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# **1.0 General Information**

## 1.1 Introduction

This document will describe the 2 Slot AdvancedTCA<sup>®</sup> chassis. This chassis consist of an ATCA Backplane, Shelf Manger, Power Entry Modules, and Fan Trays.

## 1.2 References

- PICMG 3.0 Revision 2.0 AdvancedTCA<sup>®</sup> Base Specification.
- ELMA Electronic Shelf Manager Application Notes.
- ELMA Bustronic 2 Slot AdvancedTCA<sup>®</sup> Backplane.
- ELMA Electronic Shelf Manager Technical Specifications.
- Pigeon Point Systems IPM Sentry Shelf-External Reference.

## 1.3 Company Overview

Elma Electronic Inc. is an industry innovator in the design and manufacture of electronic enclosures and passive electronic components. Elma USA has achieved a leading position in the CPCI, VME/VME64x, VXI, VXS, PXI, AdvancedTCA<sup>®</sup>, Switched Fabrics, PCI and Rugged COTS packaging markets.

Elma's component products consist of switches, knobs, and LED arrays. Headquartered in Switzerland, with offices in 22 countries, Elma has the ability to respond rapidly, with superior solutions to the requirements of its customers.

Elma has a broad base of customers throughout the United States in diverse industries such as telecommunications, industrial control, medical electronics, military and defense.

Elma Electronic Inc. strives to provide products superior in quality, reliability, performance, and consistently presents new, innovative designs to the market. Elma's product line encompasses well over 16,000 parts, including enclosures, cabinets, high quality switches, LED arrays, knobs and much more. Elma also offers design/integration services backed by responsive and knowledgeable technical support.

Elma's leading quality level is reached through training of all employees and following of systematic procedures per ISO 9001 standards to which Elma has been certified.

## 1.4 Features of the 2 Slot AdvancedTCA<sup>®</sup> chassis.

- Dimensions 2 U High X 15.75" depth X 19" width
- Rack Mounting Brackets.
- Front Universal Handles.
- 2 slot Replicated AdvancedTCA<sup>®</sup> Backplane.
- Dedicated Shelf Manager.
- Cooling for 200 W per Front Board.
- 2 removable fan trays.
- 6 fans 52 CFM each.
- 2 Filtered Terminal Blocks for Power Input
- The Shelf Manager can be located in multiple locations.

# 2.0 System Specifications

## 2.1 Mechanical Dimensions

## 2.1.1 Front View



Figure 1 Chassis Front Mechanical View

## 2.1.2 Side View



Figure 2 Chassis Side Mechanical View

## 2.1.3 Rear View

P	e e	9	<b>Q</b>	° /a	പ്ലം പ് തം ലം	• 0
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Figure 3 Chassis Rear Mechanical View

## 2.1.4 Top View



Figure 4 Chassis Top Mechanical View

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2.1.5 Skewed View



Figure 5 Chassis Skewed Mechanical View

## 2.2 Cooling Capacity

This chassis has to capability to cool 200 Watts per slot. This is accomplished by using a quantity of six 52 CFM fans in 2 removable Fan Trays.

## 2.3 Removable Fan Trays

This chassis has 2 removable fan trays. The Fan trays are located at sides of the card cage. The y are configured for a push / pull configuration.

## 2.4 Air Filter

The Chassis has a separate removable Air Filter Tray on the right side. The air filter material meets NEBS Requirements.



Figure 6 Fan Tray View

## 2.5 Fan Speed Signal

Combined with the shelf manager the chassis can monitor the speed of the fans.

## 2.6 Fan Tray Present Signals

Each Fan Tray has a signal that will alert the Shelf Manager. A low signal will alert that the Fan Tray is present. A high signal will alert that the Fan Tray has been removed.

## 2.7 Input Voltages

## 2.7.1 DC Input Version

Redundant DC Filtered Power Entry Modules. The chassis was designed for an input of 48 volt dc input range. The chassis supports 3 point grounding configurations.

## 2.7.2 AC Input Version

Single Fused AC input power entry module. The chassis was designed for a 115 volt AC input range. Typically AC input does not have provisions for Rear I/O.

## 2.8 Typical Wiring Diagrams







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Figure 11 Backplane Wiring

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# **3.0 Backplane Specifications**

## **3.1 Mechanical Dimensions**



Figure 12 Backplane Mechanical Drawing

## 3.2 Logical to Physical Slot Mapping

See the table below for the physical to logical slot mapping.

Physical Slot	1	2
Logical Slot	1	2
HW -Address	41	42
(hex)		
IPMB- Address	82	84
(hex)		

Table 1 Logical to Physical Slot Mapping

## 3.3 Base Interface

Replicated Backplane

Logical	1	2
Slot#		
Base	ShMC	ShMC
Ch. 1		
Base	2-2	1-2
Ch. 2		
Base	3-1	3-2
Ch. 3		
Base	4-1	4-2
Ch. 4		
Base	5-1	5-2
Ch. 5		
Base	6-1	6-2
Ch. 6		
Base	7-1	7-2
Ch. 7		
Base	8-1	8-2
Ch. 8		

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Base	9-1	9-2
Ch. 9		
Base	10-1	10-2
Ch. 10		
Base	11-1	11-2
Ch. 11		
Base	12-1	12-2
Ch. 12		
Base	13-1	13-2
Ch. 13		
Base	14-1	14-2
Ch. 14		
Base	15-1	15-2
Ch. 15		
Base	16-1	16-2
Ch. 16		
Т	able 2 Bas	e Interface

## 3.4 Fabric Interface

Replicated Backplane

Logical Slot #	1	2
5101 #	16.0	16.0
Fabric	16-2	16-2
Ch. 15		
Fabric	15-1	15-2
Ch. 14		
Fabric	14-1	14-2
Ch. 13		
Fabric	13-1	13-2
Ch. 12		
Fabric	12-1	12-2
Ch 11		
Eabria	11.1	11.2
radric Ch 10	11-1	11-2
Cil. 10	10.1	10.2
Fabric	10-1	10-2
Ch. 9		
Fabric	9-1	9-2
Ch. 8		
Fabric	8-1	8-2
Ch. 7		
Fabric	7-1	7-2
Ch. 6		
Fabric	6-1	6-2
Ch. 5		
Fabric	5-1	5-2
Ch. 4		
Fabric	4-1	4-2
Ch. 3		
Fabric	3-1	3-2
Ch 2	51	
<u>Ull. 2</u> Fabric	2-1	1-1
rabiic Ch 1	2-1	1-1
Un. I	Eshain Ia	

## 3.5 **IPMB Interface**

The IPMB interfaces are bused to each slot and to both Shelf Manager slots.

## 3.6 Shelf Manager Slot

The Shelf Manager can be located either inside the 2U chassis or with the front panel accessible.

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### 3.7 Serial EEPROMs

There is no Serial EEPROMS in the 2 slot AdvancedTCA<sup>®</sup> chassis.

### 3.8 **ATCA Backplane Connectors**

### FAN\_1 Interface Connector 3.8.1

Pin	Signal	
1	TACH_0	
2	PWM 0	
3	TACH 1	
4	PWM 1	
5	TACH_2	
6	PWM 2	
7	TACH_3	
8	PWM 3	
	Table 4 Ean 1 Connector	

Table 4 Fan\_1 Connector

### 3.8.2 Fan\_2 Interface Connector

Pin	Signal	
1	TACH_4	
2	TACH_5	
3	TACH_6	
4	TACH_7	

Table 5 Fan\_2 Interface Connector

#### 3.8.3 Fan\_Tach Interface Connector

1         TACH_8           2         TACH_9           3         TACH_10           4         TACH_11	Pin	Signal
2 TACH_9 3 TACH_10 4 TACH_11	1	TACH_8
3 TACH_10	2	TACH_9
4 TACH 11	3	TACH_10
4	4	TACH_11

Table 6 Fan\_Tach Interface Connector

### Fan\_Tray Interface Connector 3.8.4

Pin	Signal
1	FTP_0
2	FTP_1
3	FTP_2
4	FTP_3

Table 7 Fan\_Tray Interface Connector

3.8.5

## 5VI / 5VO Interface Connector

Pin	Signal
1	5Vdc Out
2	5Vdc In
3	5Vdc Out
4	5Vdc In
5	5Vdc Out
6	5Vdc In
7	5Vdc Out
8	5Vdc In

Table 8 5VI/5VO Interface Connector

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Pin	Signal
1	5VI
2	SCL_0
3	GND
4	SDA_0

Table 9 I2C\_BUS0 Interface Connector

## 3.8.7 I2C\_BUS1 Interface Connector

Pin	Signal
1	5VI
2	SCL_1
3	GND
4	SDA_1
Table 10         I2C         BUS1         Interface         Connector	

## 3.8.8 I2C\_BUS2 Interface Connector

Pin	Signal
1	5VI
2	SCL_2
3	GND
4	SDA_2
5	INT_2

Table 11 I2C\_BUS2 Interface Connector

## 3.8.9 **RING\_1** and **RING\_2** Connectors

Pin	Signal
1	-RNG_A
2	RRTN_A
3 -RNG_B	
4 RRTN_B	
Table 12 RING Connectors	

### 3.8.10 MT\_1 Connector

Pin	Signal
1	MT1_TIP
2	MT1_TIP
3 MT1_RING	
4 MT1_RING	
Table 13 MT_1 Connector	

### 3.8.11 MT\_2 Connector

Pin	Signal
1	MT2_TIP
2	MT2_TIP
3 MT2_RING	
4 MT2_RING	
Table 14 MT_2 Connector	

## 3.8.12 IPMB\_1 Connector

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Pin	Signal
1	SCL_A
2	GND
3 SDA_A	
Table 15 IPMB_1 Connector	

## 3.8.13 IPMB\_2 Connector

Pin	Signal
1	SCL_B
2	GND
3 SDA_B	
Table 16 IPMB 2 Connector	

 Table 16
 IPMB\_2
 Connector

## 3.8.14 T1-T2 Connectors

Pin	Signal
1	+ 5V
2	SCL_3
3	GND
4	SDA_3

Table 17\T1-T2 Connectors

# 4.0 **Power Distribution**

## 4.1 Introduction

Two Filtered Terminal Blocks are used to provide power to the Backplane and Fan Trays. The table below shows the logical and physical slots where the Power Entry Module is assigned.

These two filtered terminal blocks are intended to provide noise reduction in Telecommunications DC Power. The Filter is non-polarized. Markings indicate the polarity to be connected to the ATCA Backplane. The Terminal Blocks are capable of 30 amps and have a working voltage of 150 volts.

## 4.2 **Power Distribution diagram**

	Physical	1	2	
	Slot			
	Logical	1	2	
	Slot			
	Power	A1	A1	
	Source	B1	B1	
Tab	le 22 Power	Distrib	ution T	able

# 5.0 Shelf Manager

## 5.1 Introduction

The Shelf Manager is a 4HP wide, 3U high, and 160mm deep card that incorporates the Pigeon Point IPM Sentry.



Figure 13 Shelf Manager Locations

## 5.2 Shelf Manager Layout

## 5.2.1 Front Panel Layout



Figure 14 Shelf Manager Front Panel

## 5.2.2 Skewed View



Figure 15 Shelf Manager Skewed View

5.2.3 Rear View



Figure 16 Shelf Manager Rear View

## 5.2.4 Connector Placement



Figure 17 Shelf Manager Connector Locations

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## 5.3 Ethernet Channels

The carrier board provides two Ethernet 10/100 interfaces. The first interface can be routed to either the front panel or to the backplane through jumpers on the carrier card.

The second interface is intended for redundancy state updates between the two Shelf Managers.

These Ethernet signals are also routed to Logical Slots 1 and 2.

## 5.4 Shelf Manager Serial Interface

The Carrier Board provides a RS-232 interface using a front panel mini DB-9M (DTE) Connector.

For ShMM 300 configure serial port for 9600 BPS, 8, N, 1.

For ShMM 500 configure serial port for 115200 BPS, 8, N, 1.

## 5.5 Thermal and System Management Controller

The ADM1026 is used to control and monitor the Fan trays. This device has Voltage Monitoring, Tachometer inputs, PWM outputs, and Fan Tray Present signals. This device will control the speed of the fans.

## 5.6 Temperature Monitor

The Shelf Manager has the ability to monitor I<sup>2</sup>C temperature sensors. The LM75 I<sup>2</sup>C temperature sensors are generally used for temperature monitoring.

## 5.7 Front Panel Reset

The carrier board provides a reset button on the front panel. Activation of the button results in a full board reset, which is equivalent of power cycling the board.

## 5.8 Hardware monitoring and control

The Shelf Manager can monitor input voltage, Temperature Sensors, Fan Tray Present Signals, Fan Tachometer inputs, and PWM Outputs.

## 5.9 Hardware Address

The hardware address for the Shelf Manager is configured by the backplane. The Shelf Manager provides a pull up resistor for the address line and the backplane will configure the hardware address when the Shelf Manager is plugged in to the backplane.

HA [1]	HA [2]	Description	
0	0	Error	
1	0	First Management Slot	
0	1	Second Management Slot	
1	1	Error	
Table 10 Hardware Address			

Table 19 Hardware Address

If the hardware address is not configured the Shelf Manager will not become active.

## 5.10 Redundancy Control

The active Shelf Manager manages the IPMB and the IPM Controllers. The active Shelf Manger interacts with the backup System Manager over RMCP and other shelf external interfaces. The active Shelf Manager maintains an open TCP/IP connection (eth1) with the backup Shelf Manager. It communicates all changes in the state of managed objects to the backup Shelf Manager.

The backup Shelf Manager may become active as the result of a switchover. There are two types of switchover cooperative and forced. The cooperative switchover the active and backup Shelf Managers negotiate the transfer of responsibilities from active to backup. The forced switchover happens when the backup Shelf Manager determines that the active Shelf Manager is no longer alive or healthy.

The backup Shelf Manger recognizes the departure of the active Shelf Manager by one of the following. TCP connection gets closed or the remote healthy or remote presence becomes inactive.

A watchdog timer is used to protect against being unresponsive. If the watchdog triggers the Shelf Manager will reset and the backup will activate. For the System Manager using RMCP the switchover is transparent.

## 5.11 Telco Alarm

The Shelf Manager provides Telco Alarm Functionality with the following aspects.

- Micro DB15 Telco Alarm Interface
- Telco Alarm LED's
- Telco Alarm Cutoff Push Button

## 5.12 Serial EEPROM

The Shelf Manager can load and store the Shelf Fru Information on the external Serial EEPROM. These serial EEPROMs have the same I<sup>2</sup>C Address but are on different I<sup>2</sup>C busses.

## 5.13 Shelf Manager Connectors

## 5.13.1 CN3 JTAG ARM Injectors

Pin	Signal	Description
1	N/C	No Connection
3	/TRST	Test Power Reset
5	TDI	Test Data In
7	TMS	Test Mode Select
8	TCK	Test Clock

11	TDO	Test Data Out	
2, 4, 6, 8, 10, 12, 13, 14	NC / Ground	Ground	
Table 20   CN3 JTAG Connector			

## 5.13.2 CN8 AUX ARM Injector

Pin	Signal	Description
1	V5	+ 5 Volts
3	nMRST	Master Reset
4	GND	Ground
5	UMODE	User Mode
6	GND	Ground
7	NC	No Connection
8	GND	Ground
9	SEL_JTG_DEV	JTAG Target Control
10	GND	Ground
11	TD	Transmit Data
12	NC	No Connection
13	RD	Receive Data
14	NC	No Connection
15	NC	No Connection
2,16	GND	Ground

Table 21 CN8 AUX Connector

## 5.13.3 CN7 Serial Connector

Pin	Signal	Description	
1	CD	Carrier Detect	
2	RxD	Receive Data	
3	TxD	Transmit Data	
4	DTR	Data Terminal Ready	
5	SG	Signal Ground	
6	DSR	Data Set Ready	
7	RTS	Request to Send	
8	CTS	Clear to Send	
9	RI	Ring Indicator	

Table 22 CN7 Serial Connector

## 5.13.4 CN9 10/100 Ethernet Connector

Description
TX +
TX -
RX +
Unused pair
RX -
Unused pair

Table 23 CN9 10/100 Ethernet Connector

### 5.13.5

CN5 off Board I<sup>2</sup>C Bus Connector

Pin	Signal	Description
1	GND	Ground
2	SDA_0	Serial Data 0
3	SCL_0	Serial Clock 0
4	INT_0	Interrupt 0
5	GND	Ground
6	SDA_1	Serial Data 1
7	SCL_1	Serial Clock 1
8	INT_1	Interrupt 1
9	GND	Ground

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10	SDA_2	Serial Data 2
11	SCL_2	Serial Clock 2
12	INT_2	Interrupt 2
13	GND	Ground
14	SDA_3	Serial Data 3
15	SCL_3	Serial Clock 3
16	INT_3	Interrupt 3
17	IPMB_PWR	IPMB Power
18	IPMB_PWR	IPMB Power
19	VCC_3	+3.3V power
20	VCC_5	+5V power

Table 24 CN5 off Board I2C Bus Connector

## 5.13.6 CN1 Backplane Interface Connector

Pin	Ζ	Α	В	С	D	Е	Z
25		E0TP	EORP	GND	E1RP	E1TP	GND
24		E0TM	EORM	L_PRES	E1RM	E1TM	GND
23		GND	GND	PRES	GND	GND	GND
22		L_HLY	R_HLY	R_PRES	L_SWR	R_SWR	GND
21		GND	SDA_3	SCL_3	INT_3	GND	GND
20							
19							
18		-48V A				-48V B	
17							
16							
15		-48V A RTN				-48V B RTN	
14							
13				KEY AREA	A		
12							
11		SDA_2	SCL_2	INT_2	GND	FTP 2	GND
10		TACH 0	TACH 1	TACH 2	5V Out	FTP 3	GND
9		PWM 2	TACH 3	TACH 4	5V IN	FTP 0	GND
8		PWM 3	TACH 5	TACH 6	5V Out	FTP 1	GND
7		PWM 0	TACH 7	TACH 10	5V IN	+12V	GND
6		PWM 1	TACH 9	TACH 8	5V Out	-12V	GND
5		Tach 11	SDA_1	SCL_1	5V IN	VIO	GND
4		GND	SDA_0	SCL_0	5V Out	+3.3	GND
3		SDA B	SCL_B	SDA_A	5V IN	+5V	GND
2		SCL A	Reserved	Reserved	Reserved	GND	GND
1		Reserved	Reserved	Reserved	HA 1	HA 0	GND

 Table 25 CN1 Backplane Interface Connector

## 5.13.7 CN2 Battery Backup

Pin	Description	
1	+3.3 V Battery	
2	GND	
Table 26 CN2 Battery Backup		

## 5.13.8 JP1 and JP2 Shelf Manager Ethernet Jumpers

JP1	JP2	Description
1-3, 2-4	1-3, 2-4	Ethernet 0 is routed to Front Panel
3-5, 4-6	3-5, 4-6	Ethernet 0 is routed to Backplane
Table 27 JP1 and JP2 Ethernet Jumpers		

Description of Change	Document ID	Date
Document		
Initial release	Preliminary Revision A Version 0	03/21/07

Table 28 Revision History

Appendix A. Chassis Figures.



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