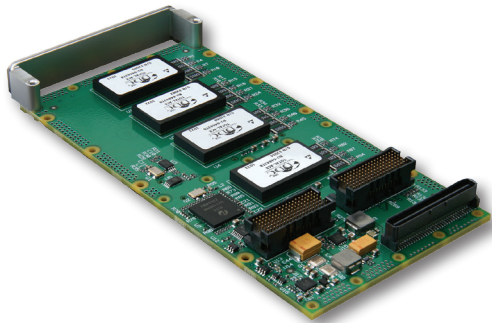


# XMC-603

## Quad-Channel MIL-STD-1553 Module

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### Key Features

- Up to four independent MIL-STD-1553 interfaces
- Support for MIL-STD-1553A, MIL-STD-1553B Notice 2, and STANAG 3838
- MIL-STD-1553 interface implemented with the DDC Total-ACE MIL-STD-1553 controller
  - + Supports 64K bytes dual port RAM with parity
- Both transformer-coupled and direct-coupled interfaces supported
- BC, RT, MT modes independently selectable for each channel
- Backplane I/O
- Linux®, VxWorks® and Windows® XP-E drivers available
- x1 PCI Express® (PCIe) Gen 1 interface
- Requires 5 V or 12 V, and 3.3 V from the carrier card
- Available in three ruggedization levels:
  - + Air-cooled: Level 0 and 100
  - + Conduction-cooled: Level 200

### Applications

- Commercial
- Military and Aerospace
- Control Computers
- Mission Computers
- SWaP-constrained applications requiring advanced I/O options

## Overview

The [XMC-603](#) PMC module allows customers to readily incorporate MIL-STD-1553 into commercial, aerospace, and military embedded computing systems. As one of several products in our comprehensive range of rugged XMC modules, the XMC-603 integrates well with other elements of our product line, featuring technical support, lifecycle management services, and assured long-term availability.

## Architecture

Figure 1 illustrates the internal architecture of the XMC-603. The card supports up to four BU-64843X Total ACE® MIL-STD-1553 controllers. The controllers are available with both direct-coupled or transformer-coupled interfaces. Due to pin limitations, some variants support both direct- and transformer-coupled interfaces, while others do not (see table 1).

The XMC-603 is connected to the processing complex through a x1 lane PCIe Gen 1 interface.

As the XMC-603 is designed to meet VITA 42 specifications, it can run off either 5 V or 12 V.

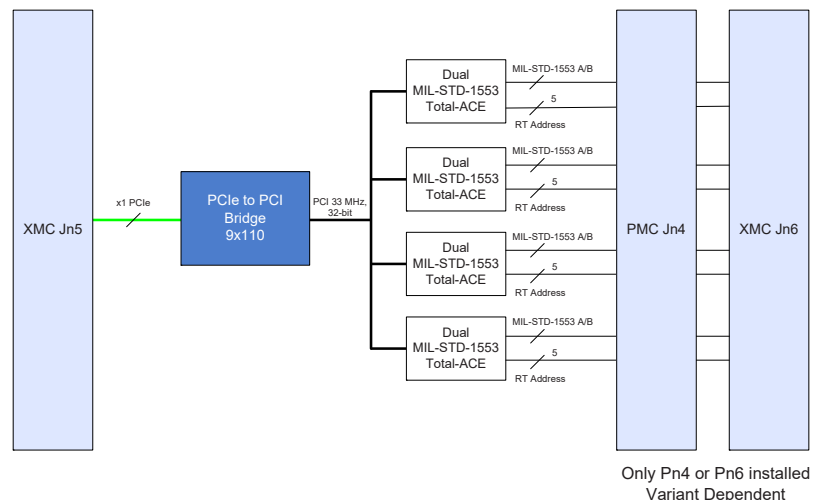


Figure 1: XMC-603 Quad MIL-STD-1553 Block Diagram

## MIL-STD-1553 Interfaces

The MIL-STD-1553 interfaces are implemented using DDCs PCI Total-Ace (BU-65863H). This device integrates the PCI MIL-STD-1553 terminal and transformers into a single BGA package. Both transformer-coupled and direct-coupled output ratios are supported in this single package. The features include:

- Bus Controller (BC), Remote Terminal (RT), and Bus Monitor (MT) modes
- 64K x 16 internal dual port RAM with parity
- Hardware and software compatibility with the Mini-ACE/Mini-ACE Plus (used on the PMC-601), and with the PCI Micro-ACE used on Curtiss-Wright's IPMs available on the VME-182/183/184/186 and VPX6-185/187
- Provides complete multi-protocol support of the MIL-STD-1553A/B/McAir and STANAG 3838
- Incorporates MIL-STD-1760 trimmed voltage source transceivers
- Bus Controller features
  - + BC frames of up to 512 messages
  - + Programmable inter-message gap time
  - + Single frame or auto-repeat modes
  - + Automatic retries
- Remote Terminal features
  - + Programmable illegalization of RT commands
  - + Busy bit programmable on a subaddress basis
- Bus Monitor modes
  - + Word Monitor mode, used to capture all words transferred on either MIL-STD-1553 bus
  - + Word Monitor with Trigger Word
  - + Selective Message Monitor mode, used for selective monitoring based on RT address, Transmit/Receive bit, and subaddress

The mode of operation of each total-ACE device (BC, RT, MT) can be selected independently of the mode of the other devices.

VARIANT	XMC/PMC CONNECTOR		CENTER TAP SUPPORT	DIRECT COUPLED	TRANSFORMER COUPLED	HARDWARE RT ADDRESSING SUPPORTED	COMMENTS
	PN4	PN6					
Dual	✓		✓	2	2	✓	
Quad	✓			4		✓	
Quad	✓		✓		4	✓	
Dual		✓		2	2	✓	VITA 46.9 - 24s+8d+12d
Quad		✓		4	4	✓	VITA 46.9 - 24s+8d+12d
Quad		✓		2	4		VITA 46.9 - 12d

## MIL-STD-1553A/B Compatibility

Standard versions of the XMC-603 are compliant to all aspects of MIL-STD-1553B, Notice 2. Standard versions are also compliant to the protocol aspects of MIL-STD-1553A that differ from MIL-STD-1553B, such as using RT address 31 as a valid RT address instead of the broadcast address, use of subaddress 31 as a valid subaddress instead of a mode code indicator, and different error conditions under which an RT should return a status word.

## RT Address Selection Options

Depending on the variant, there are different options to set the RT address for each MIL-STD-1553 interface. These options are as follows:

- For variants ordered with XMC connectors only (Pn5 and Pn6), if the carrier card supports the VITA 46.9 24s+8d+12d pinout, the user has the option to set the RT address by software or hardware, depending on the state of a register bit. RT address lines are provided on the XMC connector and are accessible on the backplane XMC site I/O pins.
- For variants ordered with XMC connectors only (Pn5 and Pn6), if the carrier card supports the VITA 46.9 8d+12d or 20d pinout, the user only has the option to only set the RT address by software.
- For variants ordered with XMC connector Pn5 and PMC connector Pn4, the user has the option to set the RT address by software or hardware, depending on the state of a register bit. RT address lines are provided on the PMC connector and are accessible on the backplane PMC pins.

## MIL-STD-1553 Interface Coupling

The XMC-603 supports both direct- and transformer-coupled interfaces. Support varies based on the variant due to pin limitations. See table 1.

- DUAL MIL-STD-1553 with PMC Pn4 connector supports both direct- and transformer-coupling.
- Quad MIL-STD-1553 with PMC Pn4 connector supports either direct- or transformer-coupled as an orderable variant.
- Quad MIL-STD-1553 with XMC Pn6, supports direct- and transformer-coupled if the carrier card supports the VITA 46.9 24s+8d+12d pinout. If the pinout is only 12d, four ports support transformer-coupled, with two ports supporting direct-coupled.

## PCIe Specifications

- Interface to the XMC-603 is through a x1 lane PCIe interface
- PCIe interface is implemented with a Pericom® PI7C9x110 PCIe - PCI bridge
- Compliant with:
  - + PCI Express Base Specification, Revision 1.0a
  - + PCI Express Card Electromechanical Specification, Revision 1.0a
  - + PCI Local Bus Specification, Revision 3.0
  - + PCI Express to PCI Bridge Specification, Revision 1.0
- Interface is a x1 lane

## Mechanical Format

The XMC-603 is a single width XMC module. Air-cooled modules are designed in accordance with the IEEE 1386 and IEEE 1386.1 specifications. All I/O is available from the Pn4 connector for routing to the backplane via basecard connectors.

Conduction-cooled modules are designed in accordance with ANSI/VITA 20-2005, Conduction-Cooled PCI Mezzanine Card Standard. The cooling surfaces provided are the Primary Thermal Interface Region and both Secondary Thermal Interface Regions (side).

## Software

For driver support for various SBCs, please refer to application note 836075 available on Curtiss-Wright's [Customer Support Center](#).

TABLE 2

Cables

CABLE	DESCRIPTION	DETAILS
CBL-601-000	PMC-601 Dual I/O Extension Cable	I/O extension cable compatible with the Curtiss-Wright standard 78-way PMC I/O connector found on basecard cable sets. Mates with the 78-way connector and provides separate connectors for the transformer-coupled MIL-STD-1553 signals, RT address bits, and discrete TTL I/O. Connectors for MIL-STD-1553 signals are 3-lug Twinax bulkhead jack connectors (Trompeter part number BJ79-47). Intended for use at air-cooled Level 0.
CBL-603-000	XMC-603 Quad PMC Pn4 Cable	Breakout cable to support the Quad XMC-603 for PMC Pn4 variants. I/O extension cable compatible with the 78-way PMC I/O connector found on basecard cable sets. Mates with the 78-way connector and provides separate connectors for the transformer-coupled MILSTD-1553 signals, and RT address bits. Connectors for MIL-STD-1553 signals are 3-lug Twinax bulkhead jack connectors (Trompeter part number BJ79-47). Intended for use at air-cooled Level 0.
CBL-603-001	XMC-603 Quad XMC Pn6 Cable	Breakout cable to support the Quad XMC-603 for XMC Pn6 variants. I/O extension cable compatible with the 78-way PMC I/O connector found on basecard cable sets. Mates with the 78-way connector and provides separate connectors for the transformer-coupled MILSTD-1553 signals, and RT address bits. Connectors for MIL-STD-1553 signals are 3-lug Twinax bulkhead jack connectors (Trompeter part number BJ79-47). Intended for use at air-cooled Level 0.

## RIM (RTM Interface Module) Support

For Curtiss-Wright SBCs that have a Rear Transition Module (RTM) with RIM support, the RIM modules in Table 3 can be used to obtain access to the XMC-603 I/O. The RIM modules support XMC sites with VITA 46.0 x24s+x8d+x12d pin out.

TABLE 3		RIM Modules
RIM MODULE	DESCRIPTION	DETAILS
RIM-GEN-0001	RTM 3u Generic RIM Low Speed	<p>RTM Interface Module (RIM), Generic interface with low-speed signals. Intended for use with VITA46.9 X24S+X8D+X12D pin mapping (64 signals). RIM breaks out 64 XMC signals from the RTM VITA 61 connector to a 78 pin D connector. Intended for low speed signaling with non-impedance controlled tracking requirements. When installed on the RTM, the RIM will protrude into the adjoining slot.</p> <p>Note: for the 603, the D connector pinout is compatible with the CBL-603-001 cable.</p>
RIM-GEN-0002	RIM Generic High-speed Diff Pairs	<p>RTM Interface Module (RIM), Generic interface with high-speed diff pair routing Intended for use with VITA46.9 X24S+X8D+X12D pin mapping (64 signals). Customer can create their own cable dependent on their specific requirements. RIM breaks out 64 XMC signals from the RTM VITA 61 connector as follows</p> <ul style="list-style-type: none"> <li>&gt; 20 diff pairs (X8D+X12D) impedance controlled routing to diff pairs go to 2mm headers, with a gnd for each.</li> <li>&gt; 24 single ended (X24S) brought to 0.1" header.</li> <li>&gt; Holes are provided for tie downs.</li> </ul> <p>When installed on the RTM, the RIM will protrude into the adjoining slot.</p>

## Specifications

### Cooling Requirements

- Temperature Range
  - + -40° to 71°C
- Air-Flow
  - + 10 CFM (2-port)
  - + 15 CFM (4-port)

Air-flow is specified for sea-level conditions. The temperature refers to the inlet temperature at the card. The air-flow specifications are for worst case (highest power) conditions, without any PMC/XMCs installed. Curtiss-Wright can supply additional recommendations for specific power/temperature/altitude scenarios. Pressure drop characteristics of the XMC-603 support the design and testing of cooling subsystems.

### Ruggedization Levels (See Note)

- Air-cooled: Level 0 and 100
- Conduction-cooled: Level 200

Note: Refer to the Curtiss-Wright Ruggedization Guidelines for more details.

TABLE 4		Dimensions & Weight	
RUGGEDIZATION		WEIGHT* (GRAMS)	SIZE
Air-cooled	2 channel	105	per IEEE 1386-2001
	4 channel	125	
Conduction-cooled	2 channel	105	
	4 channel	125 (4-port)	

Note: Weight is without thermal pads and screws.

**TABLE 5** Power Requirements (Note 1)

VOLTAGE	1553 UTILIZATION	2-PORT	4-PORT
+5 V	25%	2.2 W	4.3 W
	50%	3.7 W	7.3 W
	100%	6.7 W	13.2 W
+12 V	25%	2.3 W	4.5 W
	50%	3.8 W	7.6 W
	100%	6.9 W	13.7 W
+12 V AUX	Not used		
-12 V AUX	Not used		
+3.3 V	1.3 W		

## Notes:

- Card is design to use either a 5 V or 12 V power supply.
- Circuit card assembly is done to class 3 standards of IPC-A-610C, Acceptability of Electronic Assemblies. Standard conformal coating is acrylic PWB meets UL 94 V-0 flammability rating.

## Ordering Information

**TABLE 6** Ordering information: XMC-603-CTIXN

PART NUMBER	DESCRIPTION
3U VITA 42 form factor	XMC
Model number	603
c	Cooling Method › A: Air-cooled › C: Conduction-cooled
t	Temperature Range › 0: 0° to 50°C › 1: -40° to 71°C › 2: -40° to 85°C
i	Interface › 0: Transformer coupled › 1: Direct coupled › 2: Direct and Transformer coupled
x	XMC/PMC Connectors › 0: XMC Pn5 & 6 › 1: PMC Pn4 and XMC Pn5 › 9: Custom
n	Number MIL-STD-1553 Ports › 2: x2 MIL-STD-1553 Ports › 4: x4 MIL-STD-1553 Ports

Note: Support for 1553 McAir is by customer specific request.

**TABLE 7** Supported standard product part numbers

VARIANT	DESCRIPTION
XMC-603-A0212	Dual 1553 DTC PN45 A0
XMC-603-A0014	Quad 1553 TC PN45 A0
XMC-603-A0202	Dual 1553 DTC PN56 A0
XMC-603-A0204	Quad 1553 DTC PN56 A0
XMC-603-A1212	Dual 1553 DTC PN45 A1
XMC-603-A1014	Quad 1553 TC PN45 A1
XMC-603-A1202	Dual 1553 DTC PN56 A1
XMC-603-A1204	Quad 1553 DTC PN56 A1
XMC-603-C2212	Dual 1553 DTC PN45 C2
XMC-603-C2014	Quad 1553 TC PN45 C2
XMC-603-C2202	Dual 1553 DTC PN56 C2
XMC-603-C2204	Quad 1553 DTC PN56 C2