TAMC890

16 Port Gigabit Ethernet Switch

Version 1.0

User Manual

Issue 1.0.1

July 2012

TAMC890-10

16-Channel 10/100/1000BaseTX Ethernet-Switch, mid-size front panel

TAMC890-11

16-Channel 10/100/1000BaseTX Ethernet-Switch, full-size front panel

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Style Conventions

Hexadecimal characters are specified with prefix 0x, i.e. 0x029E (that means hexadecimal value 029E).

For signals on hardware products, an ‚Active Low' is represented by the signal name with # following, i.e. IP_RESET#.

Access terms are described as:

W	Write Only
R	Read Only
R/W	Read/Write
R/C	Read/Clear
R/S	Read/Set

Issue	Description	Date
1.0.0	Initial Issue	April 2010
1.0.1	Correction Name of Ethernet Switch	July 2012

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1   Product Description

The TAMC890 is a standard single width Mid-Size / Full-Size AMC.2 compliant 16 Port gigabit Ethernet Switch.

The TAMC890 supports four RJ45 front panel ports which are compliant to IEEE 802.3ab for 10BaseT, 100BaseTX and IEEE 802.3ab for 1000BaseT via CAT5 TP cable and 12 SerDes ports which are connected to the AMC backplane connector.

The TAMC890 is AMC.2 Type 4 compliant.

The auto-sensing and auto-negotiation function detect and configure automatically the data rate and the duplex mode.

The functionality of the TAMC890 based on the unmanaged Broadcom BCM5396 Gigabit Ethernet switch.

Front panel RJ45 ports are galvanically isolated from the transceiver and switch.

Each channel provides a front panel LEDs to indicate the different network activities.

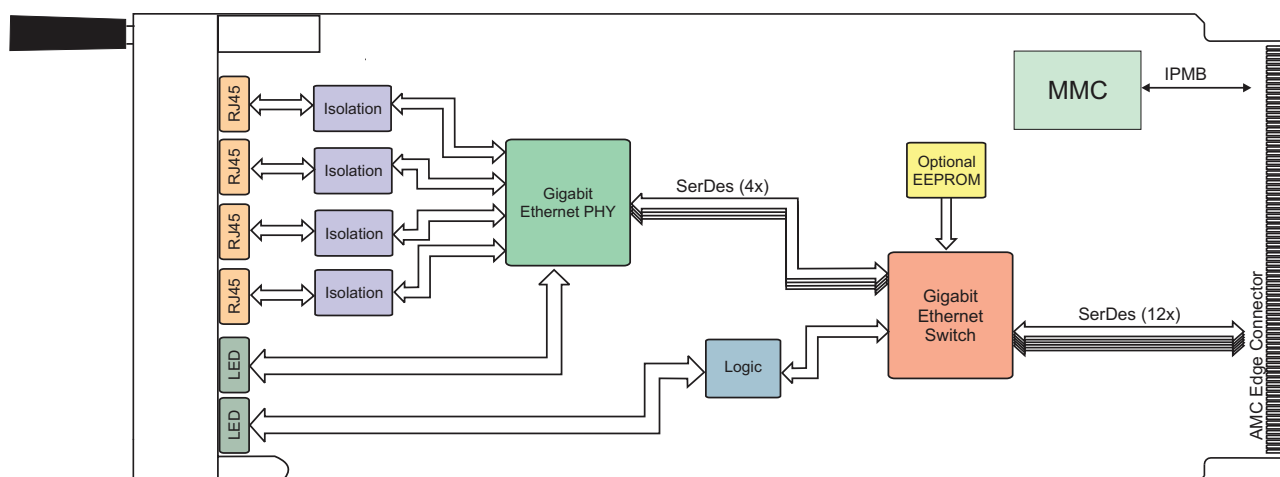The operating temperature range is 0°C to +70°C.

Figure 1-1 : Block Diagram

2 Technical Specification

AMC Interface	
Mechanical Interface	Advanced Mezzanine Card (AMC) Interface confirming to PICMG® AMC.0 R2.0 Single, Mid / Full Size Module
Electrical Interface	PICMG® AMC.2 Type E2 and Type 4 Interface 6 additional GbE Ports on AMC port 12-15, 17 and 18
IPMI	
IPMI Version	1.5
Front Panel LEDs	Blue Hot-Swap LED Red Power Good LED (LED1) Green IP-Activity USER LED (LED 2) 16 x Link / Status LED
On Board Devices	
Ethernet-Switch	16-Channel 10/100/1000 Mbit/s Ethernet-Switch Broadcom BCM5396
Gigabit Ethernet PHY	Broadcom BCM5464R
I/O Interface	
Number of Channels	
Number of Channels	Sixteen 10/100/1000 Mbit/s Ethernet Ports 12 x 1.25G-SerDes/SGMII ports (AMC backplane ports) 4 x RJ45 front panel ports
I/O Connector	Front I/O: 4 x RJ45 - Würth (615 032 137 821)
Physical Data	
Power Requirements	800mA typical @ +12V DC (Payload Power) 35mA typical @ +3.3V DC (Management Power)
Temperature Range	Operating 0 °C to +70 °C Storage -40°C to +125°C
MTBF	TAMC890-10R/11R: 5240000h MTBF values shown are based on calculation according to MIL-HDBK-217F and MIL-HDBK-217F Notice 2; Environment: G_B 20°C. The MTBF calculation is based on component FIT rates provided by the component suppliers. If FIT rates are not available, MIL-HDBK-217F and MIL-HDBK-217F Notice 2 formulas are used for FIT rate calculation.
Humidity	5 – 95 % non-condensing
Weight	110 g

Table 2-1 : Technical Specification

3 Handling and Operation Instructions

3.1 ESD Protection

 The TAMC890 is sensitive to static electricity. Packing, unpacking and all other handling of the TAMC890 has to be done in an ESD/EOS protected Area.

4 Module Management

4.1 Indicators

For a quick visual inspection the TAMC890 offers 3 LEDs in the front panel.

4.1.1 Front Panel AMC LEDs

LED	Color	State	Description
HS	Blue	Off	No Power or module is powered
		Short Blink	Hot-Swap negotiation (extraction)
		Long Blink	Hot-Swap negotiation (insertion)
		On	Module is ready to be powered or module is ready to be unpowered
FAIL	Red	Off	No fault
		On	Failure or out of service status
Power	Green	Off	Board is unpowered
		On	Board is powered

Table 4-1 : Front Panel LEDs

4.2 Temperature and Voltage Sensors

Sensor Number	Signal Type	Signal Monitored
0	Event	Hot-swap switch
1	Temperature	LM75 #1
2	Temperature	LM75 #2
3	Voltage	+12V (PWR)
4	Voltage	+1.2V
5	Voltage	+2,5V
6	Voltage	+3,3V

Table 4-2 : Temperature and Voltage Sensors

4.3 Connectivity / Link LEDs

The TAMC890 provides 12 x 1.25G-SerDes Link on AMC Port and 4 x Gigabit Ethernet RJ45 front panel ports.

Each port provides a front panel LED to indicate the different network activities. If the LED is illuminated the corresponding port has established a link and if there is activity the LED flashes.

LED	AMC Port
1	Front I/O Port 1
2	Front I/O Port 2
3	Front I/O Port 3
4	Front I/O Port 4
5	AMC Port 0
6	AMC Port 1
7	AMC Port 8
8	AMC Port 9
9	AMC Port 10
10	AMC Port 11
11	AMC Port 12
12	AMC Port 13
13	AMC Port 14
14	AMC Port 15
15	AMC Port 17
16	AMC Port 18

Table 4-3 : Link LED Assignment
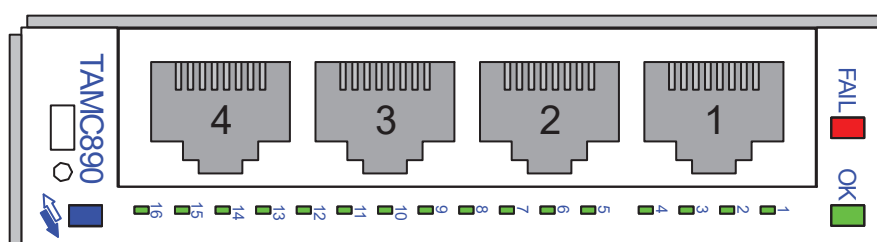
Figure 4-1 : Front Panel View TAMC890-10

5 <u>Installation</u>

5.1 AMC Module Insertion & Hot-Swap

5.1.1 Insertion

Handle	Blue LED	Description
Open (Full extracted)	OFF	Insert Module into slot
Open (Full extracted)	ON	Module is ready to attempt activation
Closed (Pushed all way in)	Long Blink	Hot-Swap Negotiation
Closed (Pushed all way in)	OFF	Module is ready & powered

Table 5-1 : AMC Module Insertion

When the blue LED does not go off, but returns to the "ON" state, the module FRU information is invalid or the carrier cannot provide the necessary power.

5.1.2 Extraction

Handle	Blue LED	Description
Pulled out 1/2	OFF	Request Hot-Swap
Pulled out 1/2	Short Blink	Hot-Swap Negotiation
Pulled out 1/2	ON	Module is ready to be extracted
Open (Full extracted)	ON	Extract Module from slot

Table 5-2 : AMC Module Extraction

6 Application Hints

The TAMC890 supports four RJ45 front panel ports which are compliant to IEEE 802.3ab for 10BaseT, 100BaseTX and IEEE 802.3ab for 1000BaseT via CAT5 TP cable and 12 SerDes ports which are connected to the AMC backplane connector.

Basically the Gigabit Ethernet Switch TAMC890 is designed to operate in a Simple MicroTCA System which supports at least AMC.2 Type E2 and Type 4. In addition the TAMC890 supports 6 Gigabit Ethernet Ports on AMC port 12-15, 17 and 18.

Generally the TAMC890 also could operate on a MicoTCA System or an AdvancedTCA Carrier.

Connector Region		AMC Port #	Signal Convention
Basic Connector	Common Options	0	AMC.2 GbE
		1	AMC.2 GbE
		2	
		3	
	Fat Pipes	4	
		5	
		6	
		7	
Extended Connector	Extended Fat Pipes	8	AMC.2 GbE
		9	AMC.2 GbE
		10	AMC.2 GbE
		11	AMC.2 GbE
	Extended Options	12	GbE
		13	GbE
		14	GbE
		15	GbE
		16	
		17	GbE
		18	GbE
		19	
		20	

Table 6-1 : TAMC890 Port mapping regions

The total 16 channel switch function of the TAMC890 is only possible if the AMC carrier or backplane supports all 12 Gigabit Ethernet connections. In addition, fewer connections have no influence on the switch function. Thus the TAMC890 can be operated also without any Gigabit Ethernet connection to the backplane. Then only the four RJ45 front panel ports are supported and could be used for Ethernet switching function.

6.1 Typical Application / Example

6.1.1 Typical Simple MicroTCA System:

Upload via TAMC890 Front I/O Slot 4.

Ethernet Gigabit Connection via Backplane to:

- SSM
- CPU
- HDD
- all other AMCxxx Slots
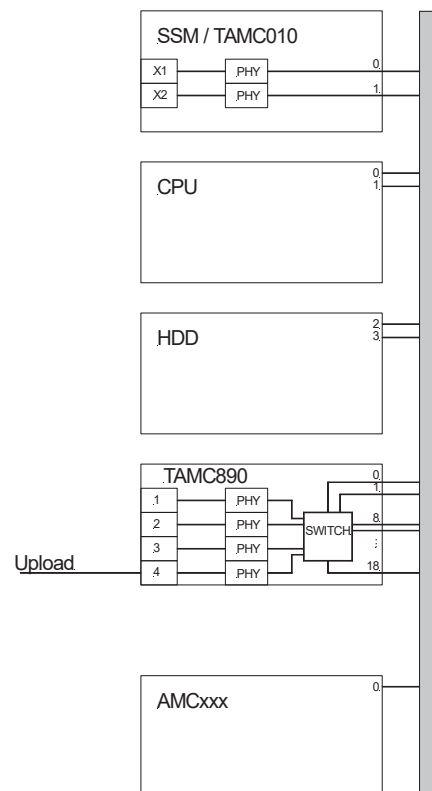
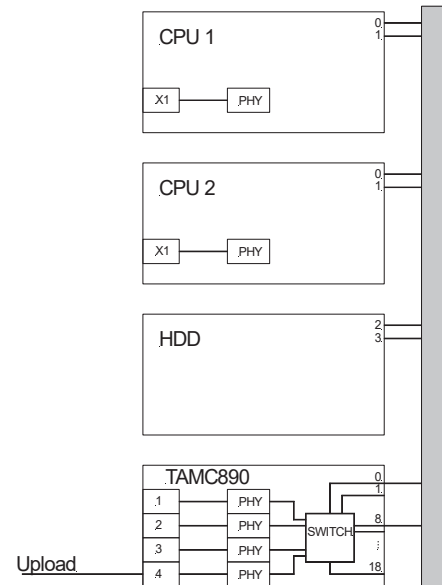## 6.1.2 MicroTCA System with backplane connection

Upload via TAMC890 Front I/O Slot 4.

Ethernet Gigabit Connection via Backplane CPU 1.

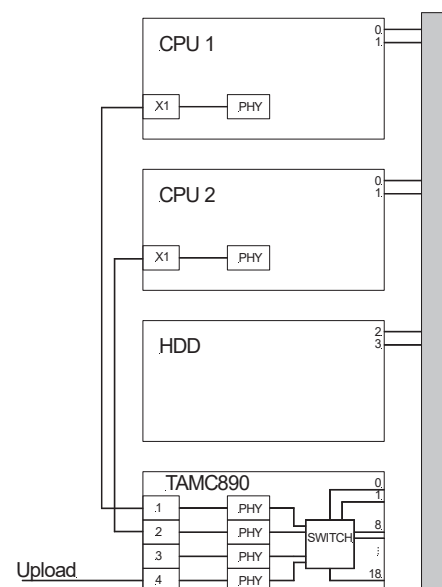Ethernet Gigabit Connection via Backplane CPU 2.

6.1.3 MicroTCA System without backplane connection

Upload via TAMC890 Front I/O Slot 4.

Gigabit Ethernet connection via Front I/O Slot 1 to CPU 1.

Gigabit Ethernet connection via Front I/O Slot 2 to CPU 2.

6.2 AMC Interface

The AMC connector interface of TAMC890 follows AMC.0 specifications for fabric interface electrical requirements for LVDS. Therefore there is no problem to mount the TAMC890 into every AMC Slot which is AMC.0 compliant.

All AMC modules and the backplane/carrier must follow AMC.0 R2.0 specification to assure a correct function and no damage. This specification defines different guidelines which guard all modules from damage.

All modules which connected to the TAMC890 must keep the LVDS voltage level for the AMC fabric interface. Also the hardware must not be damaged during interconnects of different fabric interface types. The TAMC890 uses receive interface capacitors to protect the receiver against dissentient transmitter DC offset voltage.

The main requirement to protect the TAMC890 of damage is that each module which uses the AMC fabric interface with non-LVDS signals shall be disabled (set to high impedance) signals if E-Keying has identified a none matching connection.
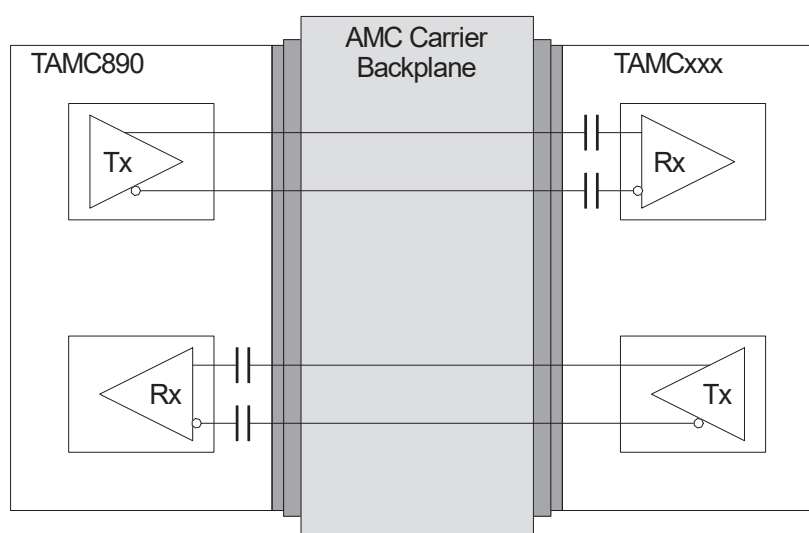
Table 6-2 : TAMC890 interface principle

If some fabric interface connections do not match, the TAMC890 can not negotiate a gigabit Ethernet connection for this switching port but all other ports will work.

7 Pin Assignment – I/O Connector

7.1 Front I/O Connectors

The TAMC890 provides four Ethernet interfaces by four RJ-45 connectors located in the front panel.
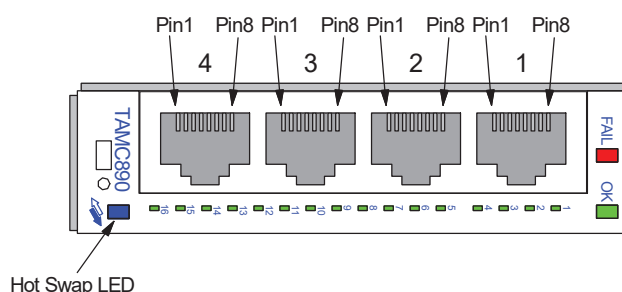
Figure 7-1 : Front Panel View TAMC890-10

Details about Pin Assignment of the Front Panel Connectors and Front Panel LED Indicators are subject of the following chapters.
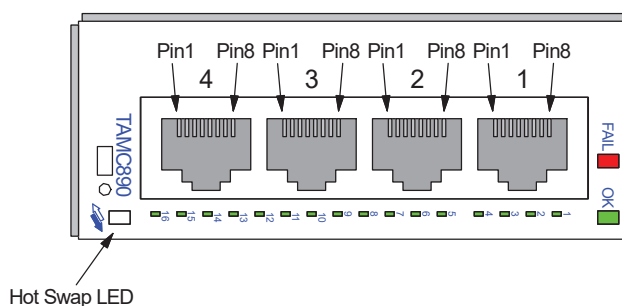
Figure 7-2 : Front Panel View TAMC890-11

Pin	Signal	Front I/O Port	Switch Port
1	TRD0_4+	4	RXD SerDes Port 5 TXD SerDes Port 5
2	TRD0_4-		
3	TRD1_4+		
4	TRD1_4-		
5	TRD2_4+		
6	TRD2_4-		
7	TRD3_4+		
8	TRD3_4-		

Pin	Signal	Front I/O Port	Switch Port
1	TRD0_3+	3	RXD SerDes Port 6 TXD SerDes Port 6
2	TRD0_3-		
3	TRD1_3+		
4	TRD1_3-		
5	TRD2_3+		

Pin	Signal	Front I/O Port	Switch Port
6	TRD2_3-		
7	TRD3_3+		
8	TRD3_3-		

Pin	Signal	Front I/O Port	Switch Port
1	TRD0_2+		
2	TRD0_2-		
3	TRD1_2+		
4	TRD1_2-	2	RXD SerDes Port 7
5	TRD2_2+		TXD SerDes Port 7
6	TRD2_2-		
7	TRD3_2+		
8	TRD3_2-		

Pin	Signal	Front I/O Port	Switch Port
1	TRD0_1+		
2	TRD0_1-		
3	TRD1_1+		
4	TRD1_1-	1	RXD SerDes Port 8
5	TRD2_1+		TXD SerDes Port 8
6	TRD2_1-		
7	TRD3_1+		
8	TRD3_1-		

Table 7-1 : Pin Assignment I/O Connector X2

7.2 Backplane Connector

The TAMC890 uses a mechanical AMC.0 compliant Connector for backplane interconnection.
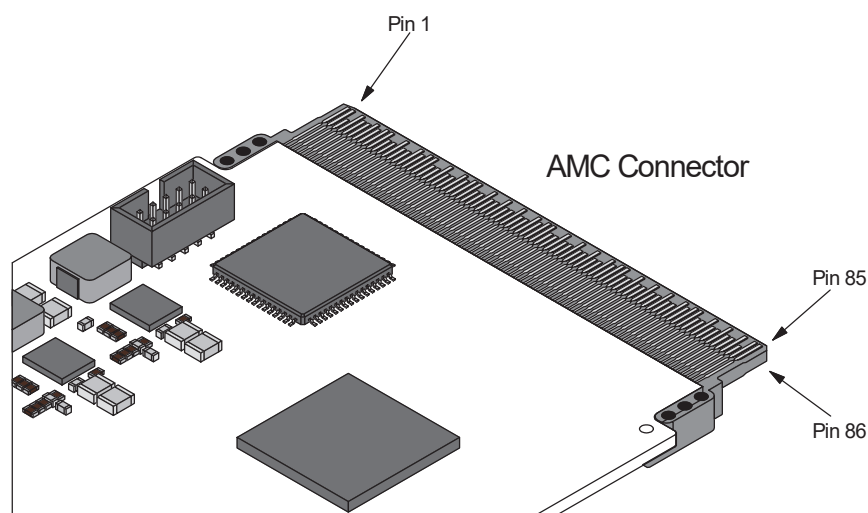
Figure 7-3 : AMC Connector Pin Locations

7.2.1.1   Pin Assignment

Pin	Signal	Function
85	GND	Logic Ground
84	PWR	+12V Payload Power
83	PS0#	Present detect
82	GND	Logic Ground
81	FCLKA-	-
80	FCLKA+	
79	GND	Logic Ground
78	*TCLKB-*	-
77	*TCLKB+*	
76	GND	Logic Ground
75	*TCLKA-*	-
74	*TCLKA+*	
73	GND	Logic Ground
72	PWR	+12V Payload Power
71	SDA_L	IPMB-L Data
70	GND	Logic Ground
69	Rx7-	-
68	Rx7+	
67	GND	Logic Ground
66	Tx7-	-

Pin	Signal	Function
86	GND	Logic Ground
87	Rx8-	RXD SerDes Port 9
88	Rx8+	
89	GND	Logic Ground
90	Tx8-	TXD SerDes Port 9
91	Tx8+	
92	GND	Logic Ground
93	Rx9-	RXD SerDes Port 10
94	Rx9+	
95	GND	Logic Ground
96	Tx9-	TXD SerDes Port 10
97	Tx9+	
98	GND	Logic Ground
99	Rx10-	RXD SerDes Port 11
100	Rx10+	
101	GND	Logic Ground
102	Tx10-	TXD SerDes Port 11
103	Tx10+	
104	GND	Logic Ground
105	Rx11-	RXD SerDes Port 12

Pin	Signal	Function	Pin	Signal	Function
65	Tx7+		106	Rx11+	
64	GND	Logic Ground	107	GND	Logic Ground
63	Rx6-	-	108	Tx11-	TXD SerDes Port 12
62	Rx6+		109	Tx11+	
61	GND	Logic Ground	110	GND	Logic Ground
60	Tx6-	-	111	Rx12-	RXD SerDes Port 13
59	Tx6+		112	Rx12+	
58	GND	Logic Ground	113	GND	Logic Ground
57	PWR	+12V Payload Power	114	Tx12-	TXD SerDes Port 13
56	SCL_L	IPMB-L Clock	115	Tx12+	
55	GND	Logic Ground	116	GND	Logic Ground
54	Rx5-	-	117	Rx13-	RXD SerDes Port 14
53	Rx5+		118	Rx13+	
52	GND	Logic Ground	119	GND	Logic Ground
51	Tx5-	-	120	Tx13-	TXD SerDes Port 14
50	Tx5+		121	Tx13+	
49	GND	Logic Ground	122	GND	Logic Ground
48	Rx4-	-	123	Rx14-	RXD SerDes Port 15
47	Rx4+		124	Rx14+	
46	GND	Logic Ground	125	GND	Logic Ground
45	Tx4-	-	126	Tx14-	TXD SerDes Port 15
44	Tx4+		127	Tx14+	
43	GND	Logic Ground	128	GND	Logic Ground
42	PWR	+12V Payload Power	129	Rx15-	RXD SerDes Port 16
41	ENABLE#	AMC Enable Input	130	Rx15+	
40	GND	Logic Ground	131	GND	Logic Ground
39	Rx3-	-	132	Tx15-	TXD SerDes Port 16
38	Rx3+		133	Tx15+	
37	GND	Logic Ground	134	GND	Logic Ground
36	Tx3-	-	135	TCLKC-	-
35	Tx3+		136	TCLKC+	
34	GND	Logic Ground	137	GND	Logic Ground
33	Rx2-	-	138	TCLKD-	-
32	Rx2+		139	TCLKD+	
31	GND	Logic Ground	140	GND	Logic Ground
30	Tx2-	-	141	Rx17-	RXD SerDes Port 1
29	Tx2+		142	Rx17+	
28	GND	Logic Ground	143	GND	Logic Ground
27	PWR	+12V Payload Power	144	Tx17-	TXD SerDes Port 1

Pin	Signal	Function	Pin	Signal	Function
26	GA2	Geogr. Address Input	145	*Tx17+*	
25	GND	Logic Ground	146	GND	Logic Ground
24	*Rx1-*	RXD SerDes Port 2	147	*Rx18-*	RXD SerDes Port 3
23	*Rx1+*		148	*Rx18+*	
22	GND	Logic Ground	149	GND	Logic Ground
21	*Tx1-*	TXD SerDes Port 2	150	*Tx18-*	TXD SerDes Port 3
20	*Tx1+*		151	*Tx18+*	
19	GND	Logic Ground	152	GND	Logic Ground
18	PWR	+12V Payload Power	153	*Rx19-*	-
17	GA1	Geogr. Address Input	154	*Rx19+*	
16	GND	Logic Ground	155	GND	Logic Ground
15	*Rx0-*	RXD SerDes Port 4	156	*Tx19-*	-
14	*Rx0+*		157	*Tx19+*	
13	GND	Logic Ground	158	GND	Logic Ground
12	*Tx0-*	TXD SerDes Port 4	159	*Rx20-*	-
11	*Tx0+*		160	*Rx20+*	
10	GND	Logic Ground	161	GND	Logic Ground
9	PWR	12V Payload Power	162	*Tx20-*	-
8	*RSRVD8*	-	163	*Tx20+*	
7	GND	Logic Ground	164	GND	Logic Ground
6	*RSRVD6*	-	165	TCK	JTAG Clock Input
5	GA0	Geogr. Address Input	166	TMS	JTAG TMS Input
4	MP	+3.3V	167	*TRST#*	*JTAG Reset Input*
3	PS1#	Present detect	168	TDO	JTAG TDO Output
2	PWR	+12V Payload Power	169	TDI	JTAG TDI Input
1	GND	Logic Ground	170	GND	Logic Ground

Table 7-2 : Pin Assignment AMC Connector