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Centellis 4440/4640

Control via IPMI Programmer's Reference

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Contents

List of Tables

About this Manual

Overview of Contents

This reference guide supports both Centellis 4440 (AXP1440 shelf) and Centellis 4620 (AXP1620 shelf) platforms. The differences between the two platforms are:

- The AXP1440 is a 14-slot shelf with 2 PEMs, 2 SAMs, and 2 FTMs.
- The AXP1620 is a 16-slot shelf with 2 PEMs, 2 SAMs, and 2 FTMs.

This guide provides FRU data and SDR for each AXP shelf.

The AXP1440 and AXP1620 both have an Intelligent Peripheral Management Controller (IPMC) which is fully compliant to the IPMI V1.5 specification. The IPMC provides access to on-board Sensor Data Records (SDRs), Field Replaceable Unit (FRU) data, and furthermore contains an event generator. Within this document you find a description of:

- Supported IPMI commands
- FRU States
- SDRs
- FRU data

For the last two items in the list, the default values are given for reference purposes if you want to restore the factory values.

This manual is divided into the following chapters and appendices.

Chapter 1, *Supported IPMI Commands*, lists IPMI commands supported by the IPMC.

Chapter 2, *FRU Information and Sensor Data Records*, lists the PEM, FTM, and ShMM-1500R Shelf Manager FRU information, as well as sensors that are accessible via IPMI for both the AXP1440 and AXP1620 shelves.

Chapter 3, *OEM Sensors*, lists the additional OEM sensors that are accessible via IPMI for both the AXP1440 and AXP1620 shelves.

Appendix A, *Related Documentation*, lists publications for blade and software products used with the Centellis 4440 and 4620 platforms.

Abbreviations

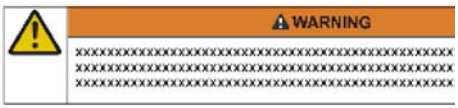
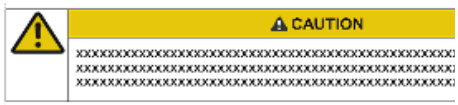
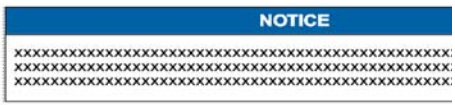
This document uses the following terms and abbreviations:

Term	Definition
FRU	Field Replaceable Unit. A module or component which will typically be replaced in its entirety as part of a field service repair operation.
FTM	Fan Tray Module. An FRU that provides cooling to the shelf.
IPMB	Intelligent Platform Management Bus. Name for the architecture, protocol, and implementation of a special bus that interconnects the baseboard and chassis electronics and provides a communications media for system platform management information. The bus is built on I^2C and provides a communications path between “management controllers” such as the BMC, FPC, and HSC.
LPMI	Local Peripheral Manager Interface.
LUN	Logical Unit Number. In the context of the Intelligent Platform Management Bus protocol, this is a subaddress that allows messages to be routed to different ‘logical units’ that reside behind the same I^2C slave address.
PEM	Power Entry Module. An FRU that introduces power to the shelf.
SAM	Shelf Manager. An FRU that provides system management functions for shelf components.
SDR	Sensor Data Record. A data record that provides platform management sensor type, locations, event generation, and access information.
SEL	System Event Log. A non-volatile storage area and associated interfaces for storing system platform event information for later retrieval.

Conventions

The following table describes the conventions used throughout this manual.

Notation	Description
0x00000000	Typical notation for hexadecimal numbers (digits are 0 through F), for example used for addresses and offsets
0b0000	Same for binary numbers (digits are 0 and 1)
bold	Used to emphasize a word
`Screen`	Used for on-screen output and code related elements or commands in body text

Notation	Description
`Courier + Bold`	Used to characterize user input and to separate it from system output
Reference	Used for references and for table and figure descriptions
File > Exit	Notation for selecting a submenu
<text>	Notation for variables and keys
[text]	Notation for software buttons to click on the screen and parameter description
...	Repeated item for example node 1, node 2, ..., node 12
. . .	Omission of information from example/command that is not necessary at the time being
..	Ranges, for example: 0..4 means one of the integers 0,1,2,3, and 4 (used in registers)
|	Logical OR
	Indicates a hazardous situation which, if not avoided, could result in death or serious injury
	Indicates a hazardous situation which, if not avoided, may result in minor or moderate injury
	Indicates a property damage message
	No danger encountered. Pay attention to important information

Summary of Changes

See the table below for manual revisions and changes.

Part Number	Date	Description
6806800G38M	September 2022	Simple rebrand to Penguin Solutions
6806800G38L	November 2019	Rebrand to SMART Embedded Computing template
6806800G38K	December 2017	Updated copyrights page.
6806800G38J	September 2015	Updated *Table 2-70, Sensor No. 137 Fans State on page 122*.
6806800G38H	February 2015	Updated *Table 2-3, Sensor Overview on page 40*.
6806800G38G	October 2014	Updated and *Chapter 2, section 2.3.6.8 Shelf FRU Info Sensor*.
6806800G38F	July 2014	Updated the table information under the section *ShM Fault Event Sensor (Artesyn OEM)* on page 202.
6806800G38E	April 2014	Re-branded to Artesyn. Updated the table information under the sections *CPLD State Sensor (Artesyn OEM) on page 200* and *ShM Fault Event Sensor (Artesyn OEM)* on page 202.
6806800G38D	September 2013	Updated *Table "HPI Sys Event Sensor" on page 125*.
6806800G38C	July 2013	Added *Table "Sensor No. 142 Blade M7 Fail Sensor" on page 77, Table "Sensor No. 141 SAM M7 Fail Sensor" on page 76, Table "Sensor No. 8 Fuse 1" on page 181, Table "Sensor No. 9 Fuse 2" on page 182, Table "Sensor No. 10 Fuse 3" on page 183, Table "Sensor No. 11 Fuse 4" on page 184, Table "Sensor No. 15 PEM LFC Status" on page 177* and *Table HPI Sys Event Sensor on Page 79*. Updated *Fan Tray Module Sensor Data Records on page 127, Table "Sensor No. 16 Current Measure1" on page 179*, and *Table "Sensor No. 17 Current Measure2" on page 180.*
6806800G38B	December 2011	Updated *Chapter 3, OEM Sensors*.
6806800G38A	September 2008	First version

Supported IPMI Commands

This chapter describes the different commands supported by the Centellis 4440/4620 series platforms. Command categories are as follows:

- *Standard IPMI Commands*
- *PICMG 3.0 Commands*
- *Pigeon Point OEM Commands*

1.1 Standard IPMI Commands

The IPMC is fully compliant to the Intelligent Platform Management Interface v.1.5. This section provides information on which IPMI commands are supported. Table entries marked with an "X" indicate which FRU or ATCA blade supports a listed command.

1.1.1 Global IPMI Commands

The IPMC supports the following global IPMI commands.

Table 1-1 Supported Global IPMI Commands

NetFn Rq/Rs	Command	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Get Device ID	0x06/0x07	0x01	X	X	X	X	X
Cold Reset	0x06/0x07	0x02					X
Warm Reset	0x06/0x07	0x03					X
Get Self Test Result	0x06/0x07	0x04					X
Manufacturing Test On	0x06/0x07	0x05					
Set ACPI Power State	0x06/0x07	0x06					
Get ACPI Power State	0x06/0x07	0x07					
Get Device GUID	0x06/0x07	0x08					

1.1.2 BMC WatchDog Timer Commands

The IPMC supports the following BMC WatchDog Timer commands.

Table 1-2 Supported BMC WatchDog Timer Commands

Command	NetFn R1/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Reset Watchdog Timer	0x06/0x07	0x22		X			X
Set Watchdog Timer	0x06/0x07	0x24		X			X
Get Watchdog Timer	0x06/0x07	0x25		X			X

1.1.3 BMC Device and Messaging Commands

The IPMC supports the following BMC device and messaging commands.

Table 1-3 Supported BMC Device and Messaging Commands

Command	NetFn Rq/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Set BMC Global Enables	0x06/0x07	0x2E	X				
Get BMC Global Enables	0x06/0x07	0x2F	X				
Clear Message Flags	0x06/0x07	0x30	X				
Get Message Flags	0x06/0x07	0x31	X				
Enable Message Channel Receive	0x06/0x07	0x32					
Get Message	0x06/0x07	0x33					
Send Message	0x06/0x07	0x34	X				
Read Event Message Buffer	0x06/0x07	0x35					
Get BT Interface Capabilities	0x06/0x07	0x36					
Get System GUID	0x06/0x07	0x37	X				
Get Channel Authentication Capabilities	0x06/0x07	0x38	X				
Get Session Challenge	0x06/0x07	0x39	X				
Activate Session	0x06/0x07	0x3A	X				
Set Session Privilege Level	0x06/0x07	0x3B	X				

Table 1-3 Supported BMC Device and Messaging Commands (continued)

Command	NetFn Rq/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Close Session	0x06/0x07	0x3C	X				
Get Session Info	0x06/0x07	0x3D	X				
Get AuthCode	0x06/0x07	0x3F	X				
Set Channel Access	0x06/0x07	0x40	X				
Get Channel Access	0x06/0x07	0x41	X				
Get Channel Info Command	0x06/0x07	0x42	X				
Set User Access Command	0x06/0x07	0x43	X				
Get User Access Command	0x06/0x07	0x44	X				
Set User Name	0x06/0x07	0x45	X				
Get User Name Command	0x06/0x07	0x46	X				
Set User Password Command	0x06/0x07	0x47	X				

1.1.4 Chassis Device Commands

The IPMC supports the following chassis device commands.

Table 1-4 Supported Chassis Device Commands

Command	NetFn Rq/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Get Chassis Capabilities	0x00/0x01	0x00	X	X			
Get Chassis Status	0x00/0x01	0x01	X	X			
Chassis Control	0x00/0x01	0x02	X	X			
Set Chassis Capabilities	0x00/0x01	0x05	X	X			
Set System Boot Options*	0x00/0x01	0x08					X
Get System Boot Options*	0x00/0x01	0x09					X
*The data portion of these commands are blade-specific. Refer to the respective blade specification.							

1.1.5 Event Commands

The IPMC supports the following event commands.

Table 1-5 Supported Event Commands

Command	NetFn Rq/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Set Event Receiver	0x04/0x05	0x00	X	X	X	X	X
Get Event Receiver	0x04/0x05	0x01	X	X	X	X	X
Platform Event (a.k.a. "Event Message")	0x04/0x05	0x02	X	X			*
*ATCA-F120 supports this command.							

1.1.6 PEF and Alerting Commands

The IPMC supports the following PEF and alerting commands.

Table 1-6 Supported PEF and Alerting Commands

Command	NetFn Rq/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Get PEF Capabilities	0x04/0x05	0x10	X	X			
Arm PEF Postpone Timer	0x04/0x05	0x11	X	X			
Set PEF Configuration Parameters	0x04/0x05	0x12	X	X			
Get PEF Configuration Parameters	0x04/0x05	0x13	X	X			
Set Last Processed Event ID	0x04/0x05	0x14	X	X			
Get Last Processed Event ID	0x04/0x05	0x15	X	X			
Alert Immediate	0x04/0x05	0x16	X	X			
PET Acknowledge	0x04/0x05	0x17	X	X			

1.1.7 Sensor Device Commands

The IPMC supports the following sensor device commands.

Table 1-7 Supported Sensor Device Commands

Command	NetFn Rq/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Get Device SDR Info	0x04/0x05	0x20	X	X	X	X	X
Get Device SDR	0x04/0x05	0x21	X	X	X	X	X
Reserve Device SDR Repository	0x04/0x05	0x22	X	X	X	X	X
Get Sensor Reading Factors	0x04/0x05	0x23	X	X	X	X	X
Set Sensor Hysteresis	0x04/0x05	0x24	X	X	X	X	X
Get Sensor Hysteresis	0x04/0x05	0x25	X	X	X	X	X
Set Sensor Threshold	0x04/0x05	0x26	X	X	X	X	X
Get Sensor Threshold	0x04/0x05	0x27	X	X	X	X	X
Set Sensor Event Enable	0x04/0x05	0x28	X	X	X	X	X
Get Sensor Event Enable	0x04/0x05	0x29	X	X	X	X	X
Re-arm Sensor Events	0x04/0x05	0x2a	X	X			*
Get Sensor Event Status	0x04/0x05	0x2b	X	X	X	X	X
Get Sensor Reading	0x04/0x05	0x2d	X	X	X	X	X
Set Sensor Type	0x04/0x05	0x2e	X	X			*
Get Sensor Type	0x04/0x05	0x2f	X	X	X	X	X

*ATCA-F120 Supports this command.

1.1.8 FRU Device Commands

The IPMC supports the following FRU device commands.

Table 1-8 Supported FRU Commands

Command	NetFn Rq/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Get FRU Inventory Area Info	0x0A/0x0B	0x10	X	X	X	X	X
Read FRU Data	0x0A/0x0B	0x11	X	X	X	X	X
Write FRU Data	0x0A/0x0B	0x12	X	X	X	X	X

1.1.9 SDR Device Commands

The IPMC supports the following SDR device commands.

Table 1-9 Supported SDR Device Commands

Command	NetFn Rq/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Get SDR Repository Info	0x0A/0x0B	0x20	X				
Get SDR Repository Allocation Info	0x0A/0x0B	0x21					
Reserve SDR Repository	0x0A/0x0B	0x22	X				
Get SDR	0x0A/0x0B	0x23	X				
Add SDR	0x0A/0x0B	0x24	X				
Partial Add SDR	0x0A/0x0B	0x25	X				
Delete SDR	0x0A/0x0B	0x26	X				
Clear SDR Repository	0x0A/0x0B	0x27	X				
Get SDR Repository Time	0x0A/0x0B	0x28	X				
Set SDR Repository Time	0x0A/0x0B	0x29	X				
Enter SDR Repository Update Mode	0x0A/0x0B	0x2A	X				
Enter SDR Repository Update Mode	0x0A/0x0B	0x2B	X				
Run Initialization Agent	0x0A/0x0B	0x2C	X				

1.1.10 SEL Device Commands

The IPMC supports the following SEL device commands.

Table 1-10 Supported SEL Commands

Command	NetFn Rq/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Get SEL Info	0x0A/0x0B	0x40	X				
Get SEL Allocation Info	0x0A/0x0B	0x41	X				
Reserve SEL	0x0A/0x0B	0x42	X				
Get SEL Entry	0x0A/0x0B	0x43	X	X			
Add SEL Entry	0x0A/0x0B	0x44	X	X			
Partial Add SEL Entry	0x0A/0x0B	0x45	X	X			
Delete SEL Entry	0x0A/0x0B	0x46	X	X			
Clear SEL	0x0A/0x0B	0x47	X	X			
Get SEL Time	0x0A/0x0B	0x48	X				
Set SEL Time	0x0A/0x0B	0x49	X	X			

1.1.11 LAN Device Commands

The IPMC supports the following LAN device commands.

Table 1-11 Supported LAN Device Commands

Command	NetFn Rq/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Set LAN Configuration Parameters	0x0C/0x0D	0x01	X				
Get LAN Configuration Parameters	0x0C/0x0D	0x02	X				
Suspend BMC ARPs	0x0C/0x0D	0x03	X				
Get IP UDP RMCP Status	0x0C/0x0D	0x04	X				

1.1.12 Serial/Modem Device Commands

The IPMC supports the following serial/modem device commands.

Table 1-12 Supported Serial/Modem Device Commands

Command	NetFn Rq/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Set User Callback Options	0x0C/0x0D	0x1A	X				
Get User Callback Options	0x0C/0x0D	0x1B	X				

1.2 PICMG 3.0 Commands

The SMART Embedded Computing IPMC is a fully compliant AdvancedTCA Intelligent Platform Management Controller. For example, it supports all required and mandatory AdvancedTCA commands as defined in the PICMG 3.0 specification.

Table 1-13 Supported PICMG 3.0 Commands

Command	NetFn Rq/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Get PICMG Properties	0x2C/0x2D	0x00	X	X	X	X	X
Get Address Info	0x2C/0x2D	0x01	X	X	X	X	X
Get Shelf Address Info	0x2C/0x2D	0x02	X	X			
Set Shelf Address Info	0x2C/0x2D	0x03	X	X			
FRU Control	0x2C/0x2D	0x04	X	X	X	X	X
Get FRU LED Properties	0x2C/0x2D	0x05			X	X	X
Get LED Color Capabilities	0x2C/0x2D	0x06			X	X	X
Set FRU LED State	0x2C/0x2D	0x07			X	X	X
Get FRU LED State	0x2C/0x2D	0x08			X	X	X
Set IPMB State	0x2C/0x2D	0x09	X	X	X	X	X
Set FRU Activation Policy	0x2C/0x2D	0x0A	X	X	X	X	X
Get FRU Activation Policy	0x2C/0x2D	0x0B	X	X	X	X	X
Set FRU Activation	0x2C/0x2D	0x0C	X	X	X	X	X
Get Device Locator Record ID	0x2C/0x2D	0x0D	X	X	X	X	X

Table 1-13 Supported PICMG 3.0 Commands (continued)

Command	NetFn Rq/Rs	CMD	Active ShelfMgr	Physical ShelfMgr	PEMs	FTMs	ATCA Blades
Set Port State	0x2C/0x2D	0x0E	X	X			X
Get Port State	0x2C/0x2D	0x0F	X	X			X
Compute Power Properties	0x2C/0x2D	0x10	X	X	X	X	X
Set Power Level	0x2C/0x2D	0x11	X	X	X	X	X
Get Power Level	0x2C/0x2D	0x12	X	X	X	X	X
Renegotiate Power	0x2C/0x2D	0x13					
Get Fan Speed Properties	0x2C/0x2D	0x14				X	
Set Fan Level	0x2C/0x2D	0x15				X	
Get Fan Level	0x2C/0x2D	0x16				X	
Bused Resource	0x2C/0x2D	0x17		X			X
Get IPMB Link Info	0x2C/0x2D	0x18					
Get Shelf Manager IPMB Address	0x2C/0x2D	0x1B	X				
Set Fan Policy	0x2C/0x2D	0x1C	X				
Get Fan Policy	0x2C/0x2D	0x1D	X				
FRU Control Capabilities	0x2C/0x2D	0x1E	X				
FRU Inventory Lock Control	0x2C/0x2D	0x1F	X				
FRU Inventory Device Write	0x2C/0x2D	0x20	X				
Get Shelf Manager IP Addresses	0x2C/0x2D	0x21	X				
Get Shelf Power Allocation	0x2C/0x2D	0x22	X				
Get Telco Alarm Capability	0x2C/0x2D	0x29	X				
Set Telco Alarm State	0x2C/0x2D	0x2A	X				
Get Telco Alarm State	0x2C/0x2D	0x2B	X				
Get Telco Alarm Location	0x2C/0x2D	0x2C	X				
Set FRU Extracted	0x2C/0x2D	0x3A	X	X	X	X	?

1.3 Pigeon Point OEM Commands

These commands can only be sent to the SMART EC AXP1440 and AXP1620 Shelf Managers. Sending these commands to other shelf managers or IPMCs results in error responses or undefined behavior.

The SAM supports these OEM IPMI commands that are not defined in the IPMI 1.5 or PICMG 3.0 specifications.

Table 1-14 Pigeon Point OEM Command Summary

IPMI NetFn (Request/Response)	SMART EC OEM Command	IPMI Cmd
Get Shelf Configuration Record	0x2E/0x2F	0x01
Shelf Manager Switchover	0x2E/0x2F	0x02
Set FRU Extracted	0x2E/0x2F	0x03
Subscribe for SEL Notifications	0x2E/0x2F	0x04
Set Shelf FRU Record Data	0x2E/0x2F	0x05
Get Cached Device SDR Info	0x2E/0x2F	0x06
Get Cached Device SDR	0x2E/0x2F	0x07
Reserve Cached Device SDR Repository	0x2E/0x2F	0x08

The following sections describe each OEM command and response in detail.

1.3.1 Get Shelf Configuration OEM Command

This command gets the shelf configuration for the AXP shelf.

Table 1-15 Get Shelf Configuration Record (Cmd = 0x01)

	Byte	Data field
Request data	1-3	Pigeon Point Systems IANA Enterprise number, LSB first 0x0A, 0x40, 0x00
	4	IANA enterprise number for the desired record, LSB first
	5	
	6	
	7	Record Type
	8	Record Number
	9	Offset within record
	10	Count of bytes to retrieve
Response data	1	Completion Code
	2-4	Pigeon Point Systems IANA Enterprise number, LSB first 0x0A, 0x40, 0x00
	5	Requested bytes from the specified Shelf FRU record
	...	
	n	

1.3.2 Shelf Manager Switchover

This command requests a SAM switchover.

Table 1-16 Shelf Manager Switchover (Cmd = 0x02)

	Byte	Data field
Request data	1-3	Pigeon Point Systems IANA Enterprise number, LSB first 0x0A, 0x40, 0x00
	4	Flags 0x00 Not Currently Supported 0x01 Switchover, and reboot the active Shelf Manager

Table 1-16 Shelf Manager Switchover (Cmd = 0x02) (continued)

	Byte	Data field
Response data	1	Completion Code
	2	0x0A
	3	0x40
	4	0x00

1.3.3 Set FRU Extracted

This command instructs the SAM to transition a FRU to the M0 (not installed) state.

Table 1-17 Set FRU Extracted (Cmd = 0x03)

	Byte	Data field
Request data	1-3	Pigeon Point Systems IANA Enterprise number, LSB first 0x0A, 0x40, 0x00
	4	IPMB address
	5	FRU Id
	6	Force option 0x00 Only extract specified FRU if it is in M7 state 0x01 Extract the specified FRU regardless of its current state
Response data	1	Completion Code
	2	Pigeon Point Systems IANA Enterprise number, LSB first
	3	0x0A
	4	0x40 0x00

1.3.4 Subscribe for SEL Notifications

This command is used by peers to request the Shelf Manager to send unsolicited events on an RMCP session.

Table 1-18 Subscribe for SEL Notifications (Cmd = 0x04)

	Byte	Data field
Request data	1-3	Pigeon Point Systems IANA Enterprise number, LSB first 0x0A, 0x40, 0x00
	4	00: End subscription on this session 01: Begin subscription on this session
Response data	1	Completion Code
	2-4	Pigeon Point Systems IANA Enterprise number, LSB first 0x0A, 0x40, 0x00

1.3.5 Set Shelf FRU Record Data

This command is used to write data into the Shelf FRU Record.

Table 1-19 Set Shelf FRU Record Data (Cmd = 0x05)

	Byte	Data field
Request data	1-3	Pigeon Point Systems IANA Enterprise number, LSB first 0x0A, 0x40, 0x00
	4 -6	The IANA Enterprise number of the shelf, LSB first
	7	Record type
	8	Record number
	9	Offset
	10	Count. Number of bytes to follow
	11-n	Data to write
Response data	1	Completion Code
	2-4	Pigeon Point Systems IANA Enterprise number, LSB first 0x0A, 0x40, 0x00
	5	Count. Number of bytes written

1.3.6 Get Cached Device SDR Info

This command is an analog to the IPMI Get Device SDR Info command for internal ShM SDR repository. It differs from the standard command only by the field in the request which points to the cached IPMC address.

Table 1-20 Get Cached Device SDR Info (Cmd = 0x06)

	Byte	Data field
Request data	1	IPMB address of device to retrieve cached data
Response data	1	Completion Code
	2	LUN Sensors
	3	Flags
	4-7	Change indicator

1.3.7 Get Cached Device SDR

This command is an analog to the IPMI Get Device SDR command for internal ShM SDR repository. It differs from the standard command only by the field in the request which points to the cached IPMC address.

Table 1-21 Get Cached Device SDR (Cmd = 0x07)

	Byte	Data field
Request data	1	IPMB address of device to retrieve cached data
	2	Reservation ID
	3	Record ID
	4	Offset
	5	Number of bytes to read
Response data	1	Completion Code
	2	Next record ID
	3-n	Data

1.3.8 Reserve Cached Device SDR Repository

This command is an analog to the IPMI Reserve Device SDR Repository command for internal ShM SDR repository. It differs from the standard command only by the field in the request which points to the cached IPMC address.

Table 1-22 Reserve Cached Device SDR Repository (Cmd = 0x08)

	Byte	Data field
Request data	1	IPMB address of device to retrieve cached data
Response data	1	Completion Code
	2	Reservation ID

Chapter 2

FRU Information and Sensor Data Records

This chapter introduces FRU information, e-keying, sensor overviews, and power configuration data for each subcomponent of the AXP1440 and AXP1620 shelf. Information in this chapter also includes:

- *Total Power Consumption*
- *SAM1500 Physical Shelf Manager*
- *SAM1500 Active (Virtual) Shelf Manager*
- *Fan Tray Module Sensor Data Records*
- *Power Entry Module Sensor Data Records*

Subcomponents include the Power Entry Modules (PEMs), upper and lower Fan Tray Modules (FTMs), and the SAM1500 Shelf Management Alarm Module (SAMs), both physical and active.

2.1 Total Power Consumption

The following table shows the total power requirements for the shelf. Power consumption breakdown is shown in the next table.

Table 2-1 Total Power Consumption for AXP1620 Shelf

Amps per Fan	Maximum Total Watts
AXP1620 Shelf 2 FTMs without AdvancedTCA Blades	850 Watts
Assumes the shelf is configured with 2 SAMs, 2 PEMs, and all FTMs running at full speed.	

2.2 SAM1500 Physical Shelf Manager

This section describes in detail, about the physical SAM Shelf Manager, FRU data, power configuration and sensors at IPMB addresses 0xFC and 0xFE. The information in this section supports the SAM on both the AXP1440 and AXP1620 shelves. The AXP1620 FRU and sensor data is highlighted and marked for ease of use.

2.2.1 SAM Physical FRU Information

The following tables provides the FRU information for the physical SAM on the AXP1440 and AXP1620 shelves.

2.2.1.1 Physical Shelf Manager FRU Data, AXP1440

```
Common Header:    Format Version = 1
Internal Use Area:
    Version = 1
Board Info Area:
    Version     = 1
    Language Code            = 25
   Mfg Date/Time         = Jan 7 00:00:00 2008 (6320160 minutes since 1996)
    Board Manufacturer       = Pigeon Point Systems
    Board Product Name       = IPM Sentry ShMM-1500
    Board Serial Number      = 08000000
    Board Part Number        = 01NL9804F45
    FRU Programmer File ID   = CENT1620_SAM.inf

Product Info Area:
    Version     = 1
    Language Code            = 25
    Manufacturer Name        = Emerson Network Power, Embedded Computing
    Product Name             = SAM1620
    Product Part / Model#    = 0106819D01B
    Product Version          = Rev 1.00
    Product Serial Number    = 1234567
    Asset Tag                =
    FRU Programmer File ID   = CENT1620_SAM.inf
Multi Record Area:
    PICMG Board Point-to-Point Connectivity Record (ID=0x14)
```

```
        Version = 0
```

2.2.1.2 Physical Shelf Manager FRU Data, AXP1620

```
 Common Header:   Version   =  1

Language Code            = 25

   Mfg Date/Time         = Jan  1 00:00:00 2006 (5260320 minutes since 1996)

    Board Manufacturer       = Pigeon Point Systems

    Board Product Name       = IPM Sentry ShMM-500

    Board Serial Number      = 08000000

    Board Part Number        = 01-W3911F11B

    FRU Programmer File ID   = SAM1500R.inf

Product Info Area:

    Version     = 1

    Language Code            = 25

    Manufacturer Name        = Motorola

    Product Name             = SAM1500

    Product Part / Model#    = 01-W2313F11A

    Product Version          = Rev 1.00

    Product Serial Number    = 12345678901

    Asset Tag                =

    FRU Programmer File ID   = SAM1500R.inf

Multi Record Area:

    PICMG Board Point-to-Point Connectivity Record (ID=0x14)

        Version = 0

 Record Type              = 0xc0 OEM Defined Record

Version = 2
```

```
PPS IPMB Topology Record (ID=0x05)

 Version =0
```

2.2.2 E-Keying

The physical SAMs (IPMB 0xfc and 0xfe) each contain the following Point-to-Point Connectivity Record:

```
PICMG Board Point-to-Point Connectivity Record (ID=0x14)

        Version = 0

    OEM GUID Count           = 0

    Link Descriptor:

        Link Grouping ID     = 0x00

        Link Type            = 0x01  PICMG®3.0 Base 10/100/1000 Base-T

        Link Type Extension  = 0x0 10/100/1000BASE-T Link (two-pair)

        Link Designator      = 0x101 Channel1/BaseInterface/Ports0

    Link Descriptor:

        Link Grouping ID     = 0x00

        Link Type            = 0x01  PICMG®3.0 Base 10/100/1000 Base-T

        Link Type Extension  = 0x0 10/100/1000BASE-T Link (two-pair)

        Link Designator      = 0x102 Channel2/BaseInterface/Ports0
```

2.2.3 Power Configuration

The following table describes the power configuration for the Physical SAM.

Table 2-2 SAM Physical Power Configuration

Item	Value	Meaning
Dynamic power reconfiguration support	No	Possibility to change FRU power consumption without switching it off, according to ATCA
Dynamic power configuration	No	Are the Power Draw levels fixed or these may vary if additional components are hot inserted or onboard components power consumption is changing dynamically
Number of Power Draw Levels	1	The amount of possible power levels, normally 1
Early Power Draw Levels, Watt	20	Complete early power consumption including IPMC
Steady state Power Draw Levels, Watt	20	Complete steady power consumption including IPMC
Transition from Early to Steady levels, sec	0	How long does board consumes early power. Early power is normally bigger than steady

2.2.4 Sensor Overview

The following table lists all IPMI sensors available on the physical SAM at IPMB addresses 0xFC and 0xFE. The information in this section supports the SAM on both the AXP1440 and AXP1620 shelves.

Table 2-3 Sensor Overview

Sensor No.	Sensor Name	Type of Measurement	What does it measure?	Sensor Type	Availability
0	FRU 0 HOT_SWAP	Status	State of FRU	Discrete	Always
1	IPMB LINK	Status	State of IPMB link	Discrete	Always
2	Local Temp	Temperature	Internal ADM1024	Analog	Always
3	+12VB	Voltage	B Feed	Analog	Always
4	Vcc +3.3V	Voltage	Internal	Analog	Always
5	+3.3V to ADP	Voltage	Internal	Analog	Always
6	Combined 12V	Voltage	A and B feeds combined	Analog	Always
7	+12VA	Voltage	A Feed	Analog	Always
8	+1.8 Eth Switch	Voltage	Internal	Analog	Always
9	+1.2V FPGA	Voltage	Internal	Analog	Always
10	PEM 1	Status	PEM 1 Presence	Discrete	Always
11	PEM 2	Status	PEM 2 Presence	Discrete	Always
12	Lower Fan Tray	Status	Lower Fan Tray Presence	Discrete	Always
13	Upper Fan Tray	Status	Upper Fan Tray Presence	Discrete	Always
14	AXP Backplane ID	OEM	Shelf type and status (identifies AXP1440 or 1620)	Discrete	Always

Table 2-3 Sensor Overview (continued)

Sensor No.	Sensor Name	Type of Measurement	What does it measure?	Sensor Type	Availability
15	Fault Event	OEM	Physical ShM Health	Discrete	Always
16	POST Results	Status	Management Subsystem Health	Discrete	Always
17	HS Ctrl A Status	OEM	Status of Hot Swap Controller A	Discrete	Always
18	HS Ctrl A Amps	Current (Amps)	Amps drawn by Hot Swap Controller A	Analog	Always
19	HS Ctrl A Source	Voltage	Voltage measured by Hot Swap Controller A	Analog	Always
20	HS Ctrl B Status	OEM	Status of Hot Swap Controller B	Analog	Always
21	HS Ctrl B Amps	Current (Amps)	Amps drawn by Hot Swap Controller B	Analog	Always
22	HS Ctrl B Source	Voltage	Voltage measured by Hot Swap Controller B	Analog	Always
23	FT Full Speed	OEM	Status of FTM Full-Speed Signals	Discrete	Always
24	FPGA Build Rev	OEM	Build Rev of firmware in SAM1500 FPGA	Discrete	Always

Table 2-3 Sensor Overview (continued)

Sensor No.	Sensor Name	Type of Measurement	What does it measure?	Sensor Type	Availability
25	Port Status	OEM	Status of physical Ethernet and serial links	Discrete	Always
128	CPLD Status	OEM	Master and Backup Shelf Manager State	Discrete	Always
129	Reboot Reason	OEM	Reason for last reboot of physical ShM	Discrete	Always
141	SAM M7 Fail	OEM	Management Subsystem Health	Discrete	Always
142	Blade M7 Fail	OEM	Management Subsystem Health	Discrete	Always

2.2.5 SAM Physical Shelf Manager Analog Sensors

The physical shelf managers at IPMB addresses 0xFC and 0xFE present the following analog sensors:

- *Voltage and Current Sensors*
- *Temperature Sensors*

The following tables describe the analog sensors available on the physical SAM. The information in this section supports the SAM on both the AXP1440 and AXP1620 shelves.

2.2.5.1 Voltage and Current Sensors

The following table describes the analog voltage and amperage sensors on the physical SAM.

Table 2-4 Sensor No. 3 +12VB

Feature	Raw Value/Description	Interpreted Value
Sensor Name	+12VB	
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		No
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask,		
Settable threshold mask (bytes 19, 20)	0x12, 0x12	Upper and Lower Critical Thresholds are Readable and Settable
Reading Type		Unsigned
Lower critical threshold	0x99	10.71 Volts
Upper critical threshold	0xBD	13.23 Volts

Table 2-5 Sensor No. 4 Vcc +3.3V

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Vcc 3.3V	
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	

Table 2-5 Sensor No. 4 Vcc +3.3V (continued)

Feature	Raw Value/Description	Interpreted Value
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		No
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask,		
Settable threshold mask (bytes 19, 20)	0x12, 0x12	Upper and Lower Critical Thresholds are Readable and Settable
Reading Type		Unsigned
Lower critical threshold	0x73	3.0245 Volts
Upper critical threshold	0x88	3.5768 Volts

Table 2-6 Sensor No. 5 +3.3V to ADP

Feature	Raw Value/Description	Interpreted Value
Sensor Name	3.3V to ADP	
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		No
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask,		

Table 2-6 Sensor No. 5 +3.3V to ADP (continued)

Feature	Raw Value/Description	Interpreted Value
Settable threshold mask (bytes 19, 20)	0x12, 0x12	Upper and Lower Critical Thresholds are Readable and Settable
Reading Type		Unsigned
Lower critical threshold	0x70	3.1136 Volts
Upper critical threshold	0x7D	3.475 Volts

Table 2-7 Sensor No. 6 Combined +12V

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Combined +12V	
Type of measurement		Voltage
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		No
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask,		
Settable threshold mask (bytes 19, 20)	0x12, 0x12	Upper and Lower Critical Threshold is Readable and Settable
Reading Type		Unsigned
Lower critical threshold	0xAB	10.602 Volts
Upper Critical threshold	0xD5	13.206 Volts

Table 2-8 Sensor No. 7 +12VA

Feature	Raw Value/Description	Interpreted Value
Sensor Name	+12VA	
Type of measurement		Voltage
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		No
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask,		
Settable threshold mask (bytes 19, 20)	0x12, 0x12	Upper and Lower Critical Threshold is Readable and Settable
Reading Type		Unsigned
Lower critical threshold	0x99	10.71 Volts
Upper Critical threshold	0xBD	13.23 Volts

Table 2-9 Sensor No. 8 +1.8V Eth Switch

Feature	Raw Value/Description	Interpreted Value
Sensor Name	+1.8V Eth Switch	
Type of measurement		Voltage
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	

Table 2-9 Sensor No. 8 +1.8V Eth Switch (continued)

Feature	Raw Value/Description	Interpreted Value
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		No
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask,		
Settable threshold mask (bytes 19, 20)	0x12, 0x12	Upper and Lower Critical Threshold is Readable and Settable
Reading Type		Unsigned
Lower critical threshold	0xA5	1.617 Volts
Upper Critical threshold	0xCA	1.9796 Volts

Table 2-10 Sensor No. 9 +1.2V FPGA

Feature	Raw Value/Description	Interpreted Value
Sensor Name	+1.2V FPGA	
Type of measurement		Voltage
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		No
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-10 Sensor No. 9 +1.2V FPGA (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask,		
Settable threshold mask (bytes 19, 20)	0x12, 0x12	Upper and Lower Critical Threshold is Readable and Settable
Reading Type		Unsigned
Lower critical threshold	0x6E	1.078 Volts
Upper Critical threshold	0x87	1.323 Volts

Table 2-11 Sensor No. 18 HS Ctlr A Amps

Feature	Raw Value/Description	Interpreted Value
Sensor Name	HS Ctlr A Amps	
Type of measurement		Current
Sensor Type	0x03	Current
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		No
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask,		
Settable threshold mask (bytes 19, 20)	0x12, 0x12	Upper and Lower Critical Threshold is Readable and Settable
Reading Type		Unsigned
Lower critical threshold	0x00	0 Amps
Upper Critical threshold	0x8A	1.794 Amps

Table 2-12 Sensor No. 19 HS Ctlr A Source

Feature	Raw Value/Description	Interpreted Value
Sensor Name	HS Ctlr A Source	
Type of measurement		Voltage
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		No
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask,		
Settable threshold mask (bytes 19, 20)	0x12, 0x12	Upper and Lower Critical Threshold is Readable and Settable
Reading Type		Unsigned
Lower critical threshold	0x00	0 Volts
Upper Critical threshold	0xFF	102 Volts

Table 2-13 Sensor No. 21 HS Ctlr B Amps

Feature	Raw Value/Description	Interpreted Value
Sensor Name	HS Ctlr B Amps	
Type of measurement		Current
Sensor Type	0x03	Current
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller

Table 2-13 Sensor No. 21 HS Ctlr B Amps (continued)

Feature	Raw Value/Description	Interpreted Value
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		No
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask,		
Settable threshold mask (bytes 19, 20)	0x12, 0x12	Upper and Lower Critical Threshold is Readable and Settable
Reading Type		Unsigned
Lower critical threshold	0x00	0 Amps
Upper Critical threshold	0x8A	1.794 Amps

Table 2-14 Sensor No. 22 HS Ctlr B Source

Feature	Raw Value/Description	Interpreted Value
Sensor Name	HS Ctlr B Source	
Type of measurement		Voltage
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		No
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask,		

Table 2-14 Sensor No. 22 HS Ctlr B Source (continued)

Feature	Raw Value/Description	Interpreted Value
Settable threshold mask (bytes 19, 20)	0x12, 0x12	Upper and Lower Critical Threshold is Readable and Settable
Reading Type		Unsigned
Lower critical threshold	0x00	0 Volts
Upper Critical threshold	0xFF	102 Volts

2.2.5.2 Temperature Sensors

The following tables describe the analog temperature sensors available on the physical SAM.

Table 2-15 Sensor No. 2 Local Temp

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Local Temp	
Sensor Type	0x01	Temperature
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable and Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask,		

Table 2-15 Sensor No. 2 Local Temp (continued)

Feature	Raw Value/Description	Interpreted Value
Settable threshold mask (bytes 19, 20)	0x12, 0x12	Upper Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Critical Threshold	0x00	0°C
Upper Critical Threshold	0x3C	60°C

2.2.6 SAM Module Discrete Sensors

The physical shelf managers at IPMB addresses 0xFC and 0xFE present the following discrete sensors:

- *Hot Swap Sensor*
- *IPMB Link Sensor*
- *PEM Sensors*
- *Fan Tray Presence Sensors*
- *AXP Backplane ID Sensor*
- *Fault Event Sensor*
- *POST Results Sensor*
- *Shelf FRU Info Sensor*
- *Hot Swap Controller Discrete Sensors*
- *Fan Tray Full Speed Sensor*
- *FPGA Build Rev Sensor*
- *Port Status Sensor*
- *CPLD State Sensor*
- *Reboot Reason Sensor*
- *Blade M7 Fail Sensor*
- *SAM M7 Fail Sensor*

2.2.6.1 Hot Swap Sensor

The following table describes the discrete hot swap sensor available on the physical SAM.

Table 2-16 Sensor No. 0 FRU 0 HOT_SWAP

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FRU 0 HOT_SWAP	
Type of Measurement		Hot Swap State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF0	Hot Swap
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15, 16)	0xFF, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0xFF, 0x00	Supports 8 Successive States
Reading Definition		According to PICMG 3.0

2.2.6.2 IPMB Link Sensor

The following table describes the discrete IPMB link sensor available on the physical SAM.

Table 2-17 Sensor No. 1 IPMB Link

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK	
Type of Measurement		IPMB Link State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

2.2.6.3 PEM Sensors

The following tables describe the discrete PEM sensors available on the physical SAM.

Table 2-18 Sensor No. 10 PEM 1

Feature	Raw Value/Description	Interpreted Value
Sensor Name	PEM 1	
Type of Measurement		Presence
Class		Discrete
Event/Reading Type	0x25	Entity Presence
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0x15	Power Management Board
Entity Instance	0x00	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x03, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 Successive States
Reading Definition		According to IPMI 1.5

Table 2-19 Sensor No. 11 PEM 2

Feature	Raw Value/Description	Interpreted Value
Sensor Name	PEM 2	
Type of Measurement		Presence
Class		Discrete
Event/Reading Type	0x25	Entity Presence
Sensor Type	0xF1	IPMB Link

Table 2-19 Sensor No. 11 PEM 2 (continued)

Feature	Raw Value/Description	Interpreted Value
Sensor Owner LUN	0x00	
Entity ID	0x15	Power Management Board
Entity Instance	0x00	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x03, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 Successive States
Reading Definition		According to IPMI 1.5

2.2.6.4 Fan Tray Presence Sensors

The following tables describe the discrete Fan Tray Presence sensors available on the physical SAM.

Table 2-20 Sensor No. 12 Lower Fan Tray

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Lower Fan Tray	
Type of Measurement		Presence
Class		Discrete
Event/Reading Type	0x25	Entity Presence
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0x1E	Cooling Unit
Entity Instance	0x00	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-20 Sensor No. 12 Lower Fan Tray

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x03, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 Successive States
Reading Definition		According to IPMI 1.5

Table 2-21 Sensor No. 13 Upper Fan Tray

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Upper Fan Tray	
Type of Measurement		Presence
Class		Discrete
Event/Reading Type	0x25	Entity Presence
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0x1E	Cooling Unit
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x03, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 Successive States
Reading Definition		According to IPMI 1.5

2.2.6.5 AXP Backplane ID Sensor

The following table describes the discrete AXP backplane ID sensor available on the physical SAM. For more detail on this sensor, refer to *AXP Backplane ID Sensor (SMART EC OEM)* on page 172.

Table 2-22 Sensor No. 14 AXP Backplane ID

Feature	Raw Value/Description	Interpreted Value
Sensor Name	AXP Backplane ID	
Type of Measurement		Specifies Bus Type of the Backplane
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xDB	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x01, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x01, 0x00	Supports 1 Successive State state 0: CRC error reported
Reading Definition		According to SMART EC XXXX: 03: AXP1620 04: AXP1440 05: AXP1420

2.2.6.6 Fault Event Sensor

The following table describes the discrete fault event sensor available on the physical SAM. For more information, refer to *ShM Fault Event Sensor (SMART EC OEM)* on page 180.

Table 2-23 Sensor No. 15 Fault Event

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fault Event	
Type of Measurement		Specifies that a serious fault has been detected by the Shelf Manager or that the Shelf Manager has rebooted.
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xDC	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-23 Sensor No. 15 Fault Event (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0xff, 0x1f	
Deassertion Event Mask (bytes 17,18)	0xff, 0x1f	
Discrete Reading Mask (bytes 19, 20)	0xff, 0x1f	Supports 13 independent states: State Mask Meaning ----- ---------- 0001: Switchover Initiated 0002: FPGA CRC Error 0004: PCI Bus Failure 0008: ADM1024 Unreadable 0010: Telco Alarm Unreadable 0020: FRU Presence Unreadable 0040: Shelf ID Unreadable 0080: HW Addr Unreadable 0100: IPMB Locked 0200: No Redundancy Eth 0400: No Hub Backplane Eth 0800: Critical Voltage 1000: FruInfo EEPROM Fail
Reading Definition	0x00	No meaning

2.2.6.7 POST Results Sensor

The following table describes the discrete POST results sensor available on the physical SAM. For more information on this sensor, refer to *POST Results Sensor (SMART EC OEM)* on page 176.

Table 2-24 Sensor No. 16 POST Results

Feature	Raw Value/Description	Interpreted Value
Sensor Name	POST Results	
Type of Measurement		POST Results
Class		Discrete
Event/Reading Type	0x06	'digital' Discrete
Sensor Type	0x28	Management Subsystem Health
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 Successive States
Reading Definition		According to IPMI 1.5

2.2.6.8 Hot Swap Controller Discrete Sensors

The following tables describe the discrete sensors describing the state reported by the LT C4260 Hot Swap Controllers on the physical SAM. For more information on these sensors, refer to *Hot Swap Controller Status (SMART EC OEM)* on page 177.

Table 2-25 Sensor No. 17 HS Ctlr A Status

Feature	Raw Value/Description	Interpreted Value
Sensor Name	HS Ctlr A status	
Type of Measurement		Status bits reported by Hot Swap Controller
Class		Discrete
Event/Reading Type	0x6F	Discrete
Sensor Type	0xDF	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-25 Sensor No. 17 HS Ctlr A Status (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x2f, 0x00	
Deassertion Event Mask(bytes 17,18)	0x2f, 0x00	
Discrete Reading Mask (bytes 19, 20)	0xFF, 0x00	Supports 8 independent states: State Mask Meaning ----- ---------- 0001: Overvoltage 0002: Undervoltage 0004: Overcurrent 0008: Power Bad 0010: Board Present 0020: FET Short 0040: GPIO Input 0080: FET On
Reading Definition	0x00	No Meaning

Table 2-26 Sensor No. 20 HS Ctlr B Status

Feature	Raw Value/Description	Interpreted Value
Sensor Name	HS Ctlr B status	
Type of Measurement		Status bits reported by Hot Swap Controller
Class		Discrete
Event/Reading Type	0x6F	Discrete
Sensor Type	0xDF	OEM-reserved

Table 2-26 Sensor No. 20 HS Ctlr B Status (continued)

Feature	Raw Value/Description	Interpreted Value
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x2f, 0x00	
Deassertion Event Mask(bytes 17,18)	0x2f, 0x00	
Discrete Reading Mask (bytes 19, 20)	0xFF, 0x00	Supports 8 independent states: State Mask Meaning ----- ---------- 0001: Overvoltage 0002: Undervoltage 0004: Overcurrent 0008: Power Bad 0010: Board Present 0020: FET Short 0040: GPIO Input 0080: FET On
Reading Definition	0x00	No Meaning

2.2.6.9 Fan Tray Full Speed Sensor

The following table describes the discrete sensor which presents the physical SAM's view of the FULL-SPEED signals. The FULL-SPEED signals, when asserted, force the fan trays to full speed. There are two signals, one for driving the Lower Fan Tray and one for driving the Upper Fan Tray. These signals are not normally driven by the SAM. The exception to this is if a serious fault occurs, such as loss of communications. For more information on this sensor, refer to *Fan Tray Full Speed Status Sensor (SMART EC OEM)* on page 178.

Table 2-27 Sensor No. 23 FT Full Speed

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FT Full Speed	
Type of Measurement		Indicates whether this SAM is driving full-speed signal to fan tray(s)
Class		Discrete
Event/Reading Type	0x6F	Discrete
Sensor Type	0xE0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-27 Sensor No. 23 FT Full Speed (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x00, 0x00	No events generated
Deassertion Event Mask(bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x00, 0x00	
Reading Definition		Supports 2 independent flags: Mask Meaning ----- ---------- 01 Lower FT Full Speed 02 Upper FT Full Speed

2.2.6.10 FPGA Build Rev Sensor

The following table describes the discrete sensor which presents the build revision information on the firmware in the SAM1500 FPGA. For more information on this sensor, refer to *Fan Tray Full Speed Status Sensor (SMART EC OEM)* on page 178.

Table 2-28 Sensor No. 24 FPGA Build Rev

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FPGA Build Rev	
Type of Measurement		Reports firmware revision on SAM1500 FPGA
Class		Discrete
Event/Reading Type	0x6F	Discrete
Sensor Type	0xE1	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	

Table 2-28 Sensor No. 24 FPGA Build Rev (continued)

Feature	Raw Value/Description	Interpreted Value
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x00, 0x00	No events generated
Deassertion Event Mask(bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x00, 0x00	Supports 2 Successive States
Reading Definition		See SMART EC XXX

2.2.6.11 Port Status Sensor

The following table describes the discrete sensor which presents status information about several physical ports and Ethernet interfaces on the SAM1500. For more information on this sensor, refer to *Port Status Sensor (SMART EC OEM)* on page 178.

Table 2-29 Sensor No. 25 Port Status

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Port Status	
Type of Measurement		Report port status
Class		Discrete
Event/Reading Type	0x6F	Discrete
Sensor Type	0xE2	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-29 Sensor No. 25 Port Status (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x03, 0x07	
Deassertion Event Mask(bytes 17,18)	0x03, 0x07	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x07	Supports 5 independent states: State Mask Description ----- ---------- 0001: Serial Port 1 interSAM between FPGAs down 0002: Serial Port 2 interSAM between FPGAs down 0100: Ethernet link to local hub slot is down 0200: Ethernet link to remote hub slot is down 0400: Ethernet link to front panel is down
Reading Definition	00	No meaning

2.2.6.12 CPLD State Sensor

The following table describes the discrete CPLD state sensor available on the physical SAM. For more information on this sensor, refer to *CPLD State Sensor (SMART EC OEM)* on page 179.

Table 2-30 Sensor No. 128 CPLD Status

Feature	Raw Value/Description	Interpreted Value
Sensor Name	CPLD Status	
Type of Measurement		States of the Master and Backup Shelf Managers
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xDE	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x00, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x00, 0x00	Supports 12 States
Reading Definition		According to SMART EC XXX

2.2.6.13 Reboot Reason Sensor

The following table describes the Reboot Reason Sensor which indicates the reason that the SAM1500 was last reset. For more information on this sensor, refer to *Reboot Reason Sensor (Pigeon Point OEM)* on page 180

Table 2-31 Sensor No. 129 Reboot Reason

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Reboot Reason	
Type of Measurement		Reports the reason the SAM was last rebooted
Class		Discrete
Event/Reading Type	0x6F	Discrete
Sensor Type	0xDD	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-31 Sensor No. 129 Reboot Reason (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x00, 0x00	
Deassertion Event Mask(bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0xFF, 0xFF	Mask Meaning ----- ---------- 0001: reboot reason unknown 0002: due to switchover 0004: forced switchover 0008: CLI cmd terminate 0010: loss of HEALTHY bit 0020: loss of ACTIVE bit 0040: redundancy link lost but active SAM still active 0080: error at shelf manager startup 0100: ShMM hardware watchdog 0200: Initiated by software (i.e., reboot command) 0400: ShMM power cycled
Reading Definition		No meaning

2.2.6.14 SAM M7 Fail Sensor

The following table describes the discrete SAM M7 Fail sensor available on the physical SAM:

Table 2-32 Sensor No. 141 SAM M7 Fail Sensor

Feature	Raw Value/Description	Interpreted Value
Sensor Name	SAM M7 Fail	
Type of Measurement		
Class		Discrete
Event/Reading Type	0x04	
Sensor Type	0x28	Management subsystem health
Sensor Owner LUN	0x0	
Entity ID	0xf0	
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x03, 0x00	
Deassertion Event Mask(bytes 17,18)	0x03, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	
Reading Definition		0x1: Predictive failure deasserted 0x2: Predictive failure asserted

2.2.6.15 Blade M7 Fail Sensor

The following table describes the discrete Blade M7 Fail sensor available on the physical SAM:

Table 2-33 Sensor No. 142 Blade M7 Fail Sensor

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Blade M7 Fail	
Type of Measurement		
Class		Discrete
Event/Reading Type	0x04	
Sensor Type	0x28	Management subsystem health
Sensor Owner LUN	0x0	
Entity ID	0xf0	
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x03, 0x00	
Deassertion Event Mask(bytes 17,18)	0x03, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	
Reading Definition		0x1: Predictive failure deasserted 0x2: Predictive failure asserted

2.3 SAM1500 Active (Virtual) Shelf Manager

This section describes in detail all available IPMI sensors of the active SAM1500 at IPMB address 0x20. The information in this section supports the SAM on both the AXP1440 and AXP1620 shelves. The AXP1620 FRU and sensor data is highlighted and/or marked for ease of use.

2.3.1 FRU Information

There are four FRU IDs which the active SAM (at address 0x20) presents:

FRU 0 – refers to the physical SAM1500 card; it could be either FRU 0 of IPMB address 0xFC or FRU 0 of IPMB address 0xFE.

FRU 1 and FRU 2 – both refer to FRU info stored in EEPROMs on the AXP1620 or AXP1440 chassis, describing the capabilities and connectivity of the Shelf Manager. Although these FRUs are stored redundantly in two different EEPROMs, their data should always be identical.

FRU 254 – this is the *virtual* FRU number which refers to the common data stored in FRU 1 and FRU 2. When reading or writing shelf FRU information, you should always use FRU 254. Writing to FRU 254 causes a write to both FRU 1 and FRU 2 and keeps them identical.

The following listings show examples of the output obtained when retrieving FRU information using the CLIA tool of the active SAM.

2.3.1.1 Active Shelf Manager FRU Data, AXP1440

```
# clia fruinfo 20 254

Pigeon Point Shelf Manager Command Line Interpreter

20: FRU # 254, FRU Info
Common Header:    Format Version = 1

Chassis Info Area:
    Version   = 1
    Chassis Type            = (1)
    Chassis Part Number     = 0106843D01C
    Chassis Serial Number    = 00001

Board Info Area:
    Version                 = 1
    Language Code           = 25
    Mfg Date/Time           = May 31 23:00:00 2008 (xxxxxxx minutes since
1996)
    Board Manufacturer      = Emerson Network Power, Embedded Computing
    Board Product Name      = AXP-1440
    Board Serial Number     = 12345
    Board Part Number       = 0106822D01C
    FRU Programmer File ID   = CENT4440_ShelfFru.inf
```

```
Product Info Area:
    Version = 1
    Language Code           = 25
    Manufacturer Name       = Emerson Network Power, Embedded Computing
    Product Name            = Centellis 4440
    Product Part / Model#   = CENT-4440-R10
    Product Version         = Rev. 1.0
    Product Serial Number   = 00001
    Asset Tag               =
    FRU Programmer File ID    = CENT4440_ShelfFru.inf

Multi Record Area:
    PICMG Shelf Manager IP Connection Record (ID=0x13)
        Version = 1

Record Type             = Management Access Record
        Version = 2
    Sub-Record Type: Component Name (0x05)

    PICMG Address Table Record (ID=0x10)
        Version = 0

    PICMG Backplane Point-to-Point Connectivity Record (ID=0x04)
        Version = 0

    PICMG Backplane Point-to-Point Connectivity Record (ID=0x04)
        Version = 0

   PICMG Shelf Power Distribution Record (ID=0x11)
        Version = 0

    PICMG Radial IPMB-0 Link Mapping Record (ID=0x15)
        Version = 0

    PICMG Shelf Activation And Power Management Record (ID=0x12)
        Version = 0

    Record Type             = 0xc0 OEM Record
        Version = 2
    Manufacturer ID         = 0x0000A1 MOTOROLA
    Record ID                = 0x02
```

2.3.1.2 Active Shelf Manager FRU Data, AXP1620

```
 # clia fruinfo 20 254

Pigeon Point Shelf Manager Command Line Interpreter
```

```
20: FRU # 254, FRU Info
Common Header:    Format Version = 1

Chassis Info Area:
    Version   = 1
    Chassis Type             = (1)
    Chassis Part Number      = 0106843D01C
    Chassis Serial Number     = 00001

Board Info Area:
    Version     = 1
    Language Code            = 25
    Mfg Date/Time           = Aug 31 23:00:00 2007 (6135780 minutes since
1996)
    Board Manufacturer       = Emerson Network Power, Embedded Computing
    Board Product Name       = AXP-1620
    Board Serial Number      = 12345
    Board Part Number        = 0106822D01C
    FRU Programmer File ID    = CENT4620_ShelfFru.inf

Product Info Area:
    Version     = 1
    Language Code            = 25
    Manufacturer Name        = Emerson Network Power, Embedded Computing
    Product Name             = Centellis 4620
    Product Part / Model#    = CENT-4620-R10
    Product Version          = Rev. 1.0
    Product Serial Number    = 00001
    Asset Tag                =
    FRU Programmer File ID    = CENT4620_ShelfFru.inf

Multi Record Area:
    PICMG Shelf Manager IP Connection Record (ID=0x13)
        Version = 1

    Record Type              = Management Access Record
        Version                  = 2
    Sub-Record Type: Component Name (0x05)

    PICMG Address Table Record (ID=0x10)
        Version = 0

    PICMG Backplane Point-to-Point Connectivity Record (ID=0x04)
        Version = 0

    PICMG Backplane Point-to-Point Connectivity Record (ID=0x04)
        Version = 0

    PICMG Backplane Point-to-Point Connectivity Record (ID=0x04)
        Version = 0
```

```
    PICMG Shelf Power Distribution Record (ID=0x11)
        Version = 0

    PICMG Radial IPMB-0 Link Mapping Record (ID=0x15)
        Version = 0

    PICMG Shelf Activation And Power Management Record (ID=0x12)
        Version = 1

    Record Type              = 0xc0 OEM Record
        Version = 2
    Manufacturer ID          = 0x0000A1 MOTOROLA
    Record ID                 = 0x02
```

2.3.1.3 SAM1500 Shelf Manager FRU Data

```
# clia fruinfo 20 0

Pigeon Point Shelf Manager Command Line Interpreter

fc: FRU # 0, FRU Info
Common Header:    Format Version = 1

Board Info Area:
    Version     = 1
    Language Code            = 25
    Mfg Date/Time           = Mar 30 23:00:00 2003 (3810180 minutes since
1996)
    Board Manufacturer       = Pigeon Point Systems
    Board Product Name       = Pigeon Point Systems ShMM-1500
    Board Serial Number      = PPS0000000
    Board Part Number        = A
    FRU Programmer File ID    =

Product Info Area:
    Version     = 1
    Language Code            = 25
    Manufacturer Name        = Pigeon Point Systems
    Product Name             = Pigeon Point Systems Shelf Manager
    Product Part / Model#    = 000000
    Product Version          = Rev 1.00
    Product Serial Number    = PPS0000000
    Asset Tag                =
    FRU Programmer File ID    =
```

2.3.2 Power Configuration

The following table describes the power configuration for the active SAM.

Table 2-34 SAM1500 Active Power Configuration

Item	Value	Meaning
Dynamic power reconfiguration support	No	Possibility to change FRU power consumption without switching it off, according to AdvancedTCA
Dynamic power configuration	No	Are the power draw levels fixed or these may vary if additional components are hot inserted or onboard components' power consumption is changing dynamically
Number of power draw levels	1	The amount of possible power levels, normally 1
Early power draw levels, Watt	5	Complete early power consumption including IPMC
Steady state power draw levels, Watt	5	Complete steady power consumption including IPMC
Transition from Early to Steady levels, sec	0	How long does board consumes early power. Early power is normally bigger than steady

2.3.3 Active SAM1500 Sensor Overview

The following table lists the discrete and analog sensors that reside on the active SAM. The information in this section supports the SAM on both the AXP1440 and AXP1620 shelves. The AXP1620 FRU and sensor data is highlighted and/or marked for ease of use.

Rows that are shaded provide information for the additional sensors on the SAM1500 for the AXP1620.

Table 2-35 Active SAM1500 Sensor Overview

Sensor No.	Sensor Name	Type of Measurement	What does it measure?	Sensor Type	Availability
0	FRU 0 HOT_SWAP	Status	State of FRU	Discrete	Always
2	FRU 1 HOT_SWAP	Status	State of FRU	Discrete	Always
3	FRU 2 HOT_SWAP	Status	State of FRU	Discrete	Always
4	SHM FAULT EVENT	Status	State of SHM	Discrete	Always
5	IPMB LINK 1	Status	State of IPMB link	Discrete	Always
6	IPMB LINK 2	Status	State of IPMB link	Discrete	Always
7	IPMB LINK 3	Status	State of IPMB link	Discrete	Always
8	IPMB LINK 4	Status	State of IPMB link	Discrete	Always
9	IPMB LINK 5	Status	State of IPMB link	Discrete	Always
10	IPMB LINK 6	Status	State of IPMB link	Discrete	Always
11	IPMB LINK 7	Status	State of IPMB link	Discrete	Always
12	IPMB LINK 8	Status	State of IPMB link	Discrete	Always
13	IPMB LINK 9	Status	State of IPMB link	Discrete	Always
14	IPMB LINK 10	Status	State of IPMB link	Discrete	Always
15	IPMB LINK 11	Status	State of IPMB link	Discrete	Always
16	IPMB LINK 12	Status	State of IPMB link	Discrete	Always

Table 2-35 Active SAM1500 Sensor Overview (continued)

Sensor No.	Sensor Name	Type of Measurement	What does it measure?	Sensor Type	Availability
17	IPMB LINK 13	Status	State of IPMB link	Discrete	Always
18	IPMB LINK 14	Status	State of IPMB link	Discrete	Always
19	IPMB LINK 15	Status	State of IPMB link	Discrete	Always
20	IPMB LINK 16	Status	State of IPMB link	Discrete	Always
21	IPMB LINK 17	Status	State of IPMB link	Discrete	Always
22	IPMB LINK 18	Status	State of IPMB link	Discrete	Always
23	IPMB LINK 19	Status	State of IPMB link	Discrete	Always
24	IPMB LINK 20	Status	State of IPMB link	Discrete	Always
25	IPMB LINK 21	Status	State of IPMB link	Discrete	Always
119	TelcoAlarmInput	Status	State of input signals to TELCO alarms	Discrete	Always
131	Telco Alarms	Status	State of TELCO alarms		
132	BMC Watchdog	Status	State of BMC Watchdog on active SAM	Discrete	Always
133	SYSTEM EVENT	Status	State of PEF actions, system reconfigured events, etc.	Discrete	Always

Table 2-35 Active SAM1500 Sensor Overview (continued)

Sensor No.	Sensor Name	Type of Measurement	What does it measure?	Sensor Type	Availability
135	FT Oper. Status	Status	Redundancy capability of fan trays	Discrete	Always
136	Cooling State	Status	State of Cooling Management Subsystem	Discrete	Always
137	Fans State	Status	Fan tachometer health	Discrete	Always
138	SHM Redundancy	Status	Redundancy capability of Shelf Manager	Discrete	Always
139	Shelf Power	Current (Amps)	Computer shelf power consumption	Analog	Always

2.3.4 Active SAM1500 Analog Sensor

The active SAM at IPMB address 0x20 presents the following analog sensor:

2.3.4.1 Shelf Power Sensor

The following table describes the Shelf Power Sensor available on the active SAM.

Table 2-36 Sensor No. 139 Shelf Power

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Shelf Power	
Sensor Type	0x0b	"Other Units-based Sensor" (watts)
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Hysteresis support		No
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask		
Settable threshold mask (bytes 19, 20)	0x00, 0x00	No events
Reading Type		Unsigned
Lower critical threshold		
Upper critical threshold		

The SAM computes the Shelf Power by polling the current and voltage sensors reported by the PEMs. Each PEM reports two feed voltage and current sensors. The SAM computes the total shelf power consumption via the following formula:

Shelf Power =(PEM_1_Feed_A_Current * PEM_1_FEED_A_Voltage) +
(PEM_1_Feed_B_Current * PEM_1_FEED_B_Voltage) +
(PEM_2_Feed_A_Current * PEM_2_FEED_A_Voltage) +
(PEM_2_Feed_B_Current * PEM_2_FEED_B_Voltage)

The sensor's raw value is a number in the range of 0-255. If this value is r, shelf wattage is computed by the following formula:

Shelf Power = 1100 + (30 * r)

The result is expressed in watts and is accurate to about +/-30W. The computed value has a floor value of 1100W.

2.3.5 SAM Active Shelf Manager Discrete Sensors

The active shelf managers at IPMB address 0x20 present the following discrete sensors:

- *Hot Swap Sensors*
- *ShM Fault Event Sensor*
- *IPMB Link Sensors*
- *Telco Alarm Sensors*
- *BMC Watchdog Sensor*
- *System Event*
- *Cooling State Sensors*
- *ShM Redundancy Sensor*
- *HPI Sys Event Sensor*

The following tables describe the discrete sensors available on the active SAM.

2.3.5.1 Shelf FRU Info Sensor

The following table describes the discrete shelf FRU info sensor available on the active (virtual) SAM. For more information on this sensor, refer to *Shelf FRU Info (SMART EC OEM)* on page 176.

Table 2-37 Sensor No. 17 Shelf FRU info

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Shelf FRU Info	
Type of Measurement		Basic validation of the Shelf FRU Info
Class		Discrete
Event/Reading Type	0x09	'digital' Discrete
Sensor Type	0xDD	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x03, 0x00	
Deassertion Event Mask(bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 Successive States
Reading Definition		According to SMART EC XXX

2.3.5.2 Hot Swap Sensors

The following table describes the discrete hot swap sensors available on the active SAM.

Table 2-38 Sensor No. 0 (0x00) FRU 0 HOT_SWAP

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FRU 0 HOT_SWAP	
Type of Measurement		Hot swap state of FRU 0, describing the SAM1500
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF0	Hot Swap
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0xFF, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0xFF, 0x00	Supports 8 Successive States
Reading Definition		According to PICMG 3.0

Table 2-39 Sensor No. 2 (0x02) FRU 1 HOT_SWAP

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FRU 1 HOT_SWAP	
Type of Measurement		Hot Swap State of FRU 1, describing the Shelf Manager
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF0	Hot Swap
Sensor Owner LUN	0x00	
Entity ID	0xF2	PICMG Shelf Management Controller
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0xFF, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0xFF, 0x00	Supports 8 Successive States
Reading Definition		According to PICMG 3.0

Table 2-40 Sensor No. 3 (0x03) FRU 2 HOT_SWAP

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FRU 2 HOT_SWAP	
Type of Measurement		Hot Swap State of FRU 2, describing the Shelf Manager
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF0	Hot Swap
Sensor Owner LUN	0x00	

Table 2-40 Sensor No. 3 (0x03) FRU 2 HOT_SWAP (continued)

Feature	Raw Value/Description	Interpreted Value
Entity ID	0xF2	PICMG Shelf Management Controller
Entity Instance	0x61	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0xFF, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0xFF, 0x00	Supports 8 Successive States
Reading Definition		According to PICMG 3.0

2.3.5.3 ShM Fault Event Sensor

The following table describes the discrete ShM Fault Event sensor available on the active SAM.

Table 2-41 Sensor No. 4 (0x04) ShM Fault Event

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Shm Fault Event	
Type of Measurement		Status of various classes of software-discovered faults in the ShM
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xDE	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto

Table 2-41 Sensor No. 4 (0x04) ShM Fault Event

Feature	Raw Value/Description	Interpreted Value
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0xFE, 0x01	
Deassertion Event Mask (bytes 17,18)	0xFE, 0x01	
Discrete Reading Mask (bytes 19, 20)	0xFE, 0x01	Supports 8 Successive States
Reading Definition		According to SMART EC XXX

2.3.5.4 IPMB Link Sensors

Link sensors describe the status of links to the various controlled IPMCs. Their semantics are defined in PICMG 3.0. For the AXP product, the various Link sensors refer to the IPMB links via the following table:

Table 2-42 Link-to-IPMC Mapping

Link	AXP1620	AXP1440
1	IPMB Addr 0x82 (Blade slot 1)	IPMB Addr 0x9A (Blade slot 1)
2	IPMB Addr 0x86 (Blade slot 2)	IPMB Addr 0x96 (Blade slot 2)
3	IPMB Addr 0x8A (Blade slot 3)	IPMB Addr 0x92 (Blade slot 3)
4	IPMB Addr 0x8E (Blade slot 4)	IPMB Addr 0x8E (Blade slot 4)
5	IPMB Addr 0x92 (Blade slot 5)	IPMB Addr 0x8A (Blade slot 5)
6	IPMB Addr 0x96 (Blade slot 6)	IPMB Addr 0x82 (Blade slot 6)
7	IPMB Addr 0x9A (Blade slot 7)	IPMB Addr 0x86 (Blade slot 7)
8	IPMB Addr 0x9E (Blade slot 8)	IPMB Addr 0x88 (Blade slot 8)
9	IPMB Addr 0x88 (Blade slot 9)	IPMB Addr 0x84 (Blade slot 9)
10	IPMB Addr 0x8C (Blade slot 10)	IPMB Addr 0x8C (Blade slot 10)
11	IPMB Addr 0x90 (Blade slot 11)	IPMB Addr 0x90 (Blade slot 11)
12	IPMB Addr 0x94 (Blade slot 12)	IPMB Addr 0x94 (Blade slot 12)
13	IPMB Addr 0x98 (Blade slot 13)	IPMB Addr 0x98 (Blade slot 13)

Table 2-42 Link-to-IPMC Mapping (continued)

Link	AXP1620	AXP1440
14	IPMB Addr 0x9C (Blade slot 14)	IPMB Addr 0x9C (Blade slot 14)
15	IPMB Addr 0xA0 (Blade slot 15)	Not applicable
16	IPMB Addr 0x84 (Blade slot 16)	Not applicable
17	IPMB Addr 0x66 (PEM 1)	IPMB Addr 0x66 (PEM1)
18	IPMB Addr 0x68 (PEM 2)	IPMB Addr 0x68 (PEM 2)
19	IPMB Addr 0x56 (Upper FTM)	IPMB Addr 0x56 (Upper FTM)
20	IPMB Addr 0x58 (Lower FTM)	IPMB Addr 0x58 (Lower FTM)
21	IPMB Addr 0xFC/0xFE (other SAM)	IPMB Addr 0xFC/0xFE (other SAM)

Table 2-43 Sensor No. 5 IPMB LINK 1

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 1	
Type of Measurement		IPMB Link 1 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-43 Sensor No. 5 IPMB LINK 1 (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-44 Sensor No. 6 IPMB LINK 2

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 2	
Type of Measurement		IPMB Link 2 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-45 Sensor No. 7 IPMB LINK 3

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 3	
Type of Measurement		IPMB Link 3 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-46 Sensor No. 8 IPMB LINK 4

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 4	
Type of Measurement		IPMB Link 4 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller

Table 2-46 Sensor No. 8 IPMB LINK 4 (continued)

Feature	Raw Value/Description	Interpreted Value
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-47 Sensor No. 9 IPMB LINK 5

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 5	
Type of Measurement		IPMB Link 5 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-47 Sensor No. 9 IPMB LINK 5 (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-48 Sensor No. 10 IPMB LINK 6

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 6	
Type of Measurement		IPMB Link 6 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-49 Sensor No. 11 IPMB LINK 7

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 7	
Type of Measurement		IPMB Link 7 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-50 Sensor No. 12 IPMB LINK 8

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 8	
Type of Measurement		IPMB Link 8 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller

Table 2-50 Sensor No. 12 IPMB LINK 8 (continued)

Feature	Raw Value/Description	Interpreted Value
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-51 Sensor No. 13 IPMB LINK 9

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 9	
Type of Measurement		IPMB Link 9 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-51 Sensor No. 13 IPMB LINK 9 (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-52 Sensor No. 14 IPMB LINK 10

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 10	
Type of Measurement		IPMB Link 10 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-53 Sensor No. 15 IPMB LINK 11

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 11	
Type of Measurement		IPMB Link 11 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-54 Sensor No. 16 IPMB LINK 12

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 12	
Type of Measurement		IPMB Link 12 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller

Table 2-54 Sensor No. 16 IPMB LINK 12 (continued)

Feature	Raw Value/Description	Interpreted Value
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-55 Sensor No. 17 IPMB LINK 13

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 13	
Type of Measurement		IPMB Link 13 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-55 Sensor No. 17 IPMB LINK 13 (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-56 Sensor No. 18 IPMB LINK 14

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 14	
Type of Measurement		IPMB Link 14 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-57 Sensor No. 19 IPMB LINK 15, AXP1620

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 15	
Type of Measurement		IPMB Link 14 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-58 Sensor No. 20 IPMB LINK 16, AXP1620

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 16	
Type of Measurement		IPMB Link 14 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller

Table 2-58 Sensor No. 20 IPMB LINK 16, AXP1620 (continued)

Feature	Raw Value/Description	Interpreted Value
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-59 Sensor No. 21 IPMB LINK 17

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 17	
Type of Measurement		IPMB Link 17 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-59 Sensor No. 21 IPMB LINK 17 (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-60 Sensor No. 22 IPMB LINK 18, AXP1620

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 18	
Type of Measurement		IPMB Link 17 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-61 Sensor No. 23 IPMB LINK 19, AXP1620

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 19	
Type of Measurement		IPMB Link 17 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Additional IPMB LINK sensors support the SAM used in the AXP1620 shelf.

Table 2-62 Sensor No. 24 IPMB LINK 20, AXP1620

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 20	
Type of Measurement		IPMB Link 17 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link

Table 2-62 Sensor No. 24 IPMB LINK 20, AXP1620 (continued)

Feature	Raw Value/Description	Interpreted Value
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

Table 2-63 Sensor No. 25 IPMB LINK 21, AXP1620

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB LINK 21	
Type of Measurement		IPMB Link 17 State
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-63 Sensor No. 25 IPMB LINK 21, AXP1620 (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x0F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x00	Supports 4 Successive States
Reading Definition		According to PICMG 3.0

2.3.5.5 Telco Alarm Sensors

The following tables describe the discrete Telco alarm sensors available on the active SAM. Further information on these sensors can be found at *Telco Alarms (Pigeon Point OEM)* on page 182.

Table 2-64 Sensor No. 119 Telco Alarm Input

Feature	Raw Value/Description	Interpreted Value
Sensor Name	TelcoAlarmInput	
Type of Measurement		Inputs to Telco device
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF4	Telco Alarm
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-64 Sensor No. 119 Telco Alarm Input (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x07, 0x00	
Deassertion Event Mask (bytes 17,18)	0x07, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x07, 0x00	Supports 3 States
Reading Definition		According to Pigeon Point

Table 2-65 Sensor No. 131 (0x83) Telco Alarms

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Telco Alarms	
Type of Measurement		State of the Telco Alarms
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xDF	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x00, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x07, 0x00	OEM States
Reading Definition		According to Pigeon Point

2.3.5.6 BMC Watchdog Sensor

The following table describes the discrete BMC Watchdog sensor available on the active SAM.

Table 2-66 Sensor No. 132 (0x84) BMC Watchdog

Feature	Raw Value/Description	Interpreted Value
Sensor Name	BMC Watchdog	
Type of Measurement		State of the BMC Watchdog on the active SAM
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0x23	IPMI Watchdog 2
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x0F, 0x01	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x0F, 0x01	Supports 5 States
Reading Definition		According to IPMI 1.5

2.3.5.7 System Event

The following table describes the discrete system event sensor available on the active SAM.

Table 2-67 Sensor No. 133 (0x85) System Event

Feature	Raw Value/Description	Interpreted Value
Sensor Name	System Event	
Type of Measurement		Presence
Class		Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0x12	System Event
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x1F, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x1F, 0x00	Supports 5 Successive States
Reading Definition		According to IPMI 1.5

2.3.5.8 Cooling State Sensors

The following table describes the discrete sensors available on the active SAM.

Table 2-68 Sensor No. 135 FT Oper Status

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FT Oper Status	
Type of Measurement		Reports whether all trays defined in the address table are operational
Class		Discrete
Event/Reading Type	0x0B	Discrete, Redundancy
Sensor Type	0x28	Management Subsystem Health
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x00, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x00, 0x00	Supports 3 States
Reading Definition		According to Pigeon Point: 0x00: Full Redundancy = all fan trays defined in the Address Table are operational. 0x01: Redundancy Lost - some of the fan trays defined in the Address Table are missing or non-operational.

Table 2-69 Sensor No. 136 Cooling State

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Cooling State	
Type of Measurement		Reports Cooling Management state
Class		Discrete
Event/Reading Type	0x07	Discrete, Severity
Sensor Type	0x28	Management Subsystem Health
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-69 Sensor No. 136 Cooling State (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x00, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x00, 0x00	Supports 3 States
Reading Definition		According to Pigeon Point: 0x00: Transition to OK. The cooling state is Normal. 0x01: Transition to Non-Critical. from OK. The cooling state is now Minor Alert. The previous cooling state was Normal. 0x02: Transition to Critical from less severe. The cooling state is now Major Alert The previous cooling state was either Normal or Minor Alert. 0x03: Transition to non-recoverable from less severe. The cooling state is now critical Alert. The previous cooling state was either Normal, Minor or Major Alert. 0x04: Transition to Non-Critical from more severe. The cooling state is now Minor Alert. The previous cooling state was either Major or Critical Alert. 0x05: Transition from Critical to Non-recoverable. The current cooling state is Major Alert. The previous cooling state was Critical Alert. 0x06: Transition to Non-recoverable. The current cooling state is now Critical Alert.

Table 2-70 Sensor No. 137 Fans State

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fans State	
Type of Measurement		Reports Cooling Management state
Class		Discrete
Event/Reading Type	0x07	Discrete, Severity
Sensor Type	0x28	Management Subsystem Health
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x00, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x00, 0x00	Supports 4 States
Reading Definition		According to Pigeon Point: 0x00: Transition to OK. The fans state is Normal (no thresholds are crossed on fan tachometer sensors). 0x01: Transition to Non-Critical from OK. The fans state is now Minor Alert (non-critical thresholds are crossed for some tachometer sensors). The previous fans state was Normal. 0x02: Transition to Critical from less severe. The fans state is now Major Alert (critical thresholds are crossed for some tachometer sensors), the previous fans state was either Normal or Minor Alert. 0x04: Transition to Non-Critical from more severe. The fans state is now Minor Alert. The previous fans state was either Major or Critical Alert (non-recoverable thresholds are crossed for some tachometer sensors).

2.3.5.9 ShM Redundancy Sensor

The following table describes the ShM Redundancy sensor available on the active SAM.This sensor describes the system's current capability to affect a switchover.

Table 2-71 Sensor No. 138 ShM Redundancy

Feature	Raw Value/Description	Interpreted Value
Sensor Name	ShM Redundancy	
Type of Measurement		Reports the Shelf Manager is capable of redundant operation
Class		Discrete
Event/Reading Type	0x0B	Discrete, Redundancy
Sensor Type	0x28	Management Subsystem Health
Sensor Owner LUN	0x00	
Entity ID	0xF0	PICMG Shelf Management Controller
Entity Instance	0x01	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-71 Sensor No. 138 ShM Redundancy (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x07, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x07, 0x00	Supports 3 States: 0x0001: Shelf Manager fully redundant 0x0002: Redundancy lost. Active Shelf Manager has no backup 0x0004: Redundancy degraded. Active Shelf Manager has inactive backup
Reading Definition		

2.3.5.10 HPI Sys Event Sensor

The following table describes the discrete HPI Sys Event sensor available on the active SAM:

Table 2-72 HPI Sys Event Sensor

Feature	Raw Value/Description	Interpreted Value
Sensor Name	HPI Sys Event	
Type of Measurement		
Class		Discrete
Event/Reading Type	0x6F	
Sensor Type	0xDB	OEM
Sensor Owner LUN	0x3	
Entity ID	0xf0	
Entity Instance	0x01	
Rearm mode		Auto

Table 2-72 HPI Sys Event Sensor (continued)

Feature	Raw Value/Description	Interpreted Value
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x1F, 0x00	
Deassertion Event Mask(bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x1F, 0x00	
Reading Definition		0x0: Power state changed 0x1: Power distribution changed 0x2: Shelf Address changed 0x3: IP Connection changed 0x4-0x8: reserved

2.4 Fan Tray Module Sensor Data Records

This section describes in detail all available IPMI sensors of the Fan Tray Module.

2.4.1 Fan Tray Module Sensor Overview

The following table lists all IPMI sensors available on the Fan Tray Module.

Table 2-73 IPMI Sensors on the Fan Tray Module

Sensor No. (AXP-1620)	Sensor No. (AXP-1440)	Sensor Name	Type of Measurement	What does it measure?	Sensor Type	Availability
0	0	Hot Swap	Status	State of FRU	Discrete	Always
1	1	Version Change	Version change	OEM Version Use	Discrete	Always
2	2	IPMB Link		State of IPMB link	Discrete	Always
3	3	+12V A_MON	Voltage	Fan 12V source A	Threshold	Always
4	4	+12V B_MON	Voltage	Fan 12V source B	Threshold	Always
5	5	+3.3V	Voltage	3.3V output	Threshold	Always
6	6	+5V A_MON	Voltage	5V source A	Threshold	Always
7	7	+5V B_MON	Voltage	5V source B	Threshold	Always
8	8	Fan 1	RPM	Fan Unit 1 Inlet Fan	Threshold	Always
9	9	Fan 2	RPM	Fan Unit 2 Inlet Fan	Threshold	Always
10	10	Fan 3	RPM	Fan Unit 3 Inlet Fan	Threshold	Always

Table 2-73 IPMI Sensors on the Fan Tray Module (continued)

Sensor No. (AXP-1620)	Sensor No. (AXP-1440)	Sensor Name	Type of Measurement	What does it measure?	Sensor Type	Availability
11	11	Fan 4	RPM	Fan Unit 4 Inlet Fan	Threshold	Always
12	12	Fan 5	RPM	Fan Unit 5 Inlet Fan	Threshold	Always
13		Fan 6 (AXP1620 only)	RPM	Fan Unit 6 Inlet Fan	Threshold	Always
14	13	Fan 1 Outlet	RPM	Fan Unit 1 Outlet Fan	Threshold	Always
15	14	Fan 2 Outlet	RPM	Fan Unit 2 Outlet Fan	Threshold	Always
16	15	Fan 3 Outlet	RPM	Fan Unit 3 Outlet Fan	Threshold	Always
17	16	Fan 4 Outlet	RPM	Fan Unit 4 Outlet Fan	Threshold	Always
18	17	Fan 5 Outlet	RPM	Fan Unit 5 Outlet Fan	Threshold	Always
19		Fan 6 Outlet (AXP1620 only)	RPM	Fan Unit 6 Outlet Fan	Threshold	Always
20	18	FanFault Z1F1	OEM-reserved	Zone 1 Fan Unit 1 Controller Fault State	Discrete	Always
21	19	FanFault Z1F2	OEM-reserved	Zone 1 Fan Unit 2 Controller Fault State	Discrete	Always
22	20	FanFault Z1F3	OEM-reserved	Zone 1 Fan Unit 3 Controller Fault State	Discrete	Always

Table 2-73 IPMI Sensors on the Fan Tray Module (continued)

Sensor No. (AXP-1620)	Sensor No. (AXP-1440)	Sensor Name	Type of Measurement	What does it measure?	Sensor Type	Availability
23	21	FanFault Z2F1	OEM-reserved	Zone 2 Fan Unit 1 Controller Fault State	Discrete	Always
24	22	FanFault Z2F2	OEM-reserved	Zone 2 Fan Unit 2 Controller Fault State	Discrete	Always
25	23	FanFault Z2F3	OEM-reserved	Zone 2 Fan Unit 3 Controller Fault State	Discrete	Always
26	24	FuseFail 48VA1	OEM-reserved	48V Feed A Zone 1 Fuse Failure Flag	Discrete	Always
27	25	FuseFail 48VA2	OEM-reserved	48V Feed A Zone 2 Fuse Failure Flag	Discrete	Always
28	26	FuseFail 48VB1	OEM-reserved	48V Feed B Zone 1 Fuse Failure Flag	Discrete	Always
29	27	FuseFail 48VB2	OEM-reserved	48V Feed B Zone 2 Fuse Failure Flag	Discrete	Always
30	28	FTM Temp 1	Temperature	Fan Tray Module Temperature Sensor 1	Threshold	Always
31	29	FTM Temp 2	Temperature	Fan Tray Module Temperature Sensor 2	Threshold	Always

Table 2-73 IPMI Sensors on the Fan Tray Module (continued)

Sensor No. (AXP-1620)	Sensor No. (AXP-1440)	Sensor Name	Type of Measurement	What does it measure?	Sensor Type	Availability
32	30	FTM Temp 3	Temperature	Fan Tray Module Temperature Sensor 3	Threshold	Always
33	31	FTM Temp 4	Temperature	Fan Tray Module Temperature Sensor 4	Threshold	Always
34	32	FTM Temp 5	Temperature	Fan Tray Module Temperature Sensor 5	Threshold	Always
35		FTM Temp 6 (AXP1620 only)	Temperature	Fan Tray Module Temperature Sensor 6	Threshold	Always

2.4.2 Fan Tray Module Analog Sensors

The analog sensors available on the FTM can be divided into the following three categories:

- *Voltage Sensors*
- *Temperature Sensors*
- *Fan Speed Sensors*

2.4.2.1 Voltage Sensors

The following sensors measure voltages of the FTM.

Table 2-74 Sensor No. 3 +12V A_MON

Feature	Raw Value/Description	Interpreted Value
Sensor Name	+12V A_MON	
Device		
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0xDB, 0xDA, 0xD9	(11.8260, 11.7720, 11.7180) Volts
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xF7, 0xF9, 0xFA	(13.3380, 13.4460, 13.5) Volts

Table 2-75 Sensor No. 4 +12V B_MON

Feature	Raw Value/Description	Interpreted Value
Sensor Name	+12V B_MON	
Device		
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0xDB, 0xDA, 0xD9	(11.8260, 11.7720, 11.7180) Volts
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xF7, 0xF9, 0xFA	(13.3380, 13.4460, 13.5) Volts

Table 2-76 Sensor No. 5 +3.3V

Feature	Raw Value/Description	Interpreted Value
Sensor Name	+3.3V	
Device		
Sensor Type	0x02	Voltage
Class	0x01	Threshold

Table 2-76 Sensor No. 5 +3.3V (continued)

Feature	Raw Value/Description	Interpreted Value
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0xD8, 0xD4, 0xD1	(3.1104, 3.0528, 3,0096) Volts
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xF4, 0xF7, 0xFA	(3.5136, 3.5568, 3.6) Volts

Table 2-77 Sensor No. 6 +5V A_MON

Feature	Raw Value/Description	Interpreted Value
Sensor Name	+5V A_MON	
Device		
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto

Table 2-77 Sensor No. 6 +5V A_MON (continued)

Feature	Raw Value/Description	Interpreted Value
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0xDF, 0xD5, 0xC8	(4.8168, 4.6008, 4.3200) Volts
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xF1, 0xF6, 0xFA	(5.2056, 5.3136, 5.4) Volts

Table 2-78 Sensor No. 7 +5V B_MON

Feature	Raw Value/Description	Interpreted Value
Sensor Name	+5V B_MON	
Device		
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-78 Sensor No. 7 +5V B_MON (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0xDF, 0xD5, 0xC8	(4.8168, 4.6008, 4.3200) Volts
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xF1, 0xF6, 0xFA	(5.2056, 5.3136, 5.4) Volts

2.4.2.2 Temperature Sensors

The following sensors measure temperatures of the FTM.

Table 2-79 Sensor No. 30 (AXP-1620) and Sensor No. 28 (AXP-1440) FTM Temp 1

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FTM Temp 1	
Device		
Sensor Type	0x01	Temperature
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable

Table 2-79 Sensor No. 30 (AXP-1620) and Sensor No. 28 (AXP-1440) FTM Temp 1 (continued)

Feature	Raw Value/Description	Interpreted Value
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3838	Upper Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Upper Non-Critical, Critical and Non-Recoverable thresholds	0x2D, 0x35, 0x3F	(48, 57, 67) Degrees C

Table 2-80 Sensor No. 31 (AXP-1620) and Sensor No. 29 (AXP-1440) FTM Temp 2

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FTM Temp 2	
Device		
Sensor Type	0x01	Temperature
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3838	Upper Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Upper Non-Critical, Critical and Non-Recoverable thresholds	0x2D, 0x35, 0x3F	(48, 57, 67) Degrees C

Table 2-81 Sensor No. 32 (AXP-1620) and Sensor No. 30 (AXP-1440) FTM Temp 3

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FTM Temp 3	
Device		
Sensor Type	0x01	Temperature
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3838	Upper Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Upper Non-Critical, Critical and Non-Recoverable thresholds	0x2D, 0x35, 0x3F	(48, 57, 67) Degrees C

Table 2-82 Sensor No. 33 (AXP-1620) and Sensor No. 31 (AXP-1440) FTM Temp 4

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FTM Temp 4	
Device		
Sensor Type	0x01	Temperature
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto

Table 2-82 Sensor No. 33 (AXP-1620) and Sensor No. 31 (AXP-1440) FTM Temp 4 (continued)

Feature	Raw Value/Description	Interpreted Value
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3838	Upper Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Upper Non-Critical, Critical and Non-Recoverable thresholds	0x2D, 0x35, 0x3F	(48, 57, 67) Degrees C

Table 2-83 Sensor No. 34 (AXP-1620) and Sensor No. 32 (AXP-1440) FTM Temp 5

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FTM Temp 5	
Device		
Sensor Type	0x01	Temperature
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable

Table 2-83 Sensor No. 34 (AXP-1620) and Sensor No. 32 (AXP-1440) FTM Temp 5 (continued)

Feature	Raw Value/Description	Interpreted Value
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3838	Upper Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Upper Non-Critical, Critical and Non-Recoverable thresholds	0x2D, 0x35, 0x3F	(48, 57, 67) Degrees C

Table 2-84 Sensor No. 35 FTM Temp 6 (AXP1620 only)

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FTM Temp 6	
Device		
Sensor Type	0x01	Temperature
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3838	Upper Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Upper Non-Critical, Critical and Non-Recoverable thresholds	0x2D, 0x35, 0x3F	(48, 57, 67) Degrees C

2.4.2.3 Fan Speed Sensors

The following sensors measure the speed of the fans of the FTM.

Table 2-85 Sensor No. 8 Fan 1

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fan 1	
Device		
Sensor Type	0x04	Fan
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x1D	Cooling Unit
Entity Instance	0x63	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x24, 0x24, 0x24	(1224, 1228, 1224) RPM
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xCE, 0xE6, 0xF2	(7004, 7820, 8228) RPM

Table 2-86 Sensor No. 9 Fan 2

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fan 2	
Device		
Sensor Type	0x04	Fan
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x1D	Cooling Unit
Entity Instance	0x63	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x24, 0x24, 0x24	(1224, 1228, 1224) RPM
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xCE, 0xE6, 0xF2	(7004, 7820, 8228) RPM

Table 2-87 Sensor No. 10 Fan 3

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fan 3	
Device		
Sensor Type	0x04	Fan
Class	0x01	Threshold

Table 2-87 Sensor No. 10 Fan 3 (continued)

Feature	Raw Value/Description	Interpreted Value
Sensor Owner LUN	0x00	
Entity ID	0x1D	Cooling Unit
Entity Instance	0x63	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x24, 0x24, 0x24	(1224, 1228, 1224) RPM
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xCE, 0xE6, 0xF2	(7004, 7820, 8228) RPM

Table 2-88 Sensor No. 11 Fan 4

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fan 4	
Device		
Sensor Type	0x04	Fan
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x1D	Cooling Unit
Entity Instance	0x63	
Rearm mode		Auto

Table 2-88 Sensor No. 11 Fan 4 (continued)

Feature	Raw Value/Description	Interpreted Value
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x24, 0x24, 0x24	(1224, 1228, 1224) RPM
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xCE, 0xE6, 0xF2	(7004, 7820, 8228) RPM

Table 2-89 Sensor No. 12 Fan 5

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fan 5	
Device		
Sensor Type	0x04	Fan
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x1D	Cooling Unit
Entity Instance	0x63	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-89 Sensor No. 12 Fan 5 (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x24, 0x24, 0x24	(1224, 1228, 1224) RPM
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xCE, 0xE6, 0xF2	(7004, 7820, 8228) RPM

Table 2-90 Sensor No. 13 Fan 6 (AXP1620 only)

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fan 6	
Device		
Sensor Type	0x04	Fan
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x1D	Cooling Unit
Entity Instance	0x63	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-90 Sensor No. 13 Fan 6 (AXP1620 only) (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x24, 0x24, 0x24	(1224, 1228, 1224) RPM
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xCE, 0xE6, 0xF2	(7004, 7820, 8228) RPM

Table 2-91 Sensor No. 14 (AXP-1620) and Sensor No. 13 (AXP-1440) Fan 1 Outlet

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fan 1 Outlet	
Device		
Sensor Type	0x04	Fan
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x1D	Cooling Unit
Entity Instance	0x63	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-91 Sensor No. 14 (AXP-1620) and Sensor No. 13 (AXP-1440) Fan 1 Outlet (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x24, 0x24, 0x24	(902, 902, 902) RPM
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xCE, 0xE6, 0xF2	(5588, 5610, 5610) RPM

Table 2-92 Sensor No. 15 (AXP-1620) and Sensor No. 14 (AXP-1440) Fan 2 Outlet

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fan 2 Outlet	
Device		
Sensor Type	0x04	Fan
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x1D	Cooling Unit
Entity Instance	0x63	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-92 Sensor No. 15 (AXP-1620) and Sensor No. 14 (AXP-1440) Fan 2 Outlet (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x24, 0x24, 0x24	(902, 902, 902) RPM
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xCE, 0xE6, 0xF2	(5588, 5610, 5610) RPM

Table 2-93 Sensor No. 16 (AXP-1620) and Sensor No. 15 (AXP-1440) Fan 3 Outlet

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fan 3 Outlet	
Device		
Sensor Type	0x04	Fan
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x1D	Cooling Unit
Entity Instance	0x63	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-93 Sensor No. 16 (AXP-1620) and Sensor No. 15 (AXP-1440) Fan 3 Outlet (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x24, 0x24, 0x24	(902, 902, 902) RPM
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xCE, 0xE6, 0xF2	(5588, 5610, 5610) RPM

Table 2-94 Sensor No. 17 (AXP-1620) and Sensor No. 16 (AXP-1440) Fan 4 Outlet

Sensor Name	Fan 4 Outlet	
Device		
Sensor Type	0x04	Fan
Class	0x01	Threshold
Feature	Raw Value/Description	Interpreted Value
Entity ID	0x1D	Cooling Unit
Entity Instance	0x63	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-94 Sensor No. 17 (AXP-1620) and Sensor No. 16 (AXP-1440) Fan 4 Outlet (continued)

Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x24, 0x24, 0x24	(902, 902, 902) RPM
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xCE, 0xE6, 0xF2	(5588, 5610, 5610) RPM

Table 2-95 Sensor No. 18 (AXP-1620) and Sensor No. 17 (AXP-1440) Fan 5 Outlet

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fan 5 Outlet	
Device		
Sensor Type	0x04	Fan
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x1D	Cooling Unit
Entity Instance	0x63	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-95 Sensor No. 18 (AXP-1620) and Sensor No. 17 (AXP-1440) Fan 5 Outlet (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x24, 0x24, 0x24	(902, 902, 902) RPM
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xCE, 0xE6, 0xF2	(5588, 5610, 5610) RPM

Table 2-96 Sensor No. 19 Fan 6 Outlet (AXP1620 only)

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fan 6 Outlet	
Device		
Sensor Type	0x04	Fan
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x1D	Cooling Unit
Entity Instance	0x63	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-96 Sensor No. 19 Fan 6 Outlet (AXP1620 only) (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x24, 0x24, 0x24	(902, 902, 902) RPM
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xCE, 0xE6, 0xF2	(5588, 5610, 5610) RPM

2.4.3 Fan Tray Module Discrete Sensors

The following tables describe these discrete sensors available on the FTM:

- *Hot Swap Sensor*
- *IPMB Link Sensor*
- *Reserved Sensor*
- *OEM-Reserved Sensors*

2.4.3.1 Hot Swap Sensor

The following table describes the discrete hot swap sensor available on the FTM.

Table 2-97 Sensor No. 0, Hot Swap

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Hot Swap	
Device		
Sensor Type	0xF0	Hot Swap
Class	0x6F	Discrete
Sensor Owner LUN	0x00	

Table 2-97 Sensor No. 0, Hot Swap (continued)

Feature	Raw Value/Description	Interpreted Value
Entity ID	0x1E	Fan Tray
Entity Instance	0x60	
Rearm Mode		Auto
Hysteresis support		
Threshold access support		
Event Message Control		Entire Sensor Only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x00FF	
Reading Type		According to PICMG 3.0

2.4.3.2 IPMB Link Sensor

The following table describes the IPMB link sensor on the FTMs.

Table 2-98 Sensor No. 2, IPMB Physical

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB Physical	
Type of Measurement		IPMB Link State
Class	0x6F	Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0x1E	
Entity Instance	0x60	
Rearm Mode		Auto
Hysteresis support		

Table 2-98 Sensor No. 2, IPMB Physical (continued)

Feature	Raw Value/Description	Interpreted Value
Threshold access support		
Event Message Control		Entire Sensor Only
Readable threshold mask, Settable threshold mask (bytes 19, 20)		
Reading Type		According to PICMG 3.0

2.4.3.3 Reserved Sensor

The following table describes the reserved sensor available on the FTM.

Table 2-99 Sensor No. 1 Version change

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Version change	
Type of Measurement		
Class	0x6F	Discrete
Sensor Type	0x2B	Reserved
Sensor Owner LUN	0x00	
Entity ID	0x03	
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x00FF	
Deassertion Event Mask (bytes 17,18)	0x0000	
Discrete Reading Mask (bytes 19, 20)	0x00FF	Supports 2 States
Reading Definition		According to Pigeon Point

2.4.3.4 OEM-Reserved Sensors

The following table describes the OEM-reserved sensors available on the FTM. The format of Sensors 20 through 25 is FanFault ZxFy, where x is the Zone number, and y is the Fan Unit number. The format of Sensors 26 to 29 is FuseFail 48Vxy, where x is Feed A or B, and y is Input 1 or 2.

Table 2-100 Sensor No. 20 (AXP-1620) and Sensor No. 18 (AXP-1440) FanFault Z1F1

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FanFault Z1F1	
Type of Measurement		
Class	0x03	Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 States
Reading Definition		Assertion signals a fan controller fault

Table 2-101 Sensor No. 21 (AXP-1620) and Sensor No. 19 (AXP-1440) FanFault Z1F2

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FanFault Z1F2	
Type of Measurement		
Class	0x03	Discrete
Sensor Type	0xC0	OEM-reserved

Table 2-101 Sensor No. 21 (AXP-1620) and Sensor No. 19 (AXP-1440) FanFault Z1F2 (continued)

Feature	Raw Value/Description	Interpreted Value
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 States
Reading Definition		Assertion signals a fan controller fault

Table 2-102 Sensor No. 22 (AXP-1620) and Sensor No. 20 (AXP-1440) FanFault Z1F3

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FanFault Z1F3	
Type of Measurement		
Class	0x03	Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-102 Sensor No. 22 (AXP-1620) and Sensor No. 20 (AXP-1440) FanFault Z1F3 (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 States
Reading Definition		Assertion signals a fan controller fault

Table 2-103 Sensor No. 23 (AXP-1620) and Sensor No. 21 (AXP-1440) FanFault Z2F1

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FanFault Z2F1	
Type of Measurement		
Class	0x03	Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 States
Reading Definition		Assertion signals a fan controller fault

Table 2-104 Sensor No. 24 (AXP-1620) and Sensor No. 22 (AXP-1440) FanFault Z2F2

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FanFault Z2F2	
Type of Measurement		
Class	0x03	Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 States
Reading Definition		Assertion signals a fan controller fault

Table 2-105 Sensor No. 25 (AXP-1620) and Sensor No. 23 (AXP-1440) FanFault Z2F3

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FanFault Z2F3	
Type of Measurement		
Class	0x03	Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-105 Sensor No. 25 (AXP-1620) and Sensor No. 23 (AXP-1440) FanFault Z2F3 (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 States
Reading Definition		Assertion signals a fan controller fault

Table 2-106 Sensor No. 26 (AXP-1620) and Sensor No. 24 (AXP-1440) FuseFail 48VA1

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FuseFail 48VA1	
Type of Measurement		
Class	0x03	Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 States
Reading Definition		Assertion signals a fuse failure

Table 2-107 Sensor No. 27 (AXP-1620) and Sensor No. 25 (AXP-1440) FuseFail 48VA2

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FuseFail 48VA2	
Type of Measurement		
Class	0x03	Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 States
Reading Definition		Assertion signals a fuse failure

Table 2-108 Sensor No. 28 (AXP-1620) and Sensor No. 26 (AXP-1440) FuseFail 48VB1

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FuseFail 48VB1	
Type of Measurement		
Class	0x03	Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-108 Sensor No. 28 (AXP-1620) and Sensor No. 26 (AXP-1440) FuseFail 48VB1 (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 States
Reading Definition		Assertion signals a fuse failure

Table 2-109 Sensor No. 29 (AXP-1620) and Sensor No. 27 (AXP-1440) FuseFail 48VB2

Feature	Raw Value/Description	Interpreted Value
Sensor Name	FuseFail 48VB2	
Type of Measurement		
Class	0x03	Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Supports 2 States
Reading Definition		Assertion signals a fuse failure

2.5 Power Entry Module Sensor Data Records

This section describes in detail all available IPMI sensors of the Power Entry Module.

2.5.1 PEM FRU Information

There are two PEMs; one at IPMB address 0x66 and another at IPMB address 0x68. The main FRU (FRU 0) contains the FRU information of the PEM and it is the same for both PEMs (except for the serial number). FRU 1 contains the FRU information that the active SAM caches as FRU 254 of IPMB address 0x20.

The FRU 0 information in a PEM1000 is represented in the next table.

```
Pigeon Point Shelf Manager Command Line Interpreter

66: FRU # 0, FRU Info

Common Header:    Format Version = 1

Board Info Area:

    Version     = 1

    Language Code            = 25

    Mfg Date/Time           = Jan  1 00:00:00 2006 (5260320 minutes since
1996)

    Board Manufacturer       = Motorola

    Board Product Name       = PEM1000

    Board Serial Number      = 1234567890

    Board Part Number        = 01-W2330F11A

    FRU Programmer File ID   = PEM1000R.inf

Product Info Area:

    Version     = 1

    Language Code            = 25

    Manufacturer Name        = Motorola

    Product Name             = AXP Power Entry Module

    Product Part / Model#    = PEM1000

    Product Version          = Rev. 01

    Product Serial Number    = 1234567890
```

```
Asset Tag                =

FRU Programmer File ID   = PEM1000R.inf
```

2.5.2 E-Keying

The Power Entry Module does not have e-keyed backplane interfaces, and as a result the FRU information for the PEM does not contain a PICMG Point-to-Point Connectivity Record.

2.5.3 Power Configuration

The next table describes the power configuration for the PEMs.

Table 2-110 Power Configuration for PEMs

Item	Value	Description
Dynamic power reconfiguration support	No	Possibility to change FRU power consumption without switching it off, according to AdvancedTCA
Dynamic power configuration	No	Are the power draw levels fixed or these may vary if additional components are hot inserted or onboard component power consumption is changing dynamically
Number of power draw levels	1	The amount of possible power levels, normally 1
Early power draw levels, watt	0.1	Complete early power level including IPMC
Steady state power draw levels, watt	0.1	Complete steady power consumption including IPMC
Transition from early to steady levels in seconds	0	How long does board consume early power. Early power is normally bigger than steady power

2.5.4 Power Entry Module Sensor Overview

The following table lists all IPMI sensors available on the Power Entry Module.

Table 2-111 IPMI Sensors on the PEM

Sensor No.	Sensor Name	Type of Measurement	What does it measure?	Sensor Type	Availability
0	Hot Swap	Status	State of FRU	Discrete	Always
1	IPMB Physical	Status	State of IPMB link	Discrete	Always
2	+3.3V	Voltage		Analog	Always
3	+12V Measure	Voltage		Analog	Always
4	+5V Measure	Voltage		Analog	Always
5	+12V CC	Voltage			
6	CB 1	Status	Circuit Breaker fuse state	OEM-reserved	Always
7	CB 2	Status	Circuit Breaker fuse state	OEM-reserved	Always
8	FUSE 1	Status	Hardware fuse	OEM-reserved	Always
9	FUSE 2	Status	Hardware fuse	OEM-reserved	Always
10	FUSE 3	Status	Hardware fuse	OEM-reserved	Always
11	FUSE 4	Status	Hardware fuse	Analog	Always
12	LM73 Temp	Temperature		Analog	Always
13	48.0V FEED_1	Voltage		Analog	Always

Table 2-111 IPMI Sensors on the PEM (continued)

Sensor No.	Sensor Name	Type of Measurement	What does it measure?	Sensor Type	Availability
14	48.0V FEED_2	Voltage		Analog	Always
15	PEM LFC Status	Management Subsystem Shelf		Discrete	Always
16	Current Measure1	Current		Analog	Always
17	Current Measure2	Current		Analog	Always

2.5.5 Power Entry Module Analog Sensors

The analog sensors available on the PEM can be divided into the following three categories:

- *Voltage Sensors*
- *Current Sensors*
- *Temperature Sensor*

2.5.5.1 Voltage Sensors

The following sensors measure voltages of the PEM.

Table 2-112 Sensor No. 2 +3.3V

Feature	Raw Value/Description	Interpreted Value
Sensor Name	+3.3V	
Device		
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto

Table 2-112 Sensor No. 2 +3.3V (continued)

Feature	Raw Value/Description	Interpreted Value
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F, 0x3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0xD8, 0xD4, 0xD1	(3.1104, 3.0528, 3.0096) Volts
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xF4, 0xF7, 0xFA	(3.5136, 3.5568, 3.6) Volts

Table 2-113 Sensor No. 3 +12V Measure

Feature	Raw Value/Description	Interpreted Value
Sensor Name	+12V Measure	
Device		
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-113 Sensor No. 3 +12V Measure (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0xD4, 0xCA, 0xC1	(11.024, 10.504, 10.036) Volts
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xFA, 0xFF, 0xFF	(13, 13.26, 13.26) Volts

Table 2-114 Sensor No. 4 +5V Measure

Feature	Raw Value/Description	Interpreted Value
Sensor Name	+5V Measure	
Device		
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-114 Sensor No. 4 +5V Measure (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0xDF, 0xDA, 0xD1	(4.8168, 4.7088, 4.5144) Volts
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xF6, 0xFA, 0xFF	(5.3136, 5.4, 5.508) Volts

Table 2-115 Sensor No. 5 +12V CC

Feature	Raw Value/Description	Interpreted Value
Sensor Name	+12V CC	
Device		
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-115 Sensor No. 5 +12V CC (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0xD4, 0xCA, 0xC1	(11.024, 10.504, 10.036) Volts
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xFA, 0xFF, 0xFF	(13, 13.26, 13.26) Volts

Table 2-116 Sensor No. 13, 48.0V FEED_1

Feature	Raw Value/Description	Interpreted Value
Sensor Name	48.0V FEED_1	
Device		
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-116 Sensor No. 13, 48.0V FEED_1 (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x84, 0x77, 0x71	(42.24, 38.08, 36.16) Volts
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xE1, 0xEB, 0xEE	(72, 75.20, 76.16) Volts

Table 2-117 Sensor No. 14, 48.0V FEED_2

Feature	Raw Value/Description	Interpreted Value
Sensor Name	48.0V FEED_2	
Device		
Sensor Type	0x02	Voltage
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable
Event message control		Entire Sensor only

Table 2-117 Sensor No. 14, 48.0V FEED_2 (continued)

Feature	Raw Value/Description	Interpreted Value
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3F3F	Upper and Lower Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Lower Non-Critical, Critical and Non-Recoverable thresholds	0x84, 0x77, 0x71	(42.24, 38.08, 36.16) Volts
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xE1, 0xEB, 0xEE	(72, 75.20, 76.16) Volts

Table 2-118 Sensor No. 15 PEM LFC Status

Feature	Raw Value/Description	Interpreted Value
Sensor Name	PEM LFC Status	
Device		
Sensor Type	0x28	Management Subsystem Health
Class	0x06	Discrete
Sensor Owner LUN	0x00	
Entity ID	0x0a	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only
Assertion Event Mask (bytes 15,16)	0x03, 0x00	
Deassertion Event Mask (bytes 17,18)	0x00, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	
Reading Definition		OEM

The PEM LFC sensor will generate assertion events for faults and clearing faults.

- Event data Byte 1

Possible offsets are as follows:

0xA0: sensor access degraded or unavailable

0x00: No Fault

- Event Data Byte 2 (See Note on hierarchy)

0x00: No Fault

0x50: Circuit Breaker Fault

0x51: Oscillation Dampener Fuse 1 Fault

0x52: Oscillation Dampener Fuse 2 Fault

0x5F: All Oscillation Dampener Fuses Fault

0x60: Low Priority Fault: Slave IPMC communications loss

0x61: Low Priority Fault: Hardware address check fault

0x62: Low Priority Fault: Slave Temperature sensor unavailable

0x63: Low Priority Fault: Slave Temperature sensor read error or over/under temperature condition

- Event Data Byte 3: (Failure Causes)
  0x00: No Errors (OEM)
  0x07: Incorrect Value (OEM)

Following are the examples of SEL log entries:

- Oscillation Dampener Fuse 2 Fault:

"0x007C: Event: at Jan 1 00:29:19 1970; from: (0x66,0,0);sensor: (0x28,15);event:0x6(asserted): 0xA0 0x52 0x07"

- All LFC Faults Cleared:

"0x00E4: Event: at Jan 1 00:42:13 1970; from: 0x66,0,0);sensor: (0x28,15);event:0x6(asserted):0x00 0x00 0x00"

- PEM LFC Sensor Status:

Performance Met state: When all faults are cleared

Performance Lags state: When any faults are active

The LFC sensor is run every 3 minutes.

NOTE: Only the highest active hierarchy code in Event Data Byte 2 is asserted at one time.

The hierarchy is as follows:

0x5F, 0x52, 0x51, 0x50, 0x60, 0x61, 0x63, 0x00

2.5.5.2 Current Sensors

The following table describes the sensors that measures the +12V current on the PEM

Table 2-119 Sensor No. 16 Current Measure1

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Current Measure1	
Device		
Sensor Type	0x03	Current
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable

Table 2-119 Sensor No. 16 Current Measure1 (continued)

Feature	Raw Value/Description	Interpreted Value
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3838	Upper Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xB4, 0xB8, 0xBE	(75, 77, 80) Amps

Table 2-120 Sensor No. 17 Current Measure2

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Current Measure2	
Device		
Sensor Type	0x03	Current
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable

Table 2-120 Sensor No. 17 Current Measure2 (continued)

Feature	Raw Value/Description	Interpreted Value
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3838	Upper Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Upper Non-Critical, Critical and Non-Recoverable thresholds	0xB4, 0xB8, 0xBE	(75, 77, 80) Amps

Table 2-121 Sensor No. 8 Fuse 1

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fuse 1	
Type of Measurement		Monitors for Fuse Failure.
Class		Discrete
Event/Reading Type	0x03	'digital' Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-121 Sensor No. 8 Fuse 1 (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Current state mask 0x0002: Asserted Current state mask 0x0001: Deasserted
Reading Definition		According to Pigeon Point

Table 2-122 Sensor No. 9 Fuse 2

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fuse 2	
Type of Measurement		Monitors if the Circuit Breaker has been opened.
Class		Discrete
Event/Reading Type	0x03	'digital' Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-122 Sensor No. 9 Fuse 2 (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Current state mask 0x0002: Asserted Current state mask 0x0001: Deasserted
Reading Definition		According to Pigeon Point

Table 2-123 Sensor No. 10 Fuse 3

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fuse 3	
Type of Measurement		Monitors if the Circuit Breaker has been opened.
Class		Discrete
Event/Reading Type	0x03	'digital' Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-123 Sensor No. 10 Fuse 3 (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Current state mask 0x0002: Asserted Current state mask 0x0001: Deasserted
Reading Definition		According to Pigeon Point

Table 2-124 Sensor No. 11 Fuse 4

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Fuse 4	
Type of Measurement		Monitors if the Circuit Breaker has been opened.
Class		Discrete
Event/Reading Type	0x03	'digital' Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Event message control		Entire Sensor only

Table 2-124 Sensor No. 11 Fuse 4 (continued) (continued)

Feature	Raw Value/Description	Interpreted Value
Assertion Event Mask (bytes 15,16)	0x02, 0x00	
Deassertion Event Mask (bytes 17,18)	0x02, 0x00	
Discrete Reading Mask (bytes 19, 20)	0x03, 0x00	Current state mask 0x0002: Asserted Current state mask 0x0001: Deasserted
Reading Definition		According to Pigeon Point

2.5.5.3 Temperature Sensor

The following tables describe the temperature sensor available on the PEMs.

Table 2-125 Sensor No. 12 LM73 Temp

Feature	Raw Value/Description	Interpreted Value
Sensor Name	LM73 Temp	
Device		
Sensor Type	0x01	Temperature
Class	0x01	Threshold
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm mode		Auto
Hysteresis support		Readable/Settable
Threshold access support		Readable/Settable

Table 2-125 Sensor No. 12 LM73 Temp (continued)

Feature	Raw Value/Description	Interpreted Value
Event message control		Entire Sensor only
Readable threshold mask, Settable threshold mask (bytes 19, 20)	0x3838	Upper Non-Critical, Critical and Non-Recoverable Thresholds are Readable and Settable
Reading Type		Unsigned
Upper Non-Critical, Critical and Non-Recoverable thresholds	0x17, 0x23, 0x2E	(40.48, 61.60, 80.96) degrees C

2.5.6 Power Entry Module Discrete Sensors

The following tables describe these discrete sensors available on the PEM:

- *Hot Swap Sensor*
- *IPMB Link Sensor*
- *Circuit Breaker State Sensors*

2.5.6.1 Hot Swap Sensor

The following table describes the discrete hot swap sensor available on the PEM.

Table 2-126 Sensor No. 0, Hot Swap

Feature	Raw Value/Description	Interpreted Value
Sensor Name	Hot Swap	
Device		
Sensor Type	0xF0	Hot Swap
Class	0x6F	Discrete
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm Mode		Auto

Table 2-126 Sensor No. 0, Hot Swap (continued)

Feature	Raw Value/Description	Interpreted Value
Hysteresis support		
Threshold Access support		
Event Message Control		Entire Sensor Only
Readable threshold mask, Settable threshold mask (bytes 19,20)	0x00FF	
Reading Type		According to PICMG 3.0

2.5.6.2 IPMB Link Sensor

The following table describes the IPMB link sensor on the PEMs.

Table 2-127 Sensor No. 1, IPMB Physical

Feature	Raw Value/Description	Interpreted Value
Sensor Name	IPMB Physical	
Type of Measurement		IPMB Link State
Class	0x6F	Discrete
Event/Reading Type	0x6F	Sensor-specific
Sensor Type	0xF1	IPMB Link
Sensor Owner LUN	0x00	
Entity ID	0x0A	
Entity Instance	0x60	
Rearm Mode		Auto
Hysteresis support		
Threshold access support		
Event Message Control		Entire Sensor Only
Readable threshold mask, Settable threshold mask (bytes 19, 20)		
Reading Type		According to PICMG 3.0

2.5.6.3 Circuit Breaker State Sensors

The following tables describe the OEM circuit breaker state sensors available on the PEM.

Table 2-128 Sensor No. 6, CB 1

Feature	Raw Value/Description	Interpreted Value
Sensor Name	CB 1	
Type of Measurement		Monitors if the circuit breaker has been opened.l
Class		Discrete
Event/Reading Type	0x03	Digital Discrete
Sensor Type	0xC0	OEM-reserved
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance	0x60	
Rearm Mode		Auto
Event Message Control		Entire Sensor only
Assertion Event Mask (byte 15, 16)	0x02, 0x00	
Deassertion Event Mask (byte 17, 18)	0x02, 0x00	
Discrete Reading Mask (byte 19, 20)	0x03, 0x00	Supports 2 States
Reading Definition		According to Pigeon Point

Table 2-129 Sensor No. 7 CB 2

Feature	Raw Value/Description	Interpreted Value
Sensor Name	CB 2	
Type of Measurement		Monitors if the circuit breaker has been opened.l
Class		Discrete
Event/Reading Type	0x03	Digital Discrete
Sensor Type	0xC0	OEM-reserved

Table 2-129 Sensor No. 7 CB 2 (continued)

Feature	Raw Value/Description	Interpreted Value
Sensor Owner LUN	0x00	
Entity ID	0x0A	Power Supply
Entity Instance		
Rearm Mode		Auto
Event Message Control		Discrete State Event Enable/Disable
Assertion Event Mask (byte 15, 16)	0x02, 0x00	State Deasserted State Asserted
Deassertion Event Mask (byte 17, 18)	0x02, 0x00	State Deasserted State Asserted
Discrete Reading Mask (byte 19, 20)	0x03, 0x00	Supports 2 Successive States
Reading Definition		According to IPMI 1.5

OEM Sensors

This section describes the various OEM sensors provided by SMART Embedded Computing and Pigeon Point Systems that are located on the SAM.

These sensors are added to provide additional capabilities to diagnose shelf conditions. For few sensors, events (posted to the SEL event log and sent via IPMI to subscribers such as the ATCA-F120) can be used to further refine diagnosis. When OEM sensors provide events, the event data is also described in the sections that follow.

Following are the sensors presented by the Physical SAM (IPMI Addresses 0xFC and 0XFE):

- *AXP Backplane ID Sensor (SMART EC OEM)*
- *Fault Event Sensor (SMART EC OEM)*
- *POST Results Sensor (SMART EC OEM)*
- *Shelf FRU Info (SMART EC OEM)*
- *Hot Swap Controller Status (SMART EC OEM)*
- *Fan Tray Full Speed Status Sensor (SMART EC OEM)*
- *FPGA Build Rev Sensor (SMART EC OEM)*
- *Port Status Sensor (SMART EC OEM)*
- *CPLD State Sensor (SMART EC OEM)*
- *Reboot Reason Sensor (Pigeon Point OEM)*

Following are the sensors presented by the Virtual Shelf Manager (IPMI Address 0x20):

- *ShM Fault Event Sensor (SMART EC OEM)*
- *Telco Alarms (Pigeon Point OEM)*

3.1 AXP Backplane ID Sensor (SMART EC OEM)

This sensor reports the ID number of the IPMB backplane type. The AXP1440 and AXP1620 contain a readable value which reports a unique identifier of the backplane type. While the main purpose of this sensor is to report the unique ID of the backplane, it can also be used to determine if a SAM has connectivity problems to the backplane. This sensor is available on each physical ShMM controller.

- Sensor Reading - Unique identification number of the backplane
  `0x03: AXP1620`
  `0x04: AXP1440`
  `0x05: AXP1420`
- Current State Mask - `0x00 = No failure reading ID`
  `0x01 = ECC check failed on read value`
- Events - No events are generated by this sensor.

3.2 Fault Event Sensor (SMART EC OEM)

This sensor reports the status of various software-detectable faults on the physical SAM and ShM cards. The presence of one of these faults typically indicates a failure of one or more components on the cards.

When such a fault is detected, a bit in the State Mask in this sensor is raised, and an event is issued. Often, the data present in the event contains additional information as to the cause of the fault.

By default, if a fault is detected on an active ShM and there is a backup ShM available for duty, most of these faults cause the ShM to reboot (thus, effecting a switchover to the backup ShM).The behavior of the ShM can be configured to not reboot by configuring the Severity of Fault Classes. (See the clia faultcfg command in clia application.)

Once a fault is detected, the bit remains on in the Fault Sensor State Mask until the fault is cleared. If cleared, a deassertion event is generated and the State Mask bit is also cleared.

- Sensor Reading - No meaning; always 0.
- Current State Mask - A bit-map of Fault Classes currently detected as active, according to the following table.

Table 3-1 Fault Event Active Fault Classes

State (Fault Class)	Bit Mask	Meaning	Comments
0	0x0001	Switchover Initiated	Event contains additional information regarding the cause of the switchover (see below).
1	0x0002	FPGA CRC Error	Indicates failure in SAM1500 FPGA. Software attempts to clear the CRC error before rebooting.
2	0x0004	PCI Bus Failure	Inability to read a basic register. Event contains additional information regarding the specific failure.
3	0x0008	ADM1024 Unreadable	Event contains additional information.
4	0x0010	Telco Alarm Unreadable	Event contains additional information.
5	0x0020	FRU Presence Unreadable	Inability to read a basic register.
6	0x0040	Shelf ID Unreadable	Inability to read a basic register.
7	0x0080	HW Addr Unreadable	Inability to read a basic register.
8	0x0100	IPMB Locked	IPMB subsystem has failed. Event contains additional information.
9	0x0200	No Redundancy Ethernet	The Ethernet connection to the other ShM has failed.
10	0x0400	No Hub Backplane Ethernet	The Ethernet to the hub backplane (ATCA-F120s) has failed. Event contains additional information.
11	0x0800	Critical Voltage	One or more voltage sensors on the ShM are critical. Events (for this and voltage sensor) contain additional information.
12	0x1000	FruInfo EEPROM failure	EEPROM (either on the SAM or on the ADP) is unreadable or fail the CRC check. Event contains additional information.

- Events - An event is generated on each transition for any Fault Class, either for transitioning into or away from a fault condition. For many Fault Classes, additional information is provided in the event to categorize the fault.
  Event Assertion flag: The assertion flag is set if any aspect of the Fault Class being reported is in a fault state. It is clear ("deasserted") if the Fault Class is transitioning into a non-fault state.
  Event Byte 1: bits 7-4: "0110"
  bits 3-0: The Fault Class transitioning

  Event Byte 2: bits 7-4: The severity of the fault condition (configurable by clia faultcfg)
  0000 – none (only on clearing/deassertion events)
  0001 – minor (reported, no action)
  0010 – major (system reboots only if active SHM with backup SHM available)
  0011 – critical (SHM reboots ~ 1 second following event)
  bits 3-0: "1111"

  Event Byte 3: meaning depends on fault class, according to the following table:

Table 3-2 Event Byte 3 Fault Class

Fault Class	Event Byte 3
0	Defines cause of switchover: 0x00: clia terminate command 0x01: clia switchover command performed at local ShMM 0x02: clia switchover command performed at other ShMM 0x03: failed redundancy protocol (backup ShMM only) 0x04: active and backup ShMMs are reporting incompatible carriers 0x05: IPMC command 0x06: clia switchover from standby 0x07: clia terminate without net down 0x08: clia terminate with no reboot
1	0x01: FPGA CRC error detected
2	Bit-mask of sub-classes: 0x01: PCI Failure reading CRC Error register 0x02: PCI Failure reloading FPGA 0x04: PCI Failure reading FRU Presence
3	0xFF: No I2C Device Other: Register Address of unreadable ADM1024 register

Table 3-2 Event Byte 3 Fault Class (continued)

Fault Class	Event Byte 3
4	Bit-mask of sub-classes: 0x01: Telco Alarm Relay Register unreadable 0x02: Telco Alarm LED Register unreadable 0x04: Telco Alarm Cutoff Register unreadable
5	0x01
6	0x01
7	Bit-mask of sub-classes: 0x01: Failure to read HA0 0x02: Failure to read HA1
8	Bit-mask of sub-classes: 0x01: IPMB status register unreadable 0x02: All IPMBs report SDA stuck low 0x04: All IPMBs report SCL stuck low
9	0x01
10	Bit-mask of sub-classes: 0x01: eth interface (to Broadcom Switch) is 'down' 0x02: Broadcom Switch reports memory test failure
11	Bit-mask of sub-classes: 0x01: 3.3V 0x02: 3.3V to ADP 0x04: Combined 12V 0x08: 1.8V Eth 0x10: 1.2V FPGA
12	Bit-mask of sub-classes: 0x01: Carrier Info EEPROM, Open File error 0x02: Carrier Info EEPROM, Read error 0x04: Carrier Info EEPROM, CRC error 0x08: Shelf Fru EEPROM 1 Access error 0x10: Shelf Fru EEPROM 1 CRC error 0x20: Shelf Fru EEPROM 2 Access error 0x40: Shelf Fru EEPROM 2 CRC error 0x80: Shelf FRU EEPROMs have different data

3.3 POST Results Sensor (SMART EC OEM)

This sensor reports the results of the U-Boot POST tests. This sensor is available on each physical ShMM controller. POST results are reported in an 8-bit -field. Any bit that is set (set to 1) indicates that the respective POST failure occurred.

- Sensor Reading - POST State in a 8-bit value according to the following mask definition:

```
Bit 7 - RTC
Bit 6 - Watchdog
Bit 5 - CRC
Bit 4 - Ethernet
Bit 3 - UART
Bit 2 - I2C
Bit 1 - Memory
Bit 0 - IPMB
```

- Current State Mask - `0x01 = POST Passed`
  `0x02 = POST Failed`

- Events - Events are generated at shelf manager start up that will report failure events for each individual test that fails as follows:

```
Event Data Byte 1 = 0x61
Event Data Byte 2 = 0x3F
POST Sensor Reading = Bit 0 (IPMB)
                      Bit 1 (Memory)
                      Bit 2 (I2C)
                      Bit 3 (UART)
                      Bit 4 (Ethernet)
                      Bit 5 (CRC)
                      Bit 6 (Watchdog)
                      Bit 7 (RTC)
```

3.4 Shelf FRU Info (SMART EC OEM)

This sensor reports the validity of the Shelf FRU Information. This sensor is available on active ShMM controller.The check it performs is basic checksum and length checks based on information of previous sections of the FRU area; and key bytes that are expected to have certain values.

- Sensor Reading - 0x00 (meaningless since discrete sensor reading)

- Current State Mask - `0x01 Shelf FRU Info not found (Disabled)`
  `0x02 Shelf FRU Info found (Enabled)`

- Events - Events are generated when the state of the FRU Info found state changes.

Event Data Byte 1 = `0x01 Shelf FRU Info not found (Disabled)`
`0x02 Shelf FRU Info found (Enabled)`

Event Data Byte 2 = 0xFF (Unspecified)

Event Data Byte 3 = 0xFF (Unspecified)

3.5 Hot Swap Controller Status (SMART EC OEM)

These sensors provide a snapshot of the Status registers on the LTC4260 Hot Swap Controller devices on the SAM1500. There are two LTC4260 devices, labeled “A” and “B” for the two power sources.

Some of the bits in this status register signify error conditions. When the state of an error-related bit changes, an event (either an “assertion” or “deassertion”) is generated on behalf of these sensors.

- Sensor Reading - No meaning; always 0.
- Current State Mask - A bit-map according to the following table.

State	Bit Mask	Meaning	Error Related?
0	0x0001	Overvoltage	Y
1	0x0002	Undervoltage	Y
2	0x0004	Overcurrent	Y
3	0x0008	Power Bad	Y
4	0x0010	Board Present	N
5	0x0020	FET Short	Y
6	0x0040	GPIO Input	N
7	0x0080	FET On	N

- Events - An event is generated on each transition for any error-related state change, either transitioning into or away from a fault condition. Event Byte data bits 2 and 3 are 0xFF (undefined).

3.6 Fan Tray Full Speed Status Sensor (SMART EC OEM)

The SAM design provides for a pair of hardware signals which may be driven by the SAM1500 to force the Fan Trays to Full Speed. One signal controls the upper fan tray module and the other controls the lower fan tray module. These signals are used rarely (only in case of error conditions). This sensor provides a way of viewing whether this SAM is asserting each signal.

No events are generated on behalf of this sensor.

- Sensor Reading -
  0x00: No FTMs Full Speed
  0x01: Lower FTM Full Speed
  0x02: Upper FTM Full Speed
  0x03: Both FTMs Full Speed
- Current State Mask - No meaning, always 0

3.7 FPGA Build Rev Sensor (SMART EC OEM)

The SAM1500 contains a programmable FPGA which controls access to many devices, including IPMBs. This sensor provides Build Revision information on the firmware currently loaded into the SAM1500's FPGA.

No events are generated on behalf of this sensor.

- Sensor Reading -
  bits 7:4 Major version number (BCD)
  bits 3:0: Minor version number (BCD)
- Current State Mask - No meaning, always 0

3.8 Port Status Sensor (SMART EC OEM)

This sensor provides information on port status (link up/down) on various auxiliary ports on the SAM.

In some cases ('Inter-SAM' Serial Port Status), the lack of a link (when the other ShM is present) could indicate a real problem. In other cases, the port status is informational (such as Front Panel Ethernet, which merely reports whether the Ethernet connector is connected).

- Sensor Reading - 0, no meaning

- Current State Mask - A bit-map according to the following table.

State	Bit Mask	Meaning
0	0x0001	Inter-SAM Serial Link 1 Down
1	0x0002	Inter-SAM Serial Link 2 Down
8	0x0100	Local Hub Slot Ethernet Down
9	0x0200	Remote Hub Slot Ethernet Down
10	0x0400	Front Panel Ethernet Down

- Events - An event is generated on each transition for any state bit, (“Asserted” for transitioning to link-down, “Deasserted” for transitioning to link-up). Event Byte data bits 2 and 3 are 0xFF (undefined).

3.9 CPLD State Sensor (SMART EC OEM)

This sensor provides information on the CPLD register contents. The CPLD register defines several status bits relating to redundancy-readiness of the system.

- Sensor Reading - correspond to bits 15-8 of the CPLD register
- Current State Mask - A bit-map according to the following table:

State	Bit Mask	Meaning
0	0x0001	Active ShM with no backup
1	0x0002	Active ShM with backup
2	0x0004	Backup ShM
4	0x0010	Backup, No Remote Presence
5	0x0020	Backup, No Remote SWR
6	0x0040	Backup, Active Healthy
7	0x0080	Active, No Remote Presence
8	0x0100	Active, No Remote Healthy
9	0x0200	Active, No Active
10	0x0400	No Local Presence
11	0x0800	Active, No Backup Remote Healthy
12	0x1000	Active, No Backup Remote SWR
13	0x2000	Active set on both

- Events - An event is generated on each transition.

3.10 Reboot Reason Sensor (Pigeon Point OEM)

This sensor provides information on the reason that the SAM was last reset or rebooted.

- Sensor Reading - 0, no meaning
- Current State Mask - A bit-map according to the following table:

State	Bit Mask	Meaning
0	0x0001	reboot reason unknown
1	0x0002	due to switchover
2	0x0004	forced switchover
3	0x0008	CLI command terminate
4	0x0010	loss of healthy bit
5	0x0020	loss of active bit
6	0x0040	redundancy link lost but active SAM still active
7	0x0080	error at shelf manager startup
8	0x0100	ShMM hardware watchdog
9	0x0200	initiated by software (i.e., reboot command)
10	0x0400	ShMM power cycled

- Events - No events are presented from this sensor.

3.11 ShM Fault Event Sensor (SMART EC OEM)

This sensor reports the status of Fault Classes on the Active shelf. When the value is read it indicates the presence or absence of each fault class. Currently defined fault classes relate to the health of the FTMs in the shelf.

- Sensor Reading - This is a 2-byte bit mask of active fault conditions detected by the sensor. A '1' in any bit indicates the specified fault is active. Refer to the following table for fault classes.
- Current State Mask - `0x1FE - mask of possible fault event bits`
- Events - For FTM-related faults, an event is generated when any FTM transitions into or out of a fault condition. An event is flagged as an assertion event when at least one FTM exhibits the fault class. It is flagged as a deassertion event when no FTMs remain with the fault class. Event data 1 provides the fault class details. Event data 2 notifies which Fan in

the Lower fan tray (0x58) has reported the fault and Event data 3 notifies which Fan in the Upper fan tray (0x56) has reported the fault.

The following table contains fault-class information of Event data 1.

State (Fault Class)	Bit Mask	Meaning
0	0x0001	One or more fan trays are missing
1	0x0002	One or more fan speed sensors are at or above critical level.
2	0x0004	One or more fan trays' speed sensors do not show significant increase when the active shelf manager asserts FULL_SPEED signal as part of the Fan Tray Latent Fault Check algorithm. (Active FULL_SPEED test)
3	0x0008	One or more fan trays' speed sensors do not return to a normal speed following the release of FULL_SPEED signal by the active shelf manager, as part of the Fan Tray Latent Fault Check algorithm. (Active FULL_SPEED test)
4	0x0010	One or more fan trays' speed sensors do not show significant increase when the redundant shelf manager asserts FULL_SPEED signal as part of the Fan Tray Latent Fault Check algorithm. (Redundant FULL_SPEED test)
5	0x0020	One or more fan trays' speed sensors do not return to a normal speed following the release of FULL_SPEED signal by the active shelf manager, as part of the Fan Tray Latent Fault Check algorithm. (Redundant FULL_SPEED test)
6	0x0040	One or more fan trays' speed sensors do not show significant increase when the active shelf manager increases the speed level to its maximum value as part of the Fan Tray Latent Fault Check algorithm. (PSOC LFC test)
7	0x0080	One or more fan trays' speed sensors do not return to a normal speed following the lowering of the speed level by the active shelf manager, as part of the Fan Tray Latent Fault Check algorithm. (PSOC test)

3.12 Telco Alarms (Pigeon Point OEM)

The ShM implements the alarm generation mechanism as part of the platform event filtering (PEF) framework. An OEM action in PEF is implemented as alarm generation. The ShM implements the alarm sensor in its own sensor space. The sensor type for this sensor is OEM specific, currently chosen to be DFh. The sensor is a discrete sensor with three states:

- State 0 reflects the presence of the Critical alarm
- State 1 reflects the presence of the Major alarm
- State 2 reflects the presence of the Minor alarm

Changes in the states of this sensor may be mapped to events using regular IPMI mechanisms.

Subsequently, platform event filtering may be used to specify actions, such as chassis reset or power cycle, that should be invoked for these events, or alerts to be sent to remote destinations (including the System Manager).

The alarm sensor is recorded in the device SDR repository maintained by the ShM. The command Re-Arm Sensor Events can be used by the ShM to clear active Major and Minor alarms.

The ShM tracks the current state of alarms and the alarm cutoff input line and modifies the state of alarm LEDs accordingly. When the alarm cutoff signal gets activated, the ShM stops generating the alarms to the external output, but maintains the alarm state internally. The alarm LED(s) is (are) left blinking during that time. When the alarm cutoff signal gets deactivated, the state of external outputs and LEDs is restored according to the current state of the alarms (Minor and Major alarms may still be cleared while alarm cutoff is active).

Alarm cutoff is deactivated automatically after a timeout defined as a configuration parameter (see PPS user guide for the Shmm 500 for more details about TELCO Alarms configuration parameters).

Related Documentation

A.1 SMART Embedded Computing Documentation

The documentation listed is referenced in this manual. Technical documentation can be found by using the Documentation Search at *https://www.smartembedded.com/ec/support/* or you can obtain electronic copies of SMART EC documentation by contacting your local sales representative.

Table A-1 SMART EC Documentation

Document Title	Publication Number
Centellis 4440/4620 Release 1.0 Document Collection	6806800G48
Pigeon Point Shelf Manager User Guide, Release 2.5.3	6806800G49
Pigeon Point Shelf Manager External Interface Reference, Release 2.5.3	6806800G50
ATCA-F120 Installation and Use	6806800D06
Basic Blade Services Software on ATCA-F120 Programmer's Reference	6806800E20
Centellis 4620 Installation and Use	6806800E23

A.2 Related Specifications

For additional information, refer to the following table for related specifications. As an additional help, a source for the listed document is provided. Please note that, while these sources have been verified, the information is subject to change without notice.

Table A-2 Related Specifications

Document Title	Source
IPMI Specifications, http://www.intel.com/design/servers/ipmi	
IPMI Spec v1.5, Document Revision 1.1, February 20, 2002	Intel Corporation, Hewlett-Packard, DEC, NEC
IPMI v1.5 Addenda, Errata, and Clarifications, Addendum Document Revision 5, January 29, 2004	Intel Corporation, Hewlett-Packard, DEC, NEC
Intelligent Platform Management Interface Specification v1.0, Document Revision 1.1, November 15 1999	Intel Corporation, Hewlett-Packard, NEC, Dell

Table A-2 Related Specifications (continued)

Document Title	Source
IPMI Implementer's Guide, Draft Version 0.7, September 16, 1998	Intel Corporation
IPMI Platform Management FRU Information Storage Definition V1.0, September 27, 1999	Intel Corporation
PCI Industrial Manufacturers Group (PICMG) http://www.picmg.com/	
AdvancedTCA Base 3.0 Specification, Revision 2.0	PICMG 3.0 R 2.0,Dated 03/18/05

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