# EHS-PMC5602 Data Sheet

STANAG 7221 Network Interface Card

EDGEWATER COMPUTER SYSTEMS, INC

The Edgewater EHS-PMC5602 high-performance network interface card is designed to provide rapid and affordable data capacity increases on STANAG 3838 and Mil-Standard 1553B (3838/1553B) data buses. The additional capacity operates in parallel with and independently of the existing low-speed 3838/1553B signaling. The EHS-PMC5602 complies with NATO STANAG 7221.

The EHS-PMC5602 can add up to 100Mbps of additional capacity as a separate, independent data network operating on the existing data bus infrastructure.

The EHS-PMC5602 network interface card can be configured as a bus controller or as a remote terminal and does not rely on the existing legacy 3838/1553B bus controller to manage the data traffic. No changes are required to the existing 3838/1553B hardware or software infrastructure leading to a dramatic reduction in the cost to integrate, certify, and deploy advanced capabilities requiring increased data capacity.

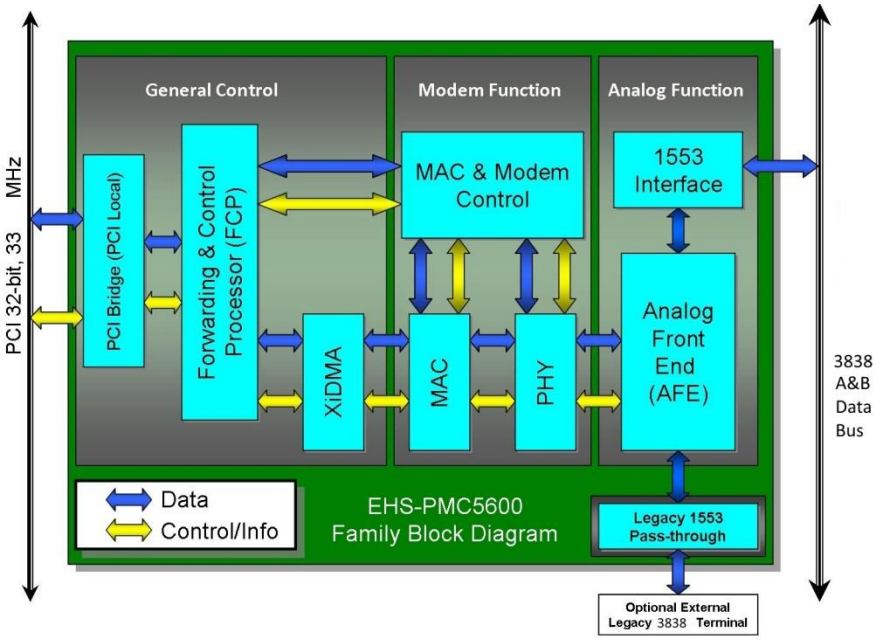
## Applications

- Transportation of high-speed data such as video, imagery, enhanced vision systems, and advanced data communications
- Reducing the load on existing 3838/1553B data buses
- Integration into Mission Computers, Stores Management Systems, and Displays to future proof existing network infrastructure
- Suited for ground, airborne, surface, and sub-surface platforms integrated with Mil-Standard 1553/STANAG 3838 data buses

## Features:

- High-performance STANAG 7221 compliant Interface
- Operates on Mil-Standard 1553, STANAG 3838, and MACAIR compatible data buses
- Advanced driver support such as VX Works 5.5.1, 6.3, and 6.9
- STANAG 7221 Bus Controller or Remote Terminal Configuration

*EHS-PMC-5602 Block Diagram*



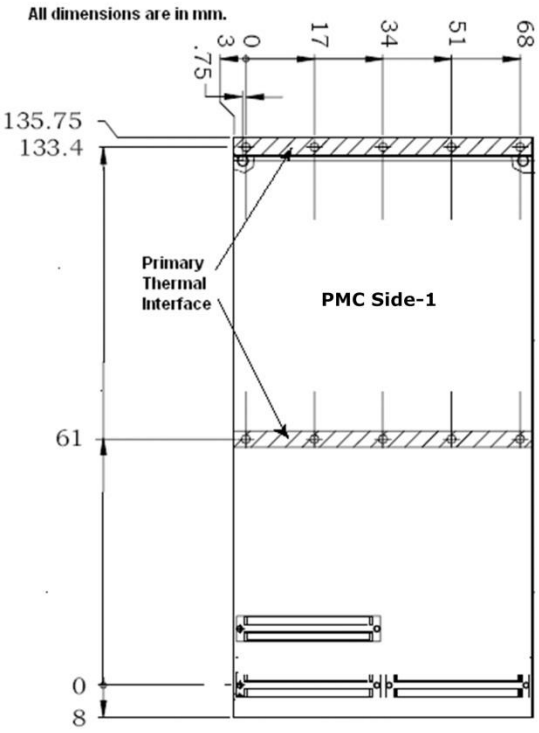

*EHS-PMC5602 PCI Mezzanine Card*

# System Interfaces

## Mechanical Interface

The EHS-PMC5602 Circuit Card Assembly (CCA) is a single height Peripheral Component Interface (PCI) Mezzanine Card (PMC) which is IEEE P1386.1 form factor compliant and is conduction cooled in accordance with ANSI/VITA 20-2001 (R2011). It can be plugged into any industry compliant conduction cooled carrier card which provides a PCI local bus slot that is keyed for 3.3V bus I/O voltage. The assembly is cooled through the primary thermal interface and requires no external airflow for temperature regulation.

It is not compatible with carrier cards that have a fixed secondary thermal interface or are keyed for 5V bus I/O voltage.




*CCA Physical Dimensions*

Complete mechanical interface details are contained in Edgewater document 9001074 EHS-PMC5602 Hardware Reference Manual.

## Thermal Interface

Heat is transferred from the EHS-PMC5602 CCA to the host card via contact with two primary thermal interfaces. Note that the secondary thermal interfaces are optional according to ANSI/VITA 20-2001 (R2011) and not used by the CCA. The CCA thermal design assumes that all heat is transferred via the primary thermal interfaces.

The thermal interfaces are plated with Electroless Nickel Immersion Gold (ENIG) to provide excellent surface co-planarity and maintain thermal performance over time by limiting oxidization and corrosion.

## Electrical Interface

All external connections for the EHS-PMC5602 CCA are through the PMC interface. Host communication is through the PCI bus on the PMC interface and the remaining connections are through the PMC user Input/Output (I/O) P14 connector.

Legacy 3838/1553B can optionally be passed through the EHS-PMC5602 CCA to connect to the 3838 bus on the same stub as the STANAG 7221 interface. This allows a legacy 3838/1553B connected LRU to continue using the legacy interface without changes to the legacy interface software and also without wiring changes external to the LRU.

These are further described in the External Interfaces section.

## Software Interface

Applications communicate with the terminal using an Application Program Interface (API) through the host driver on the host computer. The API provides a hardware abstraction layer to simplify and reduce the effort required to integrate an EHS-PMC5602 CCA into a system.

### *Host Driver*

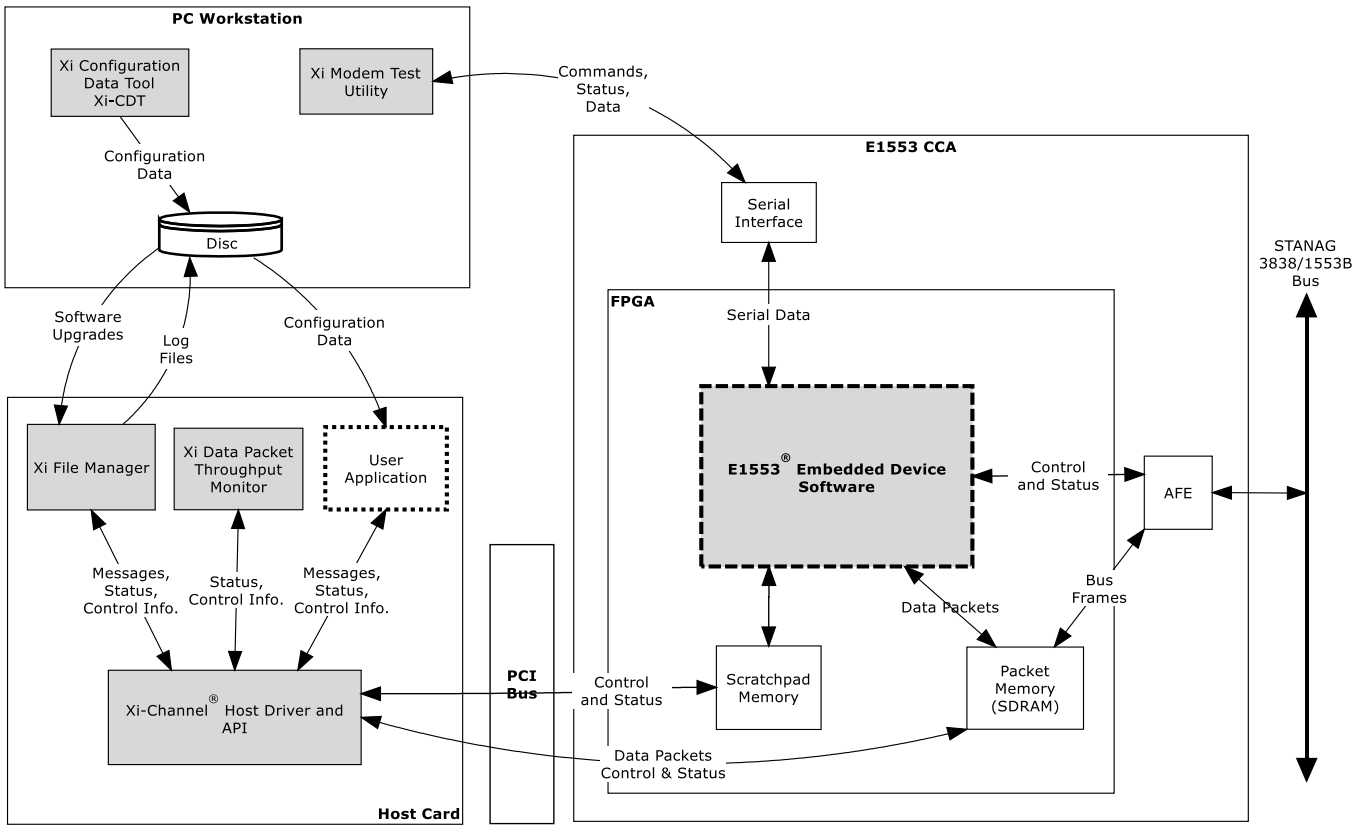
The host driver interfaces with the user application primarily through the use of Virtual Circuits (VCs), which are accessed by a Virtual Circuit Endpoint (VCE) by the application. This section describes the minimum high level functionality the driver must support through the API. Some of these are basic operations and others are specified so as to maintain application - driver efficiency.

Refer to Edgewater document 9000965 CANIC API Reference Guide for complete details on the interface.

Host driver BSPs have been ported for the following versions of VxWorks:

- Vxworks 5.5.1
- Vxworks 6.3
- Vxworks 6.9

Driver source code is also available by request for porting to other versions or operating systems.




*Software Component Structure*

## Software Tools

### File Manager Software

The Xi File Manager is an application running on the host that uses the Host API to retrieve statistics and message logs gathered during flight and to upload software upgrades.

It can also access software upgrade images, stored on a network connected PC Development system, for subsequent loading onto the EHS-PMC5602 CCA.

### Configuration Data Tool

The Xi Configuration Data Tool (XiCDT) stores the configuration data, which it produces off-line, on a Personal Computer (PC) Development system. The file format can be either a binary file format or an ASCII C file format that is compatible with the Host API calls that would use the data in a user application program.

### Data Throughput Monitor Software

The Xi Data Throughput Monitor is an application running on the host that employs the Host API to retrieve and display performance related statistics such as packet and error counts.

### Xi Modem Test Utility

The Xi Modem test utility provides direct access to the EHS-PMC5602 CCA configurations settings to monitor and change the parameters and to view certain aspects of system operation.

This tool runs on a PC type workstation and is intended to support lab testing and network characterization. To allow for flexible system deployment configuration, two connection methods are defined: an Ethernet based connection and a serial port connection.

## External Interfaces

The external hardware interfaces provide the physical link between the EHS-PMC5602 CCA, the Host computer, and the 3838 network. Edgewater document 9001074 EHS-PMC5602 Hardware Reference Manual contains a full definition of the external interfaces.

## Power

Primary power to the EHS-PMC5602 CCA is provided through the PMC PCI connectors P11 and P12.

The maximum, room temperature power dissipation is 6.5W, with the following maximum current draw per power rail as follows:

| Power Supply (V) | Max Current (A) | Noise (to 20MHz) mV pk-pk |
|---|---|---|
| +3.3 ± 5% | 1.005 | 50 |
| +5 ± 5% | 0.497 | 50 |
| +12 ± 5% | 0.052 | 240 |
| -12 ± 5% | Not used | 240 |

### Low Power Mode

Two discrete inputs, which enable host control of the EHS-PMC5602 CCA Low Power Mode, are provided through PMC I/O connector P14. Using the control signals the host can:

- Force the CCA into Low Power mode (LOW_PWR# = Low)
- Override the CCA high temperature shutdown switch (LP_OVR = High)
- Permit normal operation with CCA shutdown circuit functional (LOW_PWR# = High, LP_OVR = Low)

## PCI Bus

The EHS-PMC5602 Host interface is provided through the PMC PCI connectors P11 and P12 and is a PCI Local Bus as defined by PCI V2.3 with a bus clock rate of up to 33MHz. 66 MHz PCI is not currently supported by the EHS-PMC5602 CCA. The EHS-PMC5602 CCA supports 3.3V bus signaling only.

The EHS-PMC5602 CCA implements the PRESENT signal defined in ANSI/VITA-32-2003. The PRESENT (BUSMODE[1]) pin signal is connected as a logic 0 (pulled down) to indicate to a host card that a PMC card has been installed. BUSMODE[2..4] are ignored completely by the EHS-PMC5602 CCA.

## P14 User IO

### *JTAG Interface*

An IEEE 1149.1 compatible interface, through the PMC I/O connector P14, provides access for boundary scan testing and debug of the hardware. This interface is not used during normal operation of the EHS-PMC5602 CCA.

### *3838/1553B Bus*

The 3838/1553B bus interface is provided through the PMC I/O connector P14. By selecting the appropriate pin connections on P14, a STANAG 7221 compliant network interface is available in either transformer coupled or direct coupled mode. Component changes are not required to switch between transformer and direct coupled options.

A pass-through feature allows an external legacy 3838/1553B network to be combined with the B-RTDB network via a set of dedicated pins on P14. The legacy 3838/1553B data is passed through a passive low pass filter but is not otherwise processed or intercepted by the EHS-PMC5602 CCA. Network connections are provided to both A and B buses. When a legacy 3838 terminal is connected through the pass-through interface there is the equivalent of two RTs connected to the 3838 bus.

### *Serial I/O*

Serial I/O channels are provided through the PMC I/O P14 connector for test and monitoring activities associated with the EHS-PMC5602 CCA. The channels use data transmit and receive signals only. Hardware flow control is not used.

The interface is 3.0V LVCMOS. The TX and RX signals must be converted to RS-232 levels external to the CCA.

This interface is not used during normal operation of the EHS-PMC5602 CCA.

### *B-RTDB RT Address*

Six RT address bits, one parity select bit, one mode select (7221 BC/RT) bit, an Address Lock bit, and a Mode Lock bit are provided through the PMC I/O connector P14 as Ground/Open type discrete inputs. The interface is odd parity protected.

The state can be read by external applications under Host control and the RT address and mode can be changed by the host if not locked on the extrernal interface.

### *GPIO*

Two single ended, 3 Volt Low Voltage Transistor-Transistor Logic (LVTTL) compatible, discrete General Purpose I/Os (GPIO) are provided through the P14 I/O connector. Each GPIO is pulled up to +3V by a 4.75KΩ resistor.

# EHS-PMC5602 PMC Pin Assignments

## P11 Pin Assignments

| P11 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Pin #** | **Signal Name** | **Signal Name** | **Pin #** | **Pin #** | **Signal Name** | **Signal Name** | **Pin #** |
| **1** | TCK | -12V | **2** | **33** | FRAME# (1) | GROUND | **34** |
| **3** | GROUND | INTA# | **4** | **35** | GROUND | IRDY# | **36** |
| **5** | INTB#(1) | INTC# (1) | **6** | **37** | DEVSEL# | +5V | **38** |
| **7** | PRESENT# (2) | +5V | **8** | **39** | GROUND | LOCK# (1) | **40** |
| **9** | INTD# (1) | PCI_RSVD (3) | **10** | **41** | PCI_RSVD (3) | PCI_RSVD | **42** |
| **11** | GROUND | +3.3Vaux (1) | **12** | **43** | PAR | GROUND | **44** |
| **13** | CLK | GROUND | **14** | **45** | V(I/O) | AD[15] | **46** |
| **15** | GROUND | GNT# | **16** | **47** | AD[12] | AD[11] | **48** |
| **17** | REQ# | +5V | **18** | **49** | AD[09] | +5V | **50** |
| **19** | V(I/O) | AD[31] | **20** | **51** | GROUND | C/BE[0]# | **52** |
| **21** | AD[28] | AD[27] | **22** | **53** | AD[06] | AD[05] | **54** |
| **23** | AD[25] | GROUND | **24** | **55** | AD[04] | GROUND | **56** |
| **25** | GROUND | C/BE[3]# | **26** | **57** | V(I/O) | AD[03] | **58** |
| **27** | AD[22] | AD[21] | **28** | **59** | AD[02] | AD[01] | **60** |
| **29** | AD[19] | +5V | **30** | **61** | AD[00] | +5V | **62** |
| **31** | V(I/O) | AD[17] | **32** | **63** | GROUND | REQ64# (1) | **64** |

**NOTES:**

1. PCI signals not used by the CCA.
2. PRESENT# replaces BUSMODE[1]#.
3. Reserved for implementation of future PCI signals.

## P12 Pin Assignments

| P12 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Pin #** | **Signal Name** | **Signal Name** | **Pin #** | **Pin #** | **Signal Name** | **Signal Name** | **Pin #** |
| **1** | +12V | TRST# (1) | **2** | **33** | GROUND | PMC_RSVD (4) | **34** |
| **3** | TMS (1) | TDO (2) | **4** | **35** | TRDY# | +3.3V | **36** |
| **5** | TDI (2) | GROUND | **6** | **37** | GROUND | STOP# | **38** |
| **7** | GROUND | PCI_RSVD (3) | **8** | **39** | PERR# | GROUND | **40** |
| **9** | PCI_RSVD (3) | PCI_RSVD (3) | **10** | **41** | +3.3V | SERR# | **42** |
| **11** | BUSMODE[2]#(1) | +3.3V | **12** | **43** | C/BE[1]# | GROUND | **44** |
| **13** | RST# | BUSMODE[3]# (1) | **14** | **45** | AD[14] | AD[13] | **46** |
| **15** | +3.3V | BUSMODE[4]# (1) | **16** | **47** | M66EN | AD[10] | **48** |
| **17** | PME# | GROUND | **18** | **49** | AD[08] | +3.3V | **50** |
| **19** | AD[30] | AD[29] | **20** | **51** | AD[07] | PMC_RSVD (4) | **52** |
| **21** | GROUND | AD[26] | **22** | **53** | +3.3V | PMC_RSVD (4) | **54** |
| **23** | AD[24] | +3.3V | **24** | **55** | PMC_RSVD (4) | GROUND | **56** |
| **25** | IDSEL | AD[23] | **26** | **57** | PMC_RSVD (4) | PMC_RSVD (4) | **58** |
| **27** | +3.3V | AD[20] | **28** | **59** | GROUND | PMC_RSVD (4) | **60** |
| **29** | AD[18] | GROUND | **30** | **61** | ACK64# (1) | +3.3V | **62** |
| **31** | AD[16] | C/BE[2]# | **32** | **63** | GROUND | PMC_RSVD (4) | **64** |

**NOTES:**

1. PCI signals not used by the CCA.
2. TDI is connected to TDO.
3. Reserved for implementation of future PCI signals.
4. Reserved for implementation of future PMC signals.

## P14 Pin Assignments (User IO)

| P14 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Pin #** | **Signal Name** | **Signal Name** | **Pin #** | **Pin #** | **Signal Name** | **Signal Name** | **Pin #** |
| **1** | NIC_RSVD (1) | NIC_RSVD (1) | **2** | **33** | NIC_RSVD (1) | NIC_RSVD (1) | **34** |
| **3** | RT_AD_RTN | RT_AD_PAR | **4** | **35** | NIC_RSVD (1) | GROUND | **36** |
| **5** | RT_AD[5] | RT_AD[0] | **6** | **37** | NIC_RSVD (1) | RX | **38** |
| **7** | RT_AD[1] | RT_AD[2] | **8** | **39** | TX | GPIO[0] | **40** |
| **9** | RT_AD[3] | RT_AD[4] | **10** | **41** | GPIO[1] | NIC_RSVD (1) | **42** |
| **11** | AFE_GROUND | MUX_AH_TC | **12** | **43** | NIC_RSVD (1) | NIC_RSVD (1) | **44** |
| **13** | MUX_AL_TC | AFE_GROUND | **14** | **45** | MSEL_ LOCK | +3.0V (out) | **46** |
| **15** | MUX_BL_TC | MUX_AH_DC | **16** | **47** | NIC_RSVD (1) | NIC_RSVD (1) | **48** |
| **17** | MUX_BH_TC | MUX_AL_DC | **18** | **49** | LOW_PWR# | LP_OVR | **50** |
| **19** | AD_LOCK# | MSEL | **20** | **51** | 5.0V (out) | +3.3V (out) | **52** |
| **21** | AFE_GROUND | AFE_GROUND | **22** | **53** | 5.0V (out) | +3.3V (out) | **54** |
| **23** | AFE_GROUND | MUX_BH_DC | **24** | **55** | NIC_RSVD (2) | NIC_RSVD (2) | **56** |
| **25** | AFE_GROUND | MUX_BL_DC | **26** | **57** | NIC_RSVD (2) | GROUND | **58** |
| **27** | AFE_GROUND | MUX_AH_PT | **28** | **59** | NIC_RSVD (2) | GROUND | **60** |
| **29** | MUX_BH_PT | MUX_AL_PT | **30** | **61** | NIC_RSVD (2) | NIC_RSVD (2) | **62** |
| **31** | MUX_BL_PT | NIC_RSVD (1) | **32** | **63** | NIC_RSVD (2) | NIC_RSVD (2) | **64** |

**NOTES:**

1. **Reserved for CCA product development and support. Do not connect.**
2. **Reserved for future CCA use. Do not connect.**
3. All CCA-specific signals may be isolated from the P14 plug by removing specific zero ohm resistors on the CCA. Contact Edgewater for further information.
4. Upon customer request, P14 pin assignments may be reconfigured by use of soldered wire jumpers. Contact Edgewater for further information.

## EHS-PMC5602 Part Numbering:

| Part Number | Description | Operating Temp Range | Card Type | Host I/F | Power Dissipation Typ/Max* | STANAG 7221 Compliant | Availability for Ordering |
|---|---|---|---|---|---|---|---|
| EHS-PMC-5602-M | PCI Mezzanine Circuit (PMC) card | -40 to 85C | PMC | PCI | 6.0W/6.5W | Yes | Now |

*Measure at 25C

## Specifications:

### Temperature

Storage: -55C to 95C
Operation: -40C to 85C

### Relative Humidity

1% to 95% non-condensing

### Altitude

-15,000ft. to 70,000ft.
(-700m to 21,350m)

### Shock, Vibration, Acceleration

#### *Shock:*

- MIL-STD-810G, method 516.6; Procedure VI (Bench Handling)
- MIL-STD-810G, Method 516.6, procedure I, Test Category as defined by paragraph 2.3.2c, figure 516.6-10 (Functional)
- RCTA/DO-160D Section 7 (Operational)

#### *Vibration:*

MIL-STD-810G method 514.6 Procedure I

#### *Acceleration:*

MIL-STD-810G, Method 513.6, Procedure I & II

## Ordering Information:

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