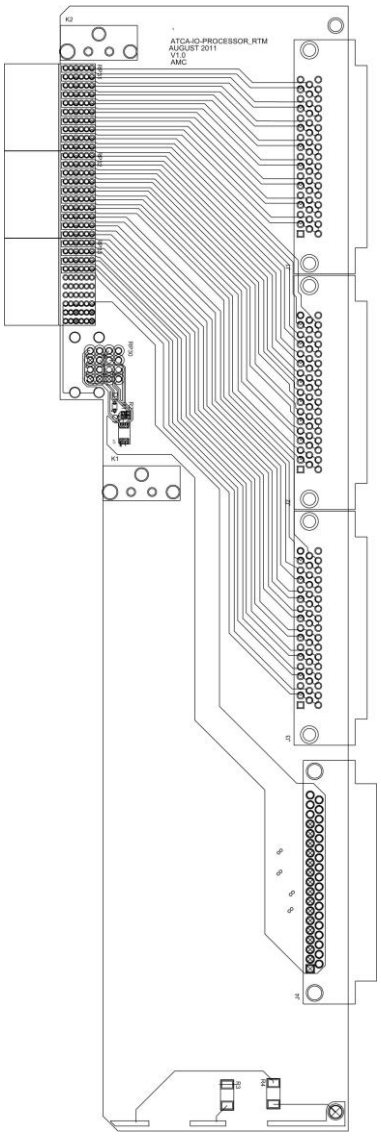
# Description

The **ATCA-IO-PROCESSOR_RTM** is a **xTCA**[1] based module that ~~follows the specifications presented in PICMG~~[2]® ~~PhysRTM.0, Revision 1.0 Draft 0.1g that complements PICMG® 3.0, Revision 3.0~~[3] ~~with respect to ARTM~~[4] ~~specification.~~

The module acts as a passive External Digital and Analogue Signals to ATCA Base carrier interface.

The module implements the following functions:

- Twenty four differential pairs of Analogue signals in a DSub-50 female connector.
- 700Vdc Galvanic Isolation between groups of two pairs of Analogue differential signals.
- Six Digital differential Input and Eight Digital differential Output signal mapped into a DSub-37 female connector.



# Board Infrastructure

## ARTM Power Connector

This connector follows specifications of *AdvancedTCA Rear Transition Module Zone 3A, PICMG® 3.8, R1.0 D0.9* from 9 March 2011.

Table 1. Power/Management Connector Pinout .


| Pin# | Use | SchName | Pin# | Use | SchName | Pin# | Use | SchName | Pin# | Use | SchName |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **A1** | MP | 3.3V_MGMT | A2 | MP_RTN | GND | A3 | 12V | 12V(*) | A4 | 12V_RTN | GND |
| **B1** | ENABLE# | --(*) | B2 | PS# | RTM_PS# | B3 | 3.3V | 3.3V | B4 | 3.3V_RTN | GND |
| **C1** | SCL_L | RTM_SCL | C2 | SDA_L | RTM_SDA | C3 | 2.5V | 2.5V | C4 | 2.5V_RTN | GND |
| **D1** | JTAG_TCK | RTM_TCK(*) | D2 | JTAG_TDO | RTM_TDO(*) | D3 | JTAG_TDI | RTM_TDI(*) | D4 | JTAG_TMS | RTM_TMS(*) |

*(*) Not Connected in Schematic.*

## Pinout (ATCA -Zone 3)

The Fabric connector follows AdvancedTCA Rear Transition Module Zone 3A, PICMG® 3.8, R1.0 D0.9xc from 3 May 2011 that points out to PICMG®3.3 Revision 3.0 AdvancedTCA® Base Specification and auxiliary documents.

Table 2. RP31 ARTM connectors pinout.

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|---|---|---|---|---|---|---|---|
| **A1** | RTM_IO_1B_P | D3 | RTM_IO_3A_N | A6 | RTM_IO_6B_P | D8 | RTM_IO_8A_N |
| **B1** | RTM_IO_1B_N | BG3 | RTM_IO_GND_3AB | B6 | RTM_IO_6B_N | BG8 | RTM_IO_GND_8AB |
| **C1** | RTM_IO_1A_P | DG3 | RTM_IO_GND_3AB | C6 | RTM_IO_6A_P | DG8 | RTM_IO_GND_8AB |
| **D1** | RTM_IO_1A_N | A4 | RTM_IO_4B_P | D6 | RTM_IO_6A_N | A9 | RTM_IO_9B_P |
| **BG1** | RTM_IO_GND_1AB | B4 | RTM_IO_4B_N | BG6 | RTM_IO_GND_6AB | B9 | RTM_IO_9B_N |
| **DG1** | RTM_IO_GND_1AB | C4 | RTM_IO_4A_P | DG6 | RTM_IO_GND_6AB | C9 | RTM_IO_9A_P |
| **A2** | RTM_IO_2B_P | D4 | RTM_IO_4A_N | A7 | RTM_IO_7B_P | D9 | RTM_IO_9A_N |
| **B2** | RTM_IO_2B_N | BG4 | RTM_IO_GND_4AB | B7 | RTM_IO_7B_N | BG9 | RTM_IO_GND_9AB |
| **C2** | RTM_IO_2A_P | DG4 | RTM_IO_GND_4AB | C7 | RTM_IO_7A_P | DG9 | RTM_IO_GND_9AB |
| **D2** | RTM_IO_2A_N | A5 | RTM_IO_5B_P | D7 | RTM_IO_7A_N | A10 | RTM_IO_10B_P |
| **BG2** | RTM_IO_GND_2AB | B5 | RTM_IO_5B_N | BG7 | RTM_IO_GND_7AB | B10 | RTM_IO_10B_N |
| **DG2** | RTM_IO_GND_2AB | C5 | RTM_IO_5A_P | DG7 | RTM_IO_GND_7AB | C10 | RTM_IO_10A_P |
| **A3** | RTM_IO_3B_P | D5 | RTM_IO_5A_N | A8 | RTM_IO_8B_P | D10 | RTM_IO_10A_N |
| **B3** | RTM_IO_3B_N | BG5 | RTM_IO_GND_5AB | B8 | RTM_IO_8B_N | BG10 | RTM_IO_GND_10AB |
| **C3** | RTM_IO_3A_P | DG5 | RTM_IO_GND_5AB | C8 | RTM_IO_8A_P | DG10 | RTM_IO_GND_10AB |

Table 2. RP32 ARTM connectors pinout.

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|---|---|---|---|---|---|---|---|
| **A1** | RTM_IO_11B_P | D3 | RTM_IO_13A_N | A6 | RTM_IO_16B_P | D8 | RTM_IO_18A_N |
| **B1** | RTM_IO_11B_N | BG3 | RTM_IO_GND_13AB | B6 | RTM_IO_16B_N | BG8 | RTM_IO_GND_18AB |
| **C1** | RTM_IO_11A_P | DG3 | RTM_IO_GND_13AB | C6 | RTM_IO_16A_P | DG8 | RTM_IO_GND_18AB |
| **D1** | RTM_IO_11A_N | A4 | RTM_IO_14B_P | D6 | RTM_IO_16A_N | A9 | RTM_IO_19B_P |
| **BG1** | RTM_IO_GND_11AB | B4 | RTM_IO_14B_N | BG6 | RTM_IO_GND_16AB | B9 | RTM_IO_19B_N |
| **DG1** | RTM_IO_GND_11AB | C4 | RTM_IO_14A_P | DG6 | RTM_IO_GND_16AB | C9 | RTM_IO_19A_P |
| **A2** | RTM_IO_12B_P | D4 | RTM_IO_14A_N | A7 | RTM_IO_17B_P | D9 | RTM_IO_19A_N |
| **B2** | RTM_IO_12B_N | BG4 | RTM_IO_GND_14AB | B7 | RTM_IO_17B_N | BG9 | RTM_IO_GND_19AB |
| **C2** | RTM_IO_12A_P | DG4 | RTM_IO_GND_14AB | C7 | RTM_IO_17A_P | DG9 | RTM_IO_GND_19AB |
| **D2** | RTM_IO_12A_N | A5 | RTM_IO_15B_P | D7 | RTM_IO_17A_N | A10 | RTM_IO_20B_P |
| **BG2** | RTM_IO_GND_12AB | B5 | RTM_IO_15B_N | BG7 | RTM_IO_GND_17AB | B10 | RTM_IO_20B_N |
| **DG2** | RTM_IO_GND_12AB | C5 | RTM_IO_15A_P | DG7 | RTM_IO_GND_17AB | C10 | RTM_IO_20A_P |
| **A3** | RTM_IO_13B_P | D5 | RTM_IO_15A_N | A8 | RTM_IO_18B_P | D10 | RTM_IO_20A_N |
| **B3** | RTM_IO_13B_N | BG5 | RTM_IO_GND_15AB | B8 | RTM_IO_18B_N | BG10 | RTM_IO_GND_20AB |
| **C3** | RTM_IO_13A_P | DG5 | RTM_IO_GND_15AB | C8 | RTM_IO_18A_P | DG10 | RTM_IO_GND_20AB |

Table 2. RP33 ARTM connectors pinout.

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|---|---|---|---|---|---|---|---|
| **A1** | RTM_IO_21B_P | D3 | RTM_IO_23A_N | A6 | -- | D8 | RTM_DIO_2_N |
| **B1** | RTM_IO_21B_N | BG3 | RTM_IO_GND_23AB | B6 | -- | BG8 | GND |
| **C1** | RTM_IO_21A_P | DG3 | RTM_IO_GND_23AB | C6 | -- | DG8 | GND |
| **D1** | RTM_IO_21A_N | A4 | RTM_IO_24B_P | D6 | -- | A9 | RTM_DIO_3_P |
| **BG1** | RTM_IO_GND_21AB | B4 | RTM_IO_24B_N | BG6 | -- | B9 | RTM_DIO_3_N |
| **DG1** | RTM_IO_GND_21AB | C4 | RTM_IO_24A_P | DG6 | -- | C9 | RTM_DIO_4_P |
| **A2** | RTM_IO_22B_P | D4 | RTM_IO_24A_N | A7 | -- | D9 | RTM_DIO_4_N |
| **B2** | RTM_IO_22B_N | BG4 | RTM_IO_GND_4AB | B7 | -- | BG9 | GND |
| **C2** | RTM_IO_22A_P | DG4 | RTM_IO_GND_4AB | C7 | -- | DG9 | GND |
| **D2** | RTM_IO_22A_N | A5 | -- | D7 | -- | A10 | RTM_DIO_5_P |
| **BG2** | RTM_IO_GND_22AB | B5 | -- | BG7 | -- | B10 | RTM_DIO_5_N |
| **DG2** | RTM_IO_GND_22AB | C5 | -- | DG7 | -- | C10 | RTM_DIO_6_P |
| **A3** | RTM_IO_23B_P | D5 | -- | A8 | RTM_DIO_1_P | D10 | RTM_DIO_6_N |
| **B3** | RTM_IO_23B_N | BG5 | -- | B8 | RTM_DIO_1_N | BG10 | GND |
| **C3** | RTM_IO_23A_P | DG5 | -- | C8 | RTM_DIO_2_P | DG10 | GND |

## DSUB-50 Analogue Connectors

To be defined

Connectors Shields are connected to panel and crate Ground.

Table 2. DSUB-50 ARTM connectors (J1).

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|---|---|---|---|---|---|---|---|
| **49** | RTM_IO_1B_P | 45 | RTM_IO_3B_P | 41 | RTM_IO_5B_P | 37 | RTM_IO_7B_P |
| **33** | RTM_IO_1B_N | 29 | RTM_IO_3B_N | 25 | RTM_IO_5B_N | 21 | RTM_IO_7B_N |
| **32** | RTM_IO_1A_P | 28 | RTM_IO_3A_P | 24 | RTM_IO_5A_P | 20 | RTM_IO_7A_P |
| **48** | RTM_IO_1A_N | 44 | RTM_IO_3A_N | 40 | RTM_IO_5A_N | 36 | RTM_IO_7A_N |
| **16** | RTM_IO_GND_1AB | 12 | RTM_IO_GND_3AB | 8 | RTM_IO_GND_5AB | 4 | RTM_IO_GND_7AB |
| **47** | RTM_IO_2B_P | 43 | RTM_IO_4B_P | 39 | RTM_IO_6B_P | 35 | RTM_IO_8B_P |
| **31** | RTM_IO_2B_N | 27 | RTM_IO_4B_N | 23 | RTM_IO_6B_N | 19 | RTM_IO_8B_N |
| **30** | RTM_IO_2A_P | 26 | RTM_IO_4A_P | 22 | RTM_IO_6A_P | 18 | RTM_IO_8A_P |
| **46** | RTM_IO_2A_N | 42 | RTM_IO_4A_N | 38 | RTM_IO_6A_N | 34 | RTM_IO_8A_N |
| **14** | RTM_IO_GND_2AB | 10 | RTM_IO_GND_4AB | 6 | RTM_IO_GND_6AB | 2 | RTM_IO_GND_8AB |

Table 2. DSUB-50 ARTM connectors (J2).

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|---|---|---|---|---|---|---|---|
| **49** | RTM_IO_9B_P | 45 | RTM_IO_11B_P | 41 | RTM_IO_13B_P | 37 | RTM_IO_15B_P |
| **33** | RTM_IO_9B_N | 29 | RTM_IO_11B_N | 25 | RTM_IO_13B_N | 21 | RTM_IO_15B_N |
| **32** | RTM_IO_9A_P | 28 | RTM_IO_11A_P | 24 | RTM_IO_13A_P | 20 | RTM_IO_15A_P |
| **48** | RTM_IO_9A_N | 44 | RTM_IO_11A_N | 40 | RTM_IO_13A_N | 36 | RTM_IO_15A_N |
| **16** | RTM_IO_GND_9AB | 12 | RTM_IO_GND_11AB | 8 | RTM_IO_GND_13AB | 4 | RTM_IO_GND_15AB |
| **47** | RTM_IO_10B_P | 43 | RTM_IO_12B_P | 39 | RTM_IO_14B_P | 35 | RTM_IO_16B_P |
| **31** | RTM_IO_10B_N | 27 | RTM_IO_12B_N | 23 | RTM_IO_14B_N | 19 | RTM_IO_16B_N |
| **30** | RTM_IO_10A_P | 26 | RTM_IO_12A_P | 22 | RTM_IO_14A_P | 18 | RTM_IO_16A_P |
| **46** | RTM_IO_10A_N | 42 | RTM_IO_12A_N | 38 | RTM_IO_14A_N | 34 | RTM_IO_16A_N |
| **14** | RTM_IO_GND_10AB | 10 | RTM_IO_GND_12AB | 6 | RTM_IO_GND_14AB | 2 | RTM_IO_GND_16AB |

Table 2. DSUB-50 ARTM connectors (J3).

| Pin | Signal | Pin | Signal | Pin | Signal | Pin | Signal |
|---|---|---|---|---|---|---|---|
| **49** | RTM_IO_17B_P | 45 | RTM_IO_19B_P | 41 | RTM_IO_21B_P | 37 | RTM_IO_23B_P |
| **33** | RTM_IO_17B_N | 29 | RTM_IO_19B_N | 25 | RTM_IO_21B_N | 21 | RTM_IO_23B_N |
| **32** | RTM_IO_17A_P | 28 | RTM_IO_19A_P | 24 | RTM_IO_21A_P | 20 | RTM_IO_23A_P |
| **48** | RTM_IO_17A_N | 44 | RTM_IO_19A_N | 40 | RTM_IO_21A_N | 36 | RTM_IO_23A_N |
| **16** | RTM_IO_GND_17AB | 12 | RTM_IO_GND_19AB | 8 | RTM_IO_GND_21AB | 4 | RTM_IO_GND_23AB |
| **47** | RTM_IO_18B_P | 43 | RTM_IO_20B_P | 39 | RTM_IO_22B_P | 35 | RTM_IO_24B_P |
| **31** | RTM_IO_18B_N | 27 | RTM_IO_20B_N | 23 | RTM_IO_22B_N | 19 | RTM_IO_24B_N |
| **30** | RTM_IO_18A_P | 26 | RTM_IO_20A_P | 22 | RTM_IO_22A_P | 18 | RTM_IO_24A_P |
| **46** | RTM_IO_18A_N | 42 | RTM_IO_20A_N | 38 | RTM_IO_22A_N | 34 | RTM_IO_24A_N |
| **14** | RTM_IO_GND_18AB | 10 | RTM_IO_GND_20AB | 6 | RTM_IO_GND_22AB | 2 | RTM_IO_GND_4AB |

## DSUB-37 Digital Connector

Connectors Shields are connected to panel and crate Ground.

Table 2. DSUB-37 ARTM connector (J4).

| Pin | Signal | Pin | Signal | Pin | Signal |
|---|---|---|---|---|---|
| **20** | RTM_DIO_1_P | 26 | RTM_DIO_4_P | 32 | RTM_DIO_7_P(*) |
| **21** | RTM_DIO_1_N | 27 | RTM_DIO_4_N | 33 | RTM_DIO_7_N(*) |
| **1** | GND | 7 | GND | 13 | GND |
| **2** | GND | 8 | GND | 14 | GND |
| **22** | RTM_DIO_2_P | 28 | RTM_DIO_5_P | 34 | RTM_DIO_8_P(*) |
| **23** | RTM_DIO_2_N | 29 | RTM_DIO_5_N | 35 | RTM_DIO_8_N(*) |
| **3** | GND | 9 | GND | 15 | GND |
| **4** | GND | 10 | GND | 16 | GND |
| **24** | RTM_DIO_3_P | 30 | RTM_DIO_6_P | 36 | 2.5V |
| **25** | RTM_DIO_3_N | 31 | RTM_DIO_6_N | 37 | 3.3V |
| **5** | GND | 11 | GND | | |
| **6** | GND | 12 | GND | | |

(*) These signals are have NO internal connection.

# Configuration Settings and Status

The ATCA-IO-PROCESSOR_RTM module includes a 1kbit Addressable Serial EEPROM. The acess is done trough the Power and Management plug on Zone 3 (see Table 1) I2C.

The I2C address is 0b101.0000 (0x50).

Read and Write operation details can be found on 24LC014 Data Sheet[5].

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[1] AdvancedTCA Rear Transition Module for Physics. PICMG® PhysRTM.0, Revision 1.0 Draft 0.1g, PCI Industrial Computer Manufacturers Group. January 20, 2010.

[2] PICMG: PCI Industrial Computer Manufacturers Group.

[3] AdvancedTCA® Base Specification, PICMG® 3.0, Revision 3.0, PCI Industrial Computer Manufacturers Group. March 24, 2008

[4]

[5] 24AA014/24LC014 1K $I^2C$ Serial EEPROM. DS21809C, 2005 Microchip.Enrich IPFN by contributing.