiles:

- P2w7-X8d+X12d – on page A-3
- P2w3-X38s+X8d – on page A-6
- P1w9-X12d+P2w3-X38s+X8d – on page A-9
- P1w13-X38s+P2w7-X8d+X12d (or P1w13-X38s+X8d+X12d) – on page A-13
- P1w9-X12d – on page A-17
- P1w9-X12d+P2w1-X8d – on page A-19

For each VITA profile, only certain pins are wired to P1/P2 on the VPX carrier board. Therefore, the availability of the module signals on the *EXC-8000ccXMC* depends on the profile used on the VPX carrier board.

Table A-1 shows which *EXC-8000ccXMC* module signals are available for each VITA profile. Tables A-2 through A-7 list the pinouts for each VITA profile.

Module #	Protocol	VITA Profile					
		P2w7-X8d+X12d	P2w3-X38s+X8d	P1w9-X12d+P2w3-X38s+X8d	P1w13-X38s+P2w7-X8d+X12d (or P1w13-X38s+X8d+X12d)	P1w9-X12d	P1w9-X12d+P2w1-X8d
0	MIL-STD-1553/1760 or ARINC 708	√	√	√	√		√
1	MIL-STD-1553/1760 or ARINC 708		√	√	√		
2	MIL-STD-1553/1760 or ARINC 708		√	√	√		
3	MIL-STD-1553/1760 or ARINC 708		√	√	√		
4	ARINC 429/717	√	√	√	√	√	√
5	ARINC 429/717			√	√		
6	Serial	√	√	√	√		√
7	Discrete	√[1]		√	√	√[1]	√[1]
External Signals		√	√	√	√	√	√

Table A-1 Modules Available per VITA Profile

1. This VITA profile does not come with External Signals by default. When using External Signals with this VITA profile, only five Discretes are available and a special ordering number is required.

P2w7-X8d+X12d VITA Profile Pinouts

Note: The suffix 'n' represents an active low signal.

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M0BUSA_p	A1	P2-E7	Module 0 MIL-STD-1553/1760 Bus A High connection/ Module 0 ARINC 708 Channel 0 High connection
GND	A2	See footnote 1	Carrier board ground
SHIELD	A3	P2-F8	Provided for cables shield connection
GND	A4	See footnote 1	Carrier board ground
M4CH0_p	A5	P2-E11	Module 4 Channel 0 ARINC 429 High Line connection
GND	A6	See footnote 1	Carrier board ground
M4CH2_p	A7	P2-F12	Module 4 Channel 2 ARINC 429 High Line connection
GND	A8	See footnote 1	Carrier board ground
M4CH4717TX_p	A9	P2-E13	Module 4 Channel 4 ARINC 429 High Line connection/ Module 4 ARINC 717 Transmit Channel High Line connection
GND	A10	See footnote 1	Carrier board ground
M6_485_422T0	A11	P2-E9	Not connected for RS-232 channel/ Module 6 Channel 0 RS-485 High Line connection/ Module 6 Channel 0 RS-422 Transmit High Line connection
GND	A12	See footnote 1	Carrier board ground
M6_485_422T1	A13	P2-F10	Not connected for RS-232 channel/ Module 6 Channel 1 RS-485 High Line connection/ Module 6 Channel 1 RS-422 Transmit High Line connection
GND	A14	See footnote 1	Carrier board ground
M7GNDDS04	A15	P2-F14	Module 7 ground reference for input and output Discretes 0–4
GND	A16	See footnote 1	Carrier board ground
M7IO1_EXTTCLKI	A17	P2-E15	Module 7 Discrete 1/ External Time Tag Clock Input (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
GND	A18	See footnote 1	Carrier board ground
M7IO3_EXTTRSTn	A19	P2-F16	Module 7 Discrete 3/ External Time Tag Reset TTL Input (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
M0BUSA_n	B1	P2-D7	Module 0 MIL-STD-1553/1760 Bus A Low connection/ Module 0 ARINC 708 Channel 0 Low connection
GND	B2	See footnote 1	Carrier board ground
SHIELD	B3	P2-E8	Provided for cables shield connection
GND	B4	See footnote 1	Carrier board ground
M4CH0_n	B5	P2-D11	Module 4 Channel 0 ARINC 429 Low Line connection
GND	B6	See footnote 1	Carrier board ground
M4CH2_n	B7	P2-E12	Module 4 Channel 2 ARINC 429 Low Line connection
GND	B8	See footnote 1	Carrier board ground

Table A-2 P2w7-X8d+X12d Profile Pinouts

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M4CH4717Tx_n	B9	P2-D13	Module 4 Channel 4 ARINC 429 Low Line connection/ Module 4 ARINC 717 Transmit Channel Low Line connection
GND	B10	See footnote 1	Carrier board ground
M6_232T_485n_422Tn0	B11	P2-D9	Module 6 Channel 0 RS-232 Transmit Line connection/ Module 6 Channel 0 RS-485 Low Line connection/ Module 6 Channel 0 RS-422 Transmit Low Line connection
GND	B12	See footnote 1	Carrier board ground
M6_232T_485n_422Tn1	B13	P2-E10	Module 6 Channel 1 RS-232 Transmit Line connection/ Module 6 Channel 1 RS-485 Low Line connection/ Module 6 Channel 1 RS-422 Transmit Low Line connection
GND	B14	See footnote 1	Carrier board ground
M7IO0_IRIGBIN	B15	P2-E14	Module 7 Discrete 0/ IRIG B120 Input (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
GND	B16	See footnote 1	Carrier board ground
M7IO2_EXTTCLKO	B17	P2-D15	Module 7 Discrete 2/ Global Time Tag Clock TTL Output (1 MHz) (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
GND	B18	See footnote 1	Carrier board ground
M7IO4_EXTTRSOn	B19	P2-E16	Module 7 Discrete 4/ Global Time Tag Reset TTL Output (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
M0BUSB_p	D1	P2-B7	Module 0 MIL-STD-1553/1760 Bus B High connection/ Module 0 ARINC 708 Channel 1 High connection
GND	D2	See footnote 1	Carrier board ground
GND	D3	P2-C8	Ground
GND	D4	See footnote 1	Carrier board ground
M4CH1_p	D5	P2-B11	Module 4 Channel 1 ARINC 429 High Line connection
GND	D6	See footnote 1	Carrier board ground
M4CH3_p	D7	P2-C12	Module 4 Channel 3 ARINC 429 High Line connection
GND	D8	See footnote 1	Carrier board ground
Reserved/ M4CH5717Rx_p	D9	Reserved/ P2-B13	Module 4 Reserved for ARINC 429 module/ Module 4 ARINC 717 Receive Channel High Line connection
GND	D10	See footnote 1	Carrier board ground
M6_232R_422R0	D11	P2-B9	Module 6 Channel 0 RS-232 Receive Line connection/ Module 6 Channel 0 RS-422 Receive High Line connection/ Not connected for RS-485 channel
GND	D12	See footnote 1	Carrier board ground
M6_232R_422R1	D13	P2-C10	Module 6 Channel 1 RS-232 Receive Line connection/ Module 6 Channel 1 RS-422 Receive High Line connection/ Not connected for RS-485 channel
GND	D14	See footnote 1	Carrier board ground

Table A-2 P2w7-X8d+X12d Profile Pinouts (Continued)

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M7IO5	D15	P2-C14	Module 7 Discrete 5
GND	D16	See footnote 1	Carrier board ground
M7IO7	D17	P2-B15	Module 7 Discrete 7
GND	D18	See footnote 1	Carrier board ground
M7IO9	D19	P2-C16	Module 7 Discrete 9
M0BUSB_n	E1	P2-A7	Module 0 MIL-STD-1553/1760 Bus B Low connection/ Module 0 ARINC 708 Channel 1 Low connection
GND	E2	See footnote 1	Carrier board ground
GND	E3	P2-B8	Ground
GND	E4	See footnote 1	Carrier board ground
M4CH1_n	E5	P2-A11	Module 4 Channel 1 ARINC 429 Low Line connection
GND	E6	See footnote 1	Carrier board ground
M4CH3_n	E7	P2-B12	Module 4 Channel 3 ARINC 429 Low Line connection
GND	E8	See footnote 1	Carrier board ground
Reserved/ M4CH5717Rx_n	E9	Reserved/ P2-A13	Module 4 Reserved for ARINC 429 module/ Module 4 ARINC 717 Receive Channel Low Line connection
GND	E10	See footnote 1	Carrier board ground
M6_422Rn0	E11	P2-A9	Module 6 Channel 0 RS-422 Receive Low Line connection
GND	E12	See footnote 1	Carrier board ground
M6_422Rn1	E13	P2-B10	Module 6 Channel 1 RS-422 Receive Low Line connection
GND	E14	See footnote 1	Carrier board ground
M7IO6	E15	P2-B14	Module 7 Discrete 6
GND	E16	See footnote 1	Carrier board ground
M7IO8	E17	P2-A15	Module 7 Discrete 8
GND	E18	See footnote 1	Carrier board ground
M7GNDDS59	E19	P2-B16	Module 7 ground reference for input and output Discretes 5–9

Table A-2 P2w7-X8d+X12d Profile Pinouts (Continued)

1. The differential ground signals are connected to the following pins on the P2 VPX connector: F7, C7, G8, D8, A8, F9, C9, G10, D10, A10, F11, C11, G12, D12, A12, F13, C13, G14, D14, A14, F15, C15, G16, D16, A16.

P2w3-X38s+X8d VITA Profile Pinouts

Note: The suffix 'n' represents an active low signal.

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M0BUSA_p	A1	P2-E13	Module 0 MIL-STD-1553/1760 Bus A High connection/ Module 0 ARINC 708 Channel 0 High connection
GND	A2	See footnote 1	Carrier board ground
SHIELD	A3	P2-F14	Provided for cables shield connection
GND	A4	See footnote 1	Carrier board ground
M6_485_422T0	A11	P2-E15	Not connected for RS-232 channel/ Module 6 Channel 0 RS-485 High Line connection/ Module 6 Channel 0 RS-422 Transmit High Line connection
GND	A12	See footnote 1	Carrier board ground
M6_485_422T1	A13	P2-F16	Not connected for RS-232 channel/ Module 6 Channel 1 RS-485 High Line connection/ Module 6 Channel 1 RS-422 Transmit High Line connection
GND	A14	See footnote 1	Carrier board ground
M0BUSA_n	B1	P2-D13	Module 0 MIL-STD-1553/1760 Bus A Low connection/ Module 0 ARINC 708 Channel 0 Low connection
GND	B2	See footnote 1	Carrier board ground
SHIELD	B3	P2-E14	Provided for cables shield connection
GND	B4	See footnote 1	Carrier board ground
M6_232T_485n_422Tn0	B11	P2-D15	Module 6 Channel 0 RS-232 Transmit Line connection/ Module 6 Channel 0 RS-485 Low Line connection/ Module 6 Channel 0 RS-422 Transmit Low Line connection
GND	B12	See footnote 1	Carrier board ground
M6_232T_485n_422Tn1	B13	P2-E16	Module 6 Channel 1 RS-232 Transmit Line connection/ Module 6 Channel 1 RS-485 Low Line connection/ Module 6 Channel 1 RS-422 Transmit Low Line connection
GND	B14	See footnote 1	Carrier board ground
SHIELD	C1	P2-B3	Provided for cables shield connection
M1BUSA_p	C2	P2-F4	Module 1 MIL-STD-1553/1760 Bus A High connection/ Module 1 ARINC 708 Channel 0 High connection
M1BUSA_n	C3	P2-E4	Module 1 MIL-STD-1553/1760 Bus A Low connection/ Module 1 ARINC 708 Channel 0 Low connection
M1BUSB_p	C4	P2-E5	Module 1 MIL-STD-1553/1760 Bus B High connection/ Module 1 ARINC 708 Channel 1 High connection
M1BUSB_n	C5	P2-D5	Module 1 MIL-STD-1553/1760 Bus B Low connection/ Module 1 ARINC 708 Channel 1 Low connection
M2BUSA_p	C6	P2-F6	Module 2 MIL-STD-1553/1760 Bus A High connection/ Module 2 ARINC 708 Channel 0 High connection
M2BUSA_n	C7	P2-E6	Module 2 MIL-STD-1553/1760 Bus A Low connection/ Module 2 ARINC 708 Channel 0 Low connection
M2BUSB_p	C8	P2-E7	Module 2 MIL-STD-1553/1760 Bus B High connection/ Module 2 ARINC 708 Channel 1 High connection

Table A-3 P2w3-X38s+X8d Profile Pinouts

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M2BUSB_n	C9	P2-D7	Module 2 MIL-STD-1553/1760 Bus B Low connection/ Module 2 ARINC 708 Channel 1 Low connection
SHIELD	C10	P2-F8	Provided for cables shield connection
SHIELD	C11	P2-E8	Provided for cables shield connection
M3BUSA_p	C12	P2-E9	Module 3 MIL-STD-1553/1760 Bus A High connection/ Module 3 ARINC 708 Channel 0 High connection
M3BUSA_n	C13	P2-D9	Module 3 MIL-STD-1553/1760 Bus A Low connection/ Module 3 ARINC 708 Channel 0 Low connection
M3BUSB_p	C14	P2-F10	Module 3 MIL-STD-1553/1760 Bus B High connection/ Module 3 ARINC 708 Channel 1 High connection
M3BUSB_n	C15	P2-E10	Module 3 MIL-STD-1553/1760 Bus B Low connection/ Module 3 ARINC 708 Channel 1 Low connection
SHIELD	C16	P2-E11	Provided for cables shield connection
EXTTCLKI	C17	P2-D11	External Time Tag Clock Input (See **External Signals** on page 3-11 for description.)
EXTTCLKO	C18	P2-F12	Global Time Tag Clock TTL Output (1 MHz) (See **External Signals** on page 3-11 for description.)
SHIELD	C19	P2-E12	Provided for cables shield connection
M0BUSB_p	D1	P2-B13	Module 0 MIL-STD-1553/1760 Bus B High connection/ Module 0 ARINC 708 Channel 1 High connection
GND	D2	See footnote 1	Carrier board ground
GND	D3	P2-C14	Ground
GND	D4	See footnote 1	Carrier board ground
M6_232R_422R0	D11	P2-B15	Module 6 Channel 0 RS-232 Receive Line connection/ Module 6 Channel 0 RS-422 Receive High Line connection/ Not connected for RS-485 channel
GND	D12	See footnote 1	Carrier board ground
M6_232R_422R1	D13	P2-C16	Module 6 Channel 1 RS-232 Receive Line connection/ Module 6 Channel 1 RS-422 Receive High Line connection/ Not connected for RS-485 channel
GND	D14	See footnote 1	Carrier board ground
M0BUSB_n	E1	P2-A13	Module 0 MIL-STD-1553/1760 Bus B Low connection/ Module 0 ARINC 708 Channel 1 Low connection
GND	E2	See footnote 1	Carrier board ground
GND	E3	P2-B14	Ground
GND	E4	See footnote 1	Carrier board ground
M6_422Rn0	E11	P2-A15	Module 6 Channel 0 RS-422 Receive Low Line connection
GND	E12	See footnote 1	Carrier board ground
M6_422Rn1	E13	P2-B16	Module 6 Channel 1 RS-422 Receive Low Line connection
GND	E14	See footnote 1	Carrier board ground
SHIELD	F1	P2-A3	Provided for cables shield connection
M5CH0_p	F2	P2-C4	Module 5 Channel 0 ARINC 429 High Line connection
M5CH0_n	F3	P2-B4	Module 5 Channel 0 ARINC 429 Low Line connection

Table A-3 P2w3-X38s+X8d Profile Pinouts (Continued)

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M5CH1_p	F4	P2-B5	Module 5 Channel 1 ARINC 429 High Line connection
M5CH1_n	F5	P2-A5	Module 5 Channel 1 ARINC 429 Low Line connection
M5CH2_p	F6	P2-C6	Module 5 Channel 2 ARINC 429 High Line connection
M5CH2_n	F7	P2-B6	Module 5 Channel 2 ARINC 429 Low Line connection
M5CH3_p	F8	P2-B7	Module 5 Channel 3 ARINC 429 High Line connection
M5CH3_n	F9	P2-A7	Module 5 Channel 3 ARINC 429 Low Line connection
M5CH4717TX_p	F10	P2-C8	Module 5 Channel 4 ARINC 429 High Line connection/ Module 5 ARINC 717 Transmit Channel High Line connection
M5CH4717Tx_n	F11	P2-B8	Module 5 Channel 4 ARINC 429 Low Line connection/ Module 5 ARINC 717 Transmit Channel Low Line connection
Reserved/ M5CH5717Rx_p	F12	Reserved/ P2-B9	Module 5 Reserved for ARINC 429 module/ Module 5 ARINC 717 Receive Channel High Line connection
Reserved/ M5CH5717Rx_n	F13	Reserved/ P2-A9	Module 5 Reserved for ARINC 429 module/ Module 5 ARINC 717 Receive Channel Low Line connection
SHIELD	F14	P2-C10	Provided for cables shield connection
EXTTRSTn	F15	P2-B10	External Time Tag Reset TTL Input (See **External Signals** on page 3-11 for description.)
EXTTRSOn	F16	P2-B11	Global Time Tag Reset TTL Output (See **External Signals** on page 3-11 for description.)
Reserved	F17	P2-A11	Reserved
IRIGBIN	F18	P2-C12	IRIG B120 Input (See **External Signals** on page 3-11 for description.)
SHIELD	F19	P2-B12	Provided for cables shield connection

Table A-3 P2w3-X38s+X8d Profile Pinouts (Continued)

1. The differential ground signals are connected to the following pins on the P2 VPX connector: F1, C1, G2, D2, A2, F3, C3, G4, D4, A4, F5, C5, G6, D6, A6, F7, C7, G8, D8, A8, F9, C9, G10, D10, A10, F11, C11, G12, D12, A12, F13, C13, G14, D14, A14, F15, C15, G16, D16, A16.

P1w9-X12d+P2w3-X38s+X8d VITA Profile Pinouts

Note: The suffix 'n' represents an active low signal.

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M0BUSA_p	A1	P2-E13	Module 0 MIL-STD-1553/1760 Bus A High connection/ Module 0 ARINC 708 Channel 0 High connection
GND	A2	See footnote 1	Carrier board ground
SHIELD	A3	P2-F14	Provided for cables shield connection
GND	A4	See footnote 1	Carrier board ground
M4CH0_p	A5	P1-E9	Module 4 Channel 0 ARINC 429 High Line connection
GND	A6	See footnote 1	Carrier board ground
M4CH2_p	A7	P1-F10	Module 4 Channel 2 ARINC 429 High Line connection
GND	A8	See footnote 1	Carrier board ground
M4CH4717TX_p	A9	P1-E11	Module 4 Channel 4 ARINC 429 High Line connection/ Module 4 ARINC 717 Transmit Channel High Line connection
GND	A10	See footnote 1	Carrier board ground
M6_485_422T0	A11	P2-E15	Not connected for RS-232 channel/ Module 6 Channel 0 RS-485 High Line connection/ Module 6 Channel 0 RS-422 Transmit High Line connection
GND	A12	See footnote 1	Carrier board ground
M6_485_422T1	A13	P2-F16	Not connected for RS-232 channel/ Module 6 Channel 1 RS-485 High Line connection/ Module 6 Channel 1 RS-422 Transmit High Line connection
GND	A14	See footnote 1	Carrier board ground
M7GNDDS04	A15	P1-F12	Module 7 ground reference for input and output Discretes 0–4
GND	A16	See footnote 1	Carrier board ground
M7IO1	A17	P1-E13	Module 7 Discrete 0
GND	A18	See footnote 1	Carrier board ground
M7IO3	A19	P1-F14	Module 7 Discrete 3
M0BUSA_n	B1	P2-D13	Module 0 MIL-STD-1553/1760 Bus A Low connection/ Module 0 ARINC 708 Channel 0 Low connection
GND	B2	See footnote 1	Carrier board ground
SHIELD	B3	P2-E14	Provided for cables shield connection
GND	B4	See footnote 1	Carrier board ground
M4CH0_n	B5	P1-D9	Module 4 Channel 0 ARINC 429 Low Line connection
GND	B6	See footnote 1	Carrier board ground
M4CH2_n	B7	P1-E10	Module 4 Channel 2 ARINC 429 Low Line connection
GND	B8	See footnote 1	Carrier board ground
M4CH4717Tx_n	B9	P1-D11	Module 4 Channel 4 ARINC 429 Low Line connection/ Module 4 ARINC 717 Transmit Channel Low Line connection
GND	B10	See footnote 1	Carrier board ground
M6_232T_485n_422Tn0	B11	P2-D15	Module 6 Channel 0 RS-232 Transmit Line connection/ Module 6 Channel 0 RS-485 Low Line connection/ Module 6 Channel 0 RS-422 Transmit Low Line connection

Table A-4 P1w9-X12d+P2w3-X38s+X8d Profile Pinouts

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
GND	B12	See footnote 1	Carrier board ground
M6_232T_485n_422Tn1	B13	P2-E16	Module 6 Channel 1 RS-232 Transmit Line connection/ Module 6 Channel 1 RS-485 Low Line connection/ Module 6 Channel 1 RS-422 Transmit Low Line connection
GND	B14	See footnote 1	Carrier board ground
M7IO0	B15	P1-E12	Module 7 Discrete 0
GND	B16	See footnote 1	Carrier board ground
M7IO2	B17	P1-D13	Module 7 Discrete 2
GND	B18	See footnote 1	Carrier board ground
M7IO4	B19	P1-E14	Module 7 Discrete 4
SHIELD	C1	P2-B3	Provided for cables shield connection
M1BUSA_p	C2	P2-F4	Module 1 MIL-STD-1553/1760 Bus A High connection/ Module 1 ARINC 708 Channel 0 High connection
M1BUSA_n	C3	P2-E4	Module 1 MIL-STD-1553/1760 Bus A Low connection/ Module 1 ARINC 708 Channel 0 Low connection
M1BUSB_p	C4	P2-E5	Module 1 MIL-STD-1553/1760 Bus B High connection/ Module 1 ARINC 708 Channel 1 High connection
M1BUSB_n	C5	P2-D5	Module 1 MIL-STD-1553/1760 Bus B Low connection/ Module 1 ARINC 708 Channel 1 Low connection
M2BUSA_p	C6	P2-F6	Module 2 MIL-STD-1553/1760 Bus A High connection/ Module 2 ARINC 708 Channel 0 High connection
M2BUSA_n	C7	P2-E6	Module 2 MIL-STD-1553/1760 Bus A Low connection/ Module 2 ARINC 708 Channel 0 Low connection
M2BUSB_p	C8	P2-E7	Module 2 MIL-STD-1553/1760 Bus B High connection/ Module 2 ARINC 708 Channel 1 High connection
M2BUSB_n	C9	P2-D7	Module 2 MIL-STD-1553/1760 Bus B Low connection/ Module 2 ARINC 708 Channel 1 Low connection
SHIELD	C10	P2-F8	Provided for cables shield connection
SHIELD	C11	P2-E8	Provided for cables shield connection
M3BUSA_p	C12	P2-E9	Module 3 MIL-STD-1553/1760 Bus A High connection/ Module 3 ARINC 708 Channel 0 High connection
M3BUSA_n	C13	P2-D9	Module 3 MIL-STD-1553/1760 Bus A Low connection/ Module 3 ARINC 708 Channel 0 Low connection
M3BUSB_p	C14	P2-F10	Module 3 MIL-STD-1553/1760 Bus B High connection/ Module 3 ARINC 708 Channel 1 High connection
M3BUSB_n	C15	P2-E10	Module 3 MIL-STD-1553/1760 Bus B Low connection/ Module 3 ARINC 708 Channel 1 Low connection
SHIELD	C16	P2-E11	Provided for cables shield connection
EXTTCLKI	C17	P2-D11	External Time Tag Clock Input (See **External Signals** on page 3-11 for description.)
EXTTCLKO	C18	P2-F12	Global Time Tag Clock TTL Output (1 MHz) (See **External Signals** on page 3-11 for description.)
SHIELD	C19	P2-E12	Provided for cables shield connection
M0BUSB_p	D1	P2-B13	Module 0 MIL-STD-1553/1760 Bus B High connection/ Module 0 ARINC 708 Channel 1 High connection

Table A-4 P1w9-X12d+P2w3-X38s+X8d Profile Pinouts (Continued)

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
GND	D2	See footnote 1	Carrier board ground
GND	D3	P2-C14	Ground
GND	D4	See footnote 1	Carrier board ground
M4CH1_p	D5	P1-B9	Module 4 Channel 1 ARINC 429 High Line connection
GND	D6	See footnote 1	Carrier board ground
M4CH3_p	D7	P1-C10	Module 4 Channel 3 ARINC 429 High Line connection
GND	D8	See footnote 1	Carrier board ground
Reserved/ M4CH5717Rx_p	D9	Reserved/ P1-B11	Module 4 Reserved for ARINC 429 module/ Module 4 ARINC 717 Receive Channel High Line connection
GND	D10	See footnote 1	Carrier board ground
M6_232R_422R0	D11	P2-B15	Module 6 Channel 0 RS-232 Receive Line connection/ Module 6 Channel 0 RS-422 Receive High Line connection/ Not connected for RS-485 channel
GND	D12	See footnote 1	Carrier board ground
M6_232R_422R1	D13	P2-C16	Module 6 Channel 1 RS-232 Receive Line connection/ Module 6 Channel 1 RS-422 Receive High Line connection/ Not connected for RS-485 channel
GND	D14	See footnote 1	Carrier board ground
M7IO5	D15	P1-C12	Module 7 Discrete 5
GND	D16	See footnote 1	Carrier board ground
M7IO7	D17	P1-B13	Module 7 Discrete 7
GND	D18	See footnote 1	Carrier board ground
M7IO9	D19	P1-C14	Module 7 Discrete 9
M0BUSB_n	E1	P2-A13	Module 0 MIL-STD-1553/1760 Bus B Low connection/ Module 0 ARINC 708 Channel 1 Low connection
GND	E2	See footnote 1	Carrier board ground
GND	E3	P2-B14	Ground
GND	E4	See footnote 1	Carrier board ground
M4CH1_n	E5	P1-A9	Module 4 Channel 1 ARINC 429 Low Line connection
GND	E6	See footnote 1	Carrier board ground
M4CH3_n	E7	P1-B10	Module 4 Channel 3 ARINC 429 Low Line connection
GND	E8	See footnote 1	Carrier board ground
Reserved/ M4CH5717Rx_n	E9	Reserved/ P1-A11	Module 4 Reserved for ARINC 429 module/ Module 4 ARINC 717 Receive Channel Low Line connection
GND	E10	See footnote 1	Carrier board ground
M6_422Rn0	E11	P2-A15	Module 6 Channel 0 RS-422 Receive Low Line connection
GND	E12	See footnote 1	Carrier board ground
M6_422Rn1	E13	P2-B16	Module 6 Channel 1 RS-422 Receive Low Line connection
GND	E14	See footnote 1	Carrier board ground
M7IO6	E15	P1-B12	Module 7 Discrete 6
GND	E16	See footnote 1	Carrier board ground
M7IO8	E17	P1-A13	Module 7 Discrete 8

Table A-4 P1w9-X12d+P2w3-X38s+X8d Profile Pinouts (Continued)

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
GND	E18	See footnote 1	Carrier board ground
M7GNDDS59	E19	P1-B14	Module 7 ground reference for input and output Discretes 5–9
SHIELD	F1	P2-A3	Provided for cables shield connection
M5CH0_p	F2	P2-C4	Module 5 Channel 0 ARINC 429 High Line connection
M5CH0_n	F3	P2-B4	Module 5 Channel 0 ARINC 429 Low Line connection
M5CH1_p	F4	P2-B5	Module 5 Channel 1 ARINC 429 High Line connection
M5CH1_n	F5	P2-A5	Module 5 Channel 1 ARINC 429 Low Line connection
M5CH2_p	F6	P2-C6	Module 5 Channel 2 ARINC 429 High Line connection
M5CH2_n	F7	P2-B6	Module 5 Channel 2 ARINC 429 Low Line connection
M5CH3_p	F8	P2-B7	Module 5 Channel 3 ARINC 429 High Line connection
M5CH3_n	F9	P2-A7	Module 5 Channel 3 ARINC 429 Low Line connection
M5CH4717TX_p	F10	P2-C8	Module 5 Channel 4 ARINC 429 High Line connection/ Module 5 ARINC 717 Transmit Channel High Line connection
M5CH4717Tx_n	F11	P2-B8	Module 5 Channel 4 ARINC 429 Low Line connection/ Module 5 ARINC 717 Transmit Channel Low Line connection
Reserved/ M5CH5717Rx_p	F12	Reserved/ P2-B9	Module 5 Reserved for ARINC 429 module/ Module 5 ARINC 717 Receive Channel High Line connection
Reserved/ M5CH5717Rx_n	F13	Reserved/ P2-A9	Module 5 Reserved for ARINC 429 module/ Module 5 ARINC 717 Receive Channel Low Line connection
SHIELD	F14	P2-C10	Provided for cables shield connection
EXTTRSTn	F15	P2-B10	External Time Tag Reset TTL Input (See **External Signals** on page 3-11 for description.)
EXTTRSOn	F16	P2-B11	Global Time Tag Reset TTL Output (See **External Signals** on page 3-11 for description.)
Reserved	F17	P2-A11	Reserved
IRIGBIN	F18	P2-C12	IRIG B120 Input (See **External Signals** on page 3-11 for description.)
SHIELD	F19	P2-B12	Provided for cables shield connection

Table A-4 P1w9-X12d+P2w3-X38s+X8d Profile Pinouts (Continued)

1. The differential ground signals are connected to the following pins on the P1 and P2 VPX connectors:
   P1 Connector: F9, C9, G10, D10, A10, F11, C11, G12, D12, A12, F13, C13, G14, D14, A14, F15, C15, G16, D16, A16.
   P2 Connector: F1, C1, G2, D2, A2, F3, C3, G4, D4, A4, F5, C5, G6, D6, A6, F7, C7, G8, D8, A8, F9, C9, G10, D10, A10, F11, C11, G12, D12, A12, F13, C13, G14, D14, A14, F15, C15, G16, D16, A16.

P1w13-X38s+P2w7-X8d+X12d VITA Profile Pinouts

Note: The suffix 'n' represents an active low signal.

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M0BUSA_p	A1	P2-E7	Module 0 MIL-STD-1553/1760 Bus A High connection/ Module 0 ARINC 708 Channel 0 High connection
GND	A2	See footnote 1	Carrier board ground
SHIELD	A3	P2-F8	Provided for cables shield connection
GND	A4	See footnote 1	Carrier board ground
M4CH0_p	A5	P2-E11	Module 4 Channel 0 ARINC 429 High Line connection
GND	A6	See footnote 1	Carrier board ground
M4CH2_p	A7	P2-F12	Module 4 Channel 2 ARINC 429 High Line connection
GND	A8	See footnote 1	Carrier board ground
M4CH4717TX_p	A9	P2-E13	Module 4 Channel 4 ARINC 429 High Line connection/ Module 4 ARINC 717 Transmit Channel High Line connection
GND	A10	See footnote 1	Carrier board ground
M6_485_422T0	A11	P2-E9	Not connected for RS-232 channel/ Module 6 Channel 0 RS-485 High Line connection/ Module 6 Channel 0 RS-422 Transmit High Line connection
GND	A12	See footnote 1	Carrier board ground
M6_485_422T1	A13	P2-F10	Not connected for RS-232 channel/ Module 6 Channel 1 RS-485 High Line connection/ Module 6 Channel 1 RS-422 Transmit High Line connection
GND	A14	See footnote 1	Carrier board ground
M7GNDDS04	A15	P2-F14	Module 7 ground reference for input and output Discretes 0–4
GND	A16	See footnote 1	Carrier board ground
M7IO1	A17	P2-E15	Module 7 Discrete 0
GND	A18	See footnote 1	Carrier board ground
M7IO3	A19	P2-F16	Module 7 Discrete 3
M0BUSA_n	B1	P2-D7	Module 0 MIL-STD-1553/1760 Bus A Low connection/ Module 0 ARINC 708 Channel 0 Low connection
GND	B2	See footnote 1	Carrier board ground
SHIELD	B3	P2-E8	Provided for cables shield connection
GND	B4	See footnote 1	Carrier board ground
M4CH0_n	B5	P2-D11	Module 4 Channel 0 ARINC 429 Low Line connection
GND	B6	See footnote 1	Carrier board ground
M4CH2_n	B7	P2-E12	Module 4 Channel 2 ARINC 429 Low Line connection
GND	B8	See footnote 1	Carrier board ground
M4CH4717Tx_n	B9	P2-D13	Module 4 Channel 4 ARINC 429 Low Line connection/ Module 4 ARINC 717 Transmit Channel Low Line connection
GND	B10	See footnote 1	Carrier board ground
M6_232T_485n_422Tn0	B11	P2-D9	Module 6 Channel 0 RS-232 Transmit Line connection/ Module 6 Channel 0 RS-485 Low Line connection/ Module 6 Channel 0 RS-422 Transmit Low Line connection

Table A-5 P1w13-X38s+P2w7-X8d+X12d Profile Pinouts

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
GND	B12	See footnote 1	Carrier board ground
M6_232T_485n_422Tn1	B13	P2-E10	Module 6 Channel 1 RS-232 Transmit Line connection/ Module 6 Channel 1 RS-485 Low Line connection/ Module 6 Channel 1 RS-422 Transmit Low Line connection
GND	B14	See footnote 1	Carrier board ground
M7IO0	B15	P2-E14	Module 7 Discrete 0
GND	B16	See footnote 1	Carrier board ground
M7IO2	B17	P2-D15	Module 7 Discrete 2
GND	B18	See footnote 1	Carrier board ground
M7IO4	B19	P2-E16	Module 7 Discrete 4
SHIELD	C1	P1-B13	Provided for cables shield connection
M1BUSA_p	C2	P1-F14	Module 1 MIL-STD-1553/1760 Bus A High connection/ Module 1 ARINC 708 Channel 0 High connection
M1BUSA_n	C3	P1-E14	Module 1 MIL-STD-1553/1760 Bus A Low connection/ Module 1 ARINC 708 Channel 0 Low connection
M1BUSB_p	C4	P1-E15	Module 1 MIL-STD-1553/1760 Bus B High connection/ Module 1 ARINC 708 Channel 1 High connection
M1BUSB_n	C5	P1-D15	Module 1 MIL-STD-1553/1760 Bus B Low connection/ Module 1 ARINC 708 Channel 1 Low connection
M2BUSA_p	C6	P1-F16	Module 2 MIL-STD-1553/1760 Bus A High connection/ Module 2 ARINC 708 Channel 0 High connection
M2BUSA_n	C7	P1-E16	Module 2 MIL-STD-1553/1760 Bus A Low connection/ Module 2 ARINC 708 Channel 0 Low connection
M2BUSB_p	C8	P2-E1	Module 2 MIL-STD-1553/1760 Bus B High connection/ Module 2 ARINC 708 Channel 1 High connection
M2BUSB_n	C9	P2-D1	Module 2 MIL-STD-1553/1760 Bus B Low connection/ Module 2 ARINC 708 Channel 1 Low connection
SHIELD	C10	P2-F2	Provided for cables shield connection
SHIELD	C11	P2-E2	Provided for cables shield connection
M3BUSA_p	C12	P2-E3	Module 3 MIL-STD-1553/1760 Bus A High connection/ Module 3 ARINC 708 Channel 0 High connection
M3BUSA_n	C13	P2-D3	Module 3 MIL-STD-1553/1760 Bus A Low connection/ Module 3 ARINC 708 Channel 0 Low connection
M3BUSB_p	C14	P2-F4	Module 3 MIL-STD-1553/1760 Bus B High connection/ Module 3 ARINC 708 Channel 1 High connection
M3BUSB_n	C15	P2-E4	Module 3 MIL-STD-1553/1760 Bus B Low connection/ Module 3 ARINC 708 Channel 1 Low connection
SHIELD	C16	P2-E5	Provided for cables shield connection
EXTTCLKI	C17	P2-D5	External Time Tag Clock Input (See **External Signals** on page 3-11 for description.)
EXTTCLKO	C18	P2-F6	Global Time Tag Clock TTL Output (1 MHz) (See **External Signals** on page 3-11 for description.)
SHIELD	C19	P2-E6	Provided for cables shield connection

Table A-5 P1w13-X38s+P2w7-X8d+X12d Profile Pinouts (Continued)

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M0BUSB_p	D1	P2-B7	Module 0 MIL-STD-1553/1760 Bus B High connection/ Module 0 ARINC 708 Channel 1 High connection
GND	D2	See footnote 1	Carrier board ground
GND	D3	P2-C8	Ground
GND	D4	See footnote 1	Carrier board ground
M4CH1_p	D5	P2-B11	Module 4 Channel 1 ARINC 429 High Line connection
GND	D6	See footnote 1	Carrier board ground
M4CH3_p	D7	P2-C12	Module 4 Channel 3 ARINC 429 High Line connection
GND	D8	See footnote 1	Carrier board ground
GND/ M4CH5717Rx_p	D9	See footnote 1/ P2-B13	Module 4 Ground for ARINC 429 module/ Module 4 ARINC 717 Receive Channel High Line connection
GND	D10	See footnote 1	Carrier board ground
M6_232R_422R0	D11	P2-B9	Module 6 Channel 0 RS-232 Receive Line connection/ Module 6 Channel 0 RS-422 Receive High Line connection/ Not connected for RS-485 channel
GND	D12	See footnote 1	Carrier board ground
M6_232R_422R1	D13	P2-C10	Module 6 Channel 1 RS-232 Receive Line connection/ Module 6 Channel 1 RS-422 Receive High Line connection/ Not connected for RS-485 channel
GND	D14	See footnote 1	Carrier board ground
M7IO5	D15	P2-C14	Module 7 Discrete 5
GND	D16	See footnote 1	Carrier board ground
M7IO7	D17	P2-B15	Module 7 Discrete 7
GND	D18	See footnote 1	Carrier board ground
M7IO9	D19	P2-C16	Module 7 Discrete 9
M0BUSB_n	E1	P2-A7	Module 0 MIL-STD-1553/1760 Bus B Low connection/ Module 0 ARINC 708 Channel 1 Low connection
GND	E2	See footnote 1	Carrier board ground
GND	E3	P2-B8	Ground
GND	E4	See footnote 1	Carrier board ground
M4CH1_n	E5	P2-A11	Module 4 Channel 1 ARINC 429 Low Line connection
GND	E6	See footnote 1	Carrier board ground
M4CH3_n	E7	P2-B12	Module 4 Channel 3 ARINC 429 Low Line connection
GND	E8	See footnote 1	Carrier board ground
Reserved/ M4CH5717Rx_n	E9	Reserved/ P2-A13	Module 4 Reserved for ARINC 429 module/ Module 4 ARINC 717 Receive Channel Low Line connection
GND	E10	See footnote 1	Carrier board ground
M6_422Rn0	E11	P2-A9	Module 6 Channel 0 RS-422 Receive Low Line connection
GND	E12	See footnote 1	Carrier board ground
M6_422Rn1	E13	P2-B10	Module 6 Channel 1 RS-422 Receive Low Line connection
GND	E14	See footnote 1	Carrier board ground

Table A-5 P1w13-X38s+P2w7-X8d+X12d Profile Pinouts (Continued)

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M7IO6	E15	P2-B14	Module 7 Discrete 6
GND	E16	See footnote 1	Carrier board ground
M7IO8	E17	P2-A15	Module 7 Discrete 8
GND	E18	See footnote 1	Carrier board ground
M7GNDDS59	E19	P2-B16	Module 7 ground reference for input and output Discretes 5–9
SHIELD	F1	P1-A13	Provided for cables shield connection
M5CH0_p	F2	P1-C14	Module 5 Channel 0 ARINC 429 High Line connection
M5CH0_n	F3	P1-B14	Module 5 Channel 0 ARINC 429 Low Line connection
M5CH1_p	F4	P1-B15	Module 5 Channel 1 ARINC 429 High Line connection
M5CH1_n	F5	P1-A15	Module 5 Channel 1 ARINC 429 Low Line connection
M5CH2_p	F6	P1-C16	Module 5 Channel 2 ARINC 429 High Line connection
M5CH2_n	F7	P1-B16	Module 5 Channel 2 ARINC 429 Low Line connection
M5CH3_p	F8	P2-B1	Module 5 Channel 3 ARINC 429 High Line connection
M5CH3_n	F9	P2-A1	Module 5 Channel 3 ARINC 429 Low Line connection
M5CH4717TX_p	F10	P2-C2	Module 5 Channel 4 ARINC 429 High Line connection/ Module 5 ARINC 717 Transmit Channel High Line connection
M5CH4717Tx_n	F11	P2-B2	Module 5 Channel 4 ARINC 429 Low Line connection/ Module 5 ARINC 717 Transmit Channel Low Line connection
Reserved/ M5CH5717Rx_p	F12	Reserved/ P2-B3	Module 5 Reserved for ARINC 429 module/ Module 5 ARINC 717 Receive Channel High Line connection
Reserved/ M5CH5717Rx_n	F13	Reserved/ P2-A3	Module 5 Reserved for ARINC 429 module/ Module 5 ARINC 717 Receive Channel Low Line connection
SHIELD	F14	P2-C4	Provided for cables shield connection
EXTTRSTn	F15	P2-B4	External Time Tag Reset TTL Input (See **External Signals** on page 3-11 for description.)
EXTTRSOn	F16	P2-B5	Global Time Tag Reset TTL Output (See **External Signals** on page 3-11 for description.)
Reserved	F17	P2-A5	Reserved
IRIGBIN	F18	P2-C6	IRIG B120 Input (See **External Signals** on page 3-11 for description.)
SHIELD	F19	P2-B6	Provided for cables shield connection

Table A-5 P1w13-X38s+P2w7-X8d+X12d Profile Pinouts (Continued)

1. The differential ground signals are connected to the following pins on the P1 and P2 VPX connectors:
   P1 Connector: F13, C13, G14, D14, A14, F15, C15, G16, D16, A16.
   P2 Connector: F1, C1, G2, D2, A2, F3, C3, G4, D4, A4, F5, C5, G6, D6, A6, F7, C7, G8, D8, A8, F9, C9, G10, D10, A10, F11, C11, G12, D12, A12, F13, C13, G14, D14, A14, F15, C15, G16, D16, A16.

P1w9-X12d VITA Profile Pinouts

Note: The suffix 'n' represents an active low signal.

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M4CH0_p	A5	P1-E9	Module 4 Channel 0 ARINC 429 High Line connection
GND	A6	See footnote 1	Carrier board ground
M4CH2_p	A7	P1-F10	Module 4 Channel 2 ARINC 429 High Line connection
GND	A8	See footnote 1	Carrier board ground
M4CH4717TX_p	A9	P1-E11	Module 4 Channel 4 ARINC 429 High Line connection/ Module 4 ARINC 717 Transmit Channel High Line connection
GND	A10	See footnote 1	Carrier board ground
M7GNDDS04	A15	P1-F12	Module 7 ground reference for input and output Discretes 0–4
GND	A16	See footnote 1	Carrier board ground
M7IO1_EXTTCLKI	A17	P1-E13	Module 7 Discrete 0/ External Time Tag Clock Input (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
GND	A18	See footnote 1	Carrier board ground
M7IO3_EXTTRSTn	A19	P1-F14	Module 7 Discrete 3/ External Time Tag Reset TTL Input (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
M4CH0_n	B5	P1-D9	Module 4 Channel 0 ARINC 429 Low Line connection
GND	B6	See footnote 1	Carrier board ground
M4CH2_n	B7	P1-E10	Module 4 Channel 2 ARINC 429 Low Line connection
GND	B8	See footnote 1	Carrier board ground
M4CH4717Tx_n	B9	P1-D11	Module 4 Channel 4 ARINC 429 Low Line connection/ Module 4 ARINC 717 Transmit Channel Low Line connection
GND	B10	See footnote 1	Carrier board ground
M7IO0_IRIGBIN	B15	P1-E12	Module 7 Discrete 0/ IRIG B120 Input (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
GND	B16	See footnote 1	Carrier board ground
M7IO2_EXTTCLKO	B17	P1-D13	Module 7 Discrete 2/ Global Time Tag Clock TTL Output (1 MHz) (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
GND	B18	See footnote 1	Carrier board ground
M7IO4_EXTTRSOn	B19	P1-E14	Module 7 Discrete 4/ Global Time Tag Reset TTL Output (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
M4CH1_p	D5	P1-B9	Module 4 Channel 1 ARINC 429 High Line connection
GND	D6	See footnote 1	Carrier board ground
M4CH3_p	D7	P1-C10	Module 4 Channel 3 ARINC 429 High Line connection

Table A-6 P1w9-X12d Profile Pinouts

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
GND	D8	See footnote 1	Carrier board ground
Reserved/ M4CH5717Rx_p	D9	Reserved/ P1-B11	Module 4 Reserved for ARINC 429 module/ Module 4 ARINC 717 Receive Channel High Line connection
GND	D10	See footnote 1	Carrier board ground
M7IO5	D15	P1-C12	Module 7 Discrete 5
GND	D16	See footnote 1	Carrier board ground
M7IO7	D17	P1-B13	Module 7 Discrete 7
GND	D18	See footnote 1	Carrier board ground
M7IO9	D19	P1-C14	Module 7 Discrete 9
M4CH1_n	E5	P1-A9	Module 4 Channel 1 ARINC 429 Low Line connection
GND	E6	See footnote 1	Carrier board ground
M4CH3_n	E7	P1-B10	Module 4 Channel 3 ARINC 429 Low Line connection
GND	E8	See footnote 1	Carrier board ground
Reserved/ M4CH5717Rx_n	E9	Reserved/ P1-A11	Module 4 Reserved for ARINC 429 module/ Module 4 ARINC 717 Receive Channel Low Line connection
GND	E10	See footnote 1	Carrier board ground
M7IO6	E15	P1-B12	Module 7 Discrete 6
GND	E16	See footnote 1	Carrier board ground
M7IO8	E17	P1-A13	Module 7 Discrete 8
GND	E18	See footnote 1	Carrier board ground
M7GNDDS59	E19	P1-B14	Module 7 ground reference for input and output Discretes 5–9

Table A-6 P1w9-X12d Profile Pinouts (Continued)

1. The differential ground signals are connected to the following pins on the P1 VPX connector: F9, C9, G10, D10, A10, F11, C11, G12, D12, A12, F13, C13, G14, D14, A14.

P1w9-X12d+P2w1-X8d VITA Profile Pinouts

Note: The suffix 'n' represents an active low signal.

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M0BUSA_p	A1	P2-E1	Module 0 MIL-STD-1553/1760 Bus A High connection/ Module 0 ARINC 708 Channel 0 High connection
GND	A2	See footnote 1	Carrier board ground
SHIELD	A3	P2-F2	Provided for cables shield connection
GND	A4	See footnote 1	Carrier board ground
M4CH0_p	A5	P1-E9	Module 4 Channel 0 ARINC 429 High Line connection
GND	A6	See footnote 1	Carrier board ground
M4CH2_p	A7	P1-F10	Module 4 Channel 2 ARINC 429 High Line connection
GND	A8	See footnote 1	Carrier board ground
M4CH4717TX_p	A9	P1-E11	Module 4 Channel 4 ARINC 429 High Line connection/ Module 4 ARINC 717 Transmit Channel High Line connection
GND	A10	See footnote 1	Carrier board ground
M6_485_422T0	A11	P2-E3	Not connected for RS-232 channel/ Module 6 Channel 0 RS-485 High Line connection/ Module 6 Channel 0 RS-422 Transmit High Line connection
GND	A12	See footnote 1	Carrier board ground
M6_485_422T1	A13	P2-F4	Not connected for RS-232 channel/ Module 6 Channel 1 RS-485 High Line connection/ Module 6 Channel 1 RS-422 Transmit High Line connection
GND	A14	See footnote 1	Carrier board ground
M7GNDDS04	A15	P1-F12	Module 7 ground reference for input and output Discretes 0–4
GND	A16	See footnote 1	Carrier board ground
M7IO1_EXTTCLKI	A17	P1-E13	Module 7 Discrete 0/ External Time Tag Clock Input (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
GND	A18	See footnote 1	Carrier board ground
M7IO3_EXTTRSTn	A19	P1-F14	Module 7 Discrete 3/ External Time Tag Reset TTL Input (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
M0BUSA_n	B1	P2-D1	Module 0 MIL-STD-1553/1760 Bus A Low connection/ Module 0 ARINC 708 Channel 0 Low connection
GND	B2	See footnote 1	Carrier board ground
SHIELD	B3	P2-E2	Provided for cables shield connection
GND	B4	See footnote 1	Carrier board ground
M4CH0_n	B5	P1-D9	Module 4 Channel 0 ARINC 429 Low Line connection
GND	B6	See footnote 1	Carrier board ground
M4CH2_n	B7	P1-E10	Module 4 Channel 2 ARINC 429 Low Line connection
GND	B8	See footnote 1	Carrier board ground

Table A-7 P1w9-X12d+P2w1-X8d Profile Pinouts

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M4CH4717Tx_n	B9	P1-D11	Module 4 Channel 4 ARINC 429 Low Line connection/ Module 4 ARINC 717 Transmit Channel Low Line connection
GND	B10	See footnote 1	Carrier board ground
M6_232T_485n_422Tn0	B11	P2-D3	Module 6 Channel 0 RS-232 Transmit Line connection/ Module 6 Channel 0 RS-485 Low Line connection/ Module 6 Channel 0 RS-422 Transmit Low Line connection
GND	B12	See footnote 1	Carrier board ground
M6_232T_485n_422Tn1	B13	P2-E4	Module 6 Channel 1 RS-232 Transmit Line connection/ Module 6 Channel 1 RS-485 Low Line connection/ Module 6 Channel 1 RS-422 Transmit Low Line connection
GND	B14	See footnote 1	Carrier board ground
M7IO0_IRIGBIN	B15	P1-E12	Module 7 Discrete 0/ IRIG B120 Input (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
GND	B16	See footnote 1	Carrier board ground
M7IO2_EXTTCLKO	B17	P1-D13	Module 7 Discrete 2/ Global Time Tag Clock TTL Output (1 MHz) (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
GND	B18	See footnote 1	Carrier board ground
M7IO4_EXTTRSOn	B19	P1-E14	Module 7 Discrete 4/ Global Time Tag Reset TTL Output (See **External Signals** on page 3-11 for description. External Signals require a special ordering number.)
M0BUSB_p	D1	P2-B1	Module 0 MIL-STD-1553/1760 Bus B High connection/ Module 0 ARINC 708 Channel 1 High connection
GND	D2	See footnote 1	Carrier board ground
GND	D3	P2-C2	Ground
GND	D4	See footnote 1	Carrier board ground
M4CH1_p	D5	P1-B9	Module 4 Channel 1 ARINC 429 High Line connection
GND	D6	See footnote 1	Carrier board ground
M4CH3_p	D7	P1-C10	Module 4 Channel 3 ARINC 429 High Line connection
GND	D8	See footnote 1	Carrier board ground
Reserved/ M4CH5717Rx_p	D9	Reserved/ P1-B11	Module 4 Reserved for ARINC 429 module/ Module 4 ARINC 717 Receive Channel High Line connection
GND	D10	See footnote 1	Carrier board ground
M6_232R_422R0	D11	P2-B3	Module 6 Channel 0 RS-232 Receive Line connection/ Module 6 Channel 0 RS-422 Receive High Line connection/ Not connected for RS-485 channel
GND	D12	See footnote 1	Carrier board ground
M6_232R_422R1	D13	P2-C4	Module 6 Channel 1 RS-232 Receive Line connection/ Module 6 Channel 1 RS-422 Receive High Line connection/ Not connected for RS-485 channel
GND	D14	See footnote 1	Carrier board ground

Table A-7 P1w9-X12d+P2w1-X8d Profile Pinouts (Continued)

Signal Name	XMC P16 Pin #	VPX P1/P2 Pin #	Description
M7IO5	D15	P1-C12	Module 7 Discrete 5
GND	D16	See footnote 1	Carrier board ground
M7IO7	D17	P1-B13	Module 7 Discrete 7
GND	D18	See footnote 1	Carrier board ground
M7IO9	D19	P1-C14	Module 7 Discrete 9
M0BUSB_n	E1	P2-A1	Module 0 MIL-STD-1553/1760 Bus B Low connection/ Module 0 ARINC 708 Channel 1 Low connection
GND	E2	See footnote 1	Carrier board ground
GND	E3	P2-B2	Ground
GND	E4	See footnote 1	Carrier board ground
M4CH1_n	E5	P1-A9	Module 4 Channel 1 ARINC 429 Low Line connection
GND	E6	See footnote 1	Carrier board ground
M4CH3_n	E7	P1-B10	Module 4 Channel 3 ARINC 429 Low Line connection
GND	E8	See footnote 1	Carrier board ground
Reserved/ M4CH5717Rx_n	E9	Reserved/ P1-A11	Module 4 Reserved for ARINC 429 module/ Module 4 ARINC 717 Receive Channel Low Line connection
GND	E10	See footnote 1	Carrier board ground
M6_422Rn0	E11	P2-A3	Module 6 Channel 0 RS-422 Receive Low Line connection
GND	E12	See footnote 1	Carrier board ground
M6_422Rn1	E13	P2-B4	Module 6 Channel 1 RS-422 Receive Low Line connection
GND	E14	See footnote 1	Carrier board ground
M7IO6	E15	P1-B12	Module 7 Discrete 6
GND	E16	See footnote 1	Carrier board ground
M7IO8	E17	P1-A13	Module 7 Discrete 8
GND	E18	See footnote 1	Carrier board ground
M7GNDDS59	E19	P1-B14	Module 7 ground reference for input and output Discretes 5–9

Table A-7 P1w9-X12d+P2w1-X8d Profile Pinouts (Continued)

1. The differential ground signals are connected to the following pins on the P1 and P2 VPX connectors:
   P1 Connector: F9, C9, G10, D10, A10, F11, C11, G12, D12, A12, F13, C13, G14, D14, A14, F15, C15, G16, D16, A16.
   P2 Connector: F1, C1, G2, D2, A2, F3, C3, G4, D4, A4, F5, C5, G6, D6, A6, F7, C7, G8, D8, A8.

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