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# PrAMC-7311: Control via IPMI

Programmer's Reference

P/N: 6806800P97C

January 2020

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Embedded Computing

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# About this Manual

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## Overview of Contents

This manual is intended for users such as system designers and system integrators qualified in electronics or electrical engineering. Users must have a working understanding of system design, Advanced Telecom Computing Architecture (AdvancedTCA) design and specifications, Intelligent Platform Management Interface (IPMI), and telephony telecommunications.

It provides a detailed description of default values of FRU information and Sensor Data Records (SDRs) contained on your board and contains the following chapters and appendix:

*Introduction on page 11* gives a short overview on the scope of the document.

*Supported IPMI Commands on page 13* lists IPMI commands supported by the IPMC.

*FRU Information on page 27* lists the blade's FRU information as well as sensors that are accessible via IPMI.

*Sensor Data Records on page 33.*

*Related Documentation on page 49* lists related documentation and specifications.

## Abbreviations

This document uses the following abbreviations:

Abbreviation	Definition
AdvancedTCA	Advanced Telecom Computing Architecture
AMC	Advanced Mezzanine Card
ASF	Alert Standard Forum
BCD	Binary-Coded Decimal
BIOS	Basic Input/Output System
BMC	Baseboard Management Controller
CMC	Common Mezzanine Card
CO	Central Office
FPGA	Field Programmable Gate-Array



<b>Abbreviation</b>	<b>Definition</b>
FRU	Field Replaceable Unit
FW	Firmware
HPI	Hardware Platform Interface
IANA	Internet Assigned Numbers Authority
ID	Identifier
IMC	IPM Master Controller
IPMB	Intelligent Platform Management Bus
IPMC	Intelligent Platform Management Interface Controller
IPMI	Intelligent Platform Management Interface
ISC	IPM Slave Controller
LAN	Local Area Network
LED	Light Emitting Diode
LSB	Least Significant Bit
LUN	Logical Unit Number
MAC	Media Access Control
MSB	Most Significant Bit
OEM	Original Equipment Manufacturer
OS	Operating System
PEM	Power Entry Module
PICMG	PCI Industrial Computer Manufacturers Group
POST	Power On Self Test
RTM	Rear Transition Module
SDR	Sensor Data Record
SEL	System Event Log
SOL	Serial over LAN








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## 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)
<b>bold</b>	Used to emphasize a word
Screen	Used for on-screen output and code related elements or commands. Sample of Programming used in a table (9pt)
<b>Courier + Bold</b>	Used to characterize user input and to separate it from system output
<i>Reference</i>	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
..	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

Notation	Description
	Indicates a property damage message
	Indicates a hot surface that could result in moderate or serious injury
	Indicates an electrical situation that could result in moderate injury or death
<b>Use ESD protection</b> 	Indicates that when working in an ESD environment care should be taken to use proper ESD practices
	No danger encountered, pay attention to important information

## Summary of Changes

Order No.	Date	Description
6806800P97C	January 2020	Rebranded to SMART Embedded Computing template.
6806800P97B	June 2014	Rebranded to Artesyn template and <i>Updated Table 4-1 IPMI sensors overview and Table 4-17 CPU Temp.</i>
6806800P97A	September 2012	Initial version.

# Introduction

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## 1.1 Overview

The PrAMC-7311 module provides an onboard Module Management Controller (MMC) implemented as per the PICMG AMC.0 Rev2.0 specification. The MMC provides an Intelligent Platform Management Interface (IPMI) that communicates with the MicroTCA and AdvancedTCA carrier and/or shelf managers. The MMC controls and monitors the following:

- Hot swap communication
- Inlet air temperature
- Voltage monitoring
- Electronic keying
- FRU information
- Sensor Data Records (SDR)
- Face plate LEDs (except RJ-45 LEDs)

In this document you will find a description of:

- Supported IPMI commands
- SDRs
- FRU data
- Related documentation

The values for SDRs and FRU data are given for reference purposes.



# Supported IPMI Commands

## 2.1 Standard IPMI Commands

The Module Management Controller (MMC) is compliant to the Intelligent Platform Management Interface (IPMI) v1.5. This section provides information on the supported IPMI commands. For command examples and responses, refer to the *Basic Blade Services Reference Manual*, listed in Appendix A, Related Documentation and the IPMI Specifications located at <http://www.intel.com/design/servers/ipmi>.

### 2.1.1 Global IPMI Commands

The IPMCs support the following global IPMI commands.

### 2.1.2 BMC Watch Dog Timer Commands

*Table 2-1 Supported Global IPMI Commands*

Command	CMD
Get Device ID	01h
Cold Reset	02h
Warm Reset	03h
Get Self Test Results	04h
Get Device GUID	08h
Broadcast "Get Device ID"	01h

The IPMCs support the following BMC Watch Dog Timer commands.

*Table 2-2 Supported BMC Watch Dog Timer Commands*

Command Name	CMD
Reset Watchdog Timer	22h
Set Watchdog Timer	24h
Get Watchdog Timer	25h

## BMC Device and Messaging Commands

---

### 2.1.3 BMC Device and Messaging Commands

Table 2-3 BMC Device and Messaging Commands

Command Name	CMD
Set BMC Global Enables	2Eh
Get BMC Global Enables	2Fh
Clear Message Flags	30h
Get Message Flags	31h
Get Message	33h
Send Message	34h
Master Write-Read	52h
Get System GUID	37h
Get Channel Authentication Capabilities	38h
Get Session Challenge	39h
Activate Session	3Ah
Set Session Privilege Level	3Bh
Close Session	3Ch
Get Session Info	3Dh
Set Channel Access	40h
Get Channel Access	41h
Get Channel Info	42h
Set User Access	43h
Get User Access	44h
Set User Name	45h
Get User Name	46h
Set User Password	47h

*Table 2-3 BMC Device and Messaging Commands*

<b>Command Name</b>	<b>CMD</b>
Activate Payload	48h
Deactivate Payload	49h
Set User Payload Access	4Ch
Get User Payload Access	4Dh
Set Channel Security Keys	56h

### 2.1.4 Chassis Device Commands

The IPMC supports the following commands.

*Table 2-4 Chassis Device Commands*

<b>Command Name</b>	<b>CMD</b>
Set System Boot Options	08h
Get System boot Options	09h

### 2.1.5 Event Commands

The IPMC supports the following event commands.

*Table 2-5 Supported Event Commands*

<b>Command Name</b>	<b>CMD</b>
Set Event Receiver	00h
Get Event Receiver	01h
Platform Event (a.k.a. Event Message)	02h

## Sensor Device Commands

---

### 2.1.6 Sensor Device Commands

The IPMCs support the following sensor device commands.

*Table 2-6 Supported Sensor Device Commands*

<b>Command Name</b>	<b>CMD</b>
Get Device SDR Info	20h
Get Device SDR	21h
Reserve Device SDR Repository	22h
Get Sensor Reading Factors	23h
Set Sensor Hysteresis	24h
Get Sensor Hysteresis	25h
Set Sensor Threshold	26h
Get Sensor Threshold	27h
Set Sensor Event Enable	28h
Get Sensor Event Enable	29h
Get Sensor Event Status	2Bh
Get Sensor Reading	2Dh
Get Sensor Type	2Fh

### 2.1.7 FRU Inventory Commands

The IPMCs support the following FRU inventory commands.

*Table 2-7 Supported FRU Commands*

<b>Command Name</b>	<b>CMD</b>
Get FRU Inventory Area Info	10h
Read FRU Data	11h
Write FRU Data	12h



## 2.1.8 LAN Device Commands

The IPMC supports the following serial/modem device commands.

*Table 2-8 LAN Device Commands*

Command Name	CMD
Set LAN Configuration Parameters	01h
Get LAN Configuration Parameters	02h

## 2.1.9 Serial/Modem Device Commands

The IPMC supports the following serial/modem device commands.

*Table 2-9 Supported Serial/Modem Device Commands*

Command Name	CMD
Set Serial/Modem Configuration	10h
Get Serial/Modem Configuration	11h
Set SOL Configuration Parameters	21h
Get SOL Configuration Parameters	22h

## 2.2 PICMG 3.0 Commands

The SMART EC 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 2-10 Supported PICMG 3.0 Commands*

Command Name	CMD
Get PICMG Properties	00h
Get Address Info[24]	01h
FRU Control	04h
Get FRU LED Properties	05h
Get LED Color Capabilities	06h

## HPM.1 Commands

---

*Table 2-10 Supported PICMG 3.0 Commands (continued)*

Command Name	CMD
Set FRU LED State	07h
Get FRU LED State	08h
Get Device Locator Record ID	0Dh
FRU Control Capabilities	1Eh

## 2.3 HPM.1 Commands

Following are the firmware upgrade commands:

*Table 2-11 HPM.1 Commands*

<b>Command Name</b>	<b>CMD</b>
Get Target Upgrade Capabilities	2Eh
Get Component Properties	2Fh
Abort Firmware Upgrade	30h
Initiate Upgrade Action	31h
Upload Firmware Block	32h
Finish Firmware Upload	33h
Get Upgrade Status	34h
Activate Firmware	35h
Query Self-test Results	36h
Query Rollback Status	37h
Initiate Manual Rollback	38h

## 2.4 Advanced MC Commands

The IPMC supports the following AMC commands.

*Table 2-12 Advanced MC Commands*

<b>Command Name</b>	<b>CMD</b>
Set AMC Port State	19h
Get AMC Port State	1Ah

## 2.5 SMART EC NetFn2E OEM Commands

The SMART EC IPMC supports several commands which are not defined in the IPMI or PICMG 3.0 specification but are introduced by SMART EC.

*Table 2-13 SMART EC Net2E OEM Commands*

<b>Command Name</b>	<b>CMD</b>
Set Feature Configuration	1Eh
Get Feature Configuration	1Fh

## Set Feature Configuration (NetFn = 0x2E/0x2F, CMD = 0x1E)

### 2.5.1 Set Feature Configuration (NetFn = 0x2E/0x2F, CMD = 0x1E)

This command can be used to enable/disable or configure features implemented on the blade at runtime.

*Table 2-14 Set Feature Configuration Command*

Data type	Byte	Data field
Request Data	1	LSB of SMART EC IANA Enterprise Number. A value of CDh shall be used.
	2	2nd byte of SMART EC IANA Enterprise Number. A value of 65h shall be used.
	3	MSB of SMART EC IANA Enterprise Number. A value of 00h shall be used.
	4	Feature Selector. For details, please see <a href="#">Table 2-15 on page 21</a>
	5	Feature Configuration. 00h = disabled 01h = enabled 02h = restore factory default 03h - BFh = feature specific configuration C0h - FFh = product specific configuration
	6	Persistency / Duration. Not all values are valid for a particular feature or product. FDh = till cold reset or warm reset depending on implementation FFh = persistent over power cycle (By default, other values are reserved for PrAMC-7311)
	7	Feature Configuration Modifier. Omitted if not used or default to 00h. Refer to <a href="#">Table 2-15 on page 21</a>

## Set Feature Configuration (NetFn = 0x2E/0x2F, CMD = 0x1E)

*Table 2-14 Set Feature Configuration Command (continued)*

Data type	Byte	Data field
Response Data	1	Completion Code. Generic plus the following command-specific completion codes: 80h = feature selector not supported. 81h = feature configuration not supported 82h = configuration persistency / duration not supported 83h = feature configuration modifier not supported
	2	LSB of SMART EC IANA Enterprise Number. A value of CDh shall be used.
	3	2nd byte of SMART EC IANA Enterprise Number. A value of 65h shall be used.
	4	MSB of SMART EC IANA Enterprise Number. A value of 00h shall be used.

*Table 2-15 Feature Selector Assignments*

Feature Selector	Description & Configuration Modifier	Configuration Modifier	Feature Configuration
3	Handle Switch Debounce	FRU Device ID. 00h = Local IPMC/MMC 01h-FFh =Not applicable	00h = fixed 500ms handle debouncer timer 01h = fixed 500ms handle debouncer timer 02h = fixed 500ms handle debouncer timer 03h - BFh = Debounce timer timeout value in 100ms C0h - FFh = product specific configuration

If the duration range does not meet the specific needs, configuration byte can be used in conjunction with to extend the duration as a special product specific configuration.

## Get Feature Configuration (NetFn = 0x2E/0x2F, CMD = 0x1F)

### 2.5.2 Get Feature Configuration (NetFn = 0x2E/0x2F, CMD = 0x1F)

This command retrieves the configuration of the feature implemented on the blade.

*Table 2-16 Get Feature Configuration Command*

Data type	Byte	Data field
Request Data	1	LSB of SMART EC IANA Enterprise Number. A value of CDh shall be used
	2	2nd byte of SMART EC IANA Enterprise Number. A value of 65h shall be used
	3	MSB of SMART EC IANA Enterprise Number. A value of 00h shall be used
	4	Feature Selector, for details see <a href="#">Table 2-15 on page 21</a>
	5	Feature Configuration Modifier. Omitted if not used. Refer to <a href="#">Table 2-15 on page 21</a>
Response Data	1	Completion Code. Generic plus the following command-specific completion codes: 80h = feature selector not supported 83h = feature configuration modifier not supported
	2	LSB of SMART EC IANA Enterprise Number. A value of CDh shall be used
	3	2nd byte of SMART EC IANA Enterprise Number. A value of 65h shall be used
	4	MSB of SMART EC IANA Enterprise Number. A value of 00h shall be used
	5	Feature Configuration
	6	Persistency / Duration

## 2.6 SMART EC NetFn30 OEM Commands

Table 2-17 SMART EC Net30 OEM Commands

Command Name	CMD
Get Payload Upgrade Flag	E2h
Set Payload Upgrade Flag	E3h
Get Boot Bank Swap Control	E4h
Set Boot Bank Swap Control	E5h

### 2.6.1 Get Payload Upgrade Flag (NetFn = 0x30/0x31, CMD = 0xE2)

This command retrieves the Payload Upgrade Flag. When the Payload Upgrade Flag is set, it overrides the boot bank swap control setting, and forces the boot bank swap feature to be enabled upon the BMC Watchdog Timer expiration with the action to hard reset. The Payload Upgrade Flag is cleared after the boot bank swap.

Table 2-18 Get Payload Upgrade Flag Command

Data type	Byte	Data field
Request Data	-	-
Response Data	1	Completion Code
	2	Upgrade Flag 0 = Payload not in upgrade mode 1 = Payload in upgrade mode. Boot bank will be swapped upon BMC Watchdog Timer expiration

## Set Payload Upgrade Flag (NetFn = 0x30/0x31, CMD = 0xE3)

### 2.6.2 Set Payload Upgrade Flag (NetFn = 0x30/0x31, CMD = 0xE3)

This command retrieves and sets the Payload Upgrade Flag. This command should be used only by the payload upgrade script or utilities.

*Table 2-19 Set Payload Upgrade Flag Command*

Data type	Byte	Data field
Request Data	1	Upgrade Flag 0 = Not in upgrade mode 1 = Payload in upgrade mode. Override boot bank swap control to be enabled.
Response Data	1	Completion Code

### 2.6.3 Get Boot Bank Swap Control (NetFn = 0x30/0x31, CMD = 0xE4)

This command retrieves the Boot Bank Swap Control setting. When the Boot Bank Swap Control is set, it disables the boot bank swap upon the BMC Watchdog Timer expiration. By default, the Boot Bank Swap Control is cleared, and the boot bank will be swapped if BMC Watchdog Timer expires (with action to be hard reset).

*Table 2-20 Get Boot Bank Swap Control Command*

Data type	Byte	Data field
Request Data	-	-
Response Data	1	Completion Code
	2	Boot Bank Swap Control 0 = Boot bank swap enabled 1 = Boot bank swap disabled



### 2.6.4 Set Boot Bank Swap Control (NetFn = 0x30/0x31, CMD = 0xE5)

This command sets the Boot Bank Swap Control setting.

*Table 2-21 Get Upgrade Flag Command*

Data type	Byte	Data field
Request Data	1	Boot Bank Swap Control 0 = Enable boot bank swap 1 = Disable boot bank swap
Response Data	1	Completion Code

## **Set Boot Bank Swap Control (NetFn = 0x30/0x31, CMD = 0xE5)**

---

# FRU Information

---

## 3.1 FRU Data

[Common Header]

Format Version = 1

[Board Info]

Format Version = 1

Language Code = en

Mfg Date/Time = <manufacturing time>

Manufacturer = Emerson

Product Name = PrAMC-7311

Serial Number = <serial number>

Part Number = <part number>

Fru File Id = <fru template id>

[Product Info]

Format Version = 1

Language Code = en

Manufacturer = Emerson

Product Name = <marketing number>

Part/Model Number = <part number>

Product Version = <product version>

Serial Number = <serial number>

Asset Tag =

Fru File Id = <fru template id>

[Module Current]

Format Version = 2

Vendor Format Version = 0

Current Draw = 5.0 Amps (i.e. 60.0 Watts)

[Amc Connectivity]

Format Version = 2

Vendor Format Version = 0

Resource = AMC

## MAC Address Record

---

```
Channels = 0, 1, 2, 3, 4 5 6 7, 8 9 10 11
0,0 = AMC.2 Ethernet, 1000Base-BX
1,0 = AMC.2 Ethernet, 1000Base-BX
2,0 = AMC.3 Storage, SATA, asymm:2
3,0 = AMC.3 Storage, SATA, asymm:2
4,0 1 2 3 = AMC.1 PCI Express, Gen1, asymm:2 (PCIEx4)
4,0 1 2 3 = AMC.1 PCI Express, Gen1-SSC, asymm:2 (PCIEx4 SSC)
4,0 1 = AMC.1 PCI Express, Gen1, asymm:2 (PCIEx2)
4,0 1 = AMC.1 PCI Express, Gen1-SSC, asymm:2 (PCIEx2 SSC)
4,0 = AMC.1 PCI Express, Gen1, asymm:2 (PCIEx1)
4,0 = AMC.1 PCI Express, Gen1-SSC, asymm:2 (PCIEx1 SSC)
5,0 1 2 3 = AMC.1 PCI Express, Gen1, asymm:2 (PCIEx4)
5,0 1 2 3 = AMC.1 PCI Express, Gen1-SSC, asymm:2 (PCIEx4 SSC)
Group = 1
4,0 1 2 3 = AMC.1 PCI Express, Gen1, asymm:2 (PCIEx8)
5,0 1 2 3 = AMC.1 PCI Express, Gen1, asymm:2
Group = 2
4,0 1 2 3 = AMC.1 PCI Express, Gen1-SSC, asymm:2 (PCIEx8 SSC)
5,0 1 2 3 = AMC.1 PCI Express, Gen1-SSC, asymm:2
[SMART EC OEM Type 0x01, MAC Addresses]
Type = 0xc0
Manufacturer Id = 0x65cd
Data = <mac addresses list>
```

## 3.2 MAC Address Record

The blade provides one OEM FRU record which contains information about on-board MAC addresses. The MAC address information is stored in one of the following two ways:

- The MAC address record holds the total number of on-board MAC addresses and the base MAC address
- The MAC address record holds all on-board MAC addresses

The format of the record is described in the following table.

*Table 3-1 SMART EC MAC Addresses Record*

Offset	Length	Description
0	1	Record Type ID. A value of C0h (OEM) shall be used for SMART EC OEM records
1	1	End of List / Version [7] End of List. Set to 1b for the last record [6:4] Reserved. Write as 000b. [3:0] Record format version. Write as 2h.
2	1	Record Length
3	1	Record Checksum (zero checksum)
4	1	Header Checksum (zero checksum)
5	1	LSB of Manufacturer ID. Write as CDh.
6	1	Second Byte of Manufacturer ID. Write as 65h
7	1	MSB of Manufacturer ID. Write as 00h.
8	1	SMART EC Record ID. 01h for SMART EC MAC Address Record.
9	1	Record Format Version. 00h for this specification.
10	1	Number of MAC (x)
11	N=(x*7)	SMART EC MAC Address Descriptors. Refer to <a href="#">Table 3-2 on page 29</a> , for definitions of SMART EC MAC Address Descriptor.

*Table 3-2 SMART EC MAC Address Descriptor*

Offset	Length	Description
0	1	Interface Type. Refer to <a href="#">Table 3-3 on page 30</a> for Interface Type Assignments
1	6	MAC Address. First Octet comes first.

## E-Keying

Table 3-3 Interface Type Assignments

Interface Type	Description
01h	AMC Common Options Region
03h	Front Panel

### 3.3 E-Keying

The following tables describes the e-keying information provided by the module. The respective information is contained in the FRU Point-to-Point Connectivity records.

Table 3-4 Point-To-Point Record

Link Type	Link Type Extension	Asym Match	Link Grouping ID	Link Designator	Link Descriptor
Ethernet	0x0	0b	0x00	0x100	0xFC00005100
Ethernet	0x0	0b	0x00	0x101	0xFC00005101
SATA	0x1	10b	0x00	0x102	0xFE00107102
SATA	0x1	10b	0x00	0x103	0xFE00107103
PCIe x4	0x0	10b	0x00	0xf04	0xFE00002F04
PCIe x4 SSC	0x1	10b	0x00	0xf04	0xFE00102F04
PCIe x2	0x0	10b	0x00	0x304	0xFE00002304
PCIe x2 SSC	0x1	10b	0x00	0x304	0xFE00102304
PCIe x1	0x0	10b	0x00	0x104	0xFE00002104
PCIe x1 SSC	0x1	10b	0x00	0x104	0xFE00102104
PCIe x4	0x0	10b	0x00	0xf05	0xFE00002F05
PCIe x4 SSC	0x1	10b	0x00	0xf05	0xFE00102F05

Table 3-4 Point-To-Point Record (continued)

Link Type	Link Type Extension	Asym Match	Link Grouping ID	Link Designator	Link Descriptor
PCIe x8	0x0	10b	0x01	0xf04	0xFE01002F04
	0x0	10b	0x01	0xf05	0xFE01002F05
PCIe x8 SSC	0x1	10b	0x02	0xf04	0xFE02102F04
	0x1	10b	0x02	0xf05	0xFE02102F05

## 3.4 Power Configuration

Table 3-5 on page 31 provides the current configuration data.

Table 3-5 Current Configuration

Processor Type	Value
2.2GHz	5.0 Amps





# Sensor Data Records

## 4.1 Sensor Overview

The following table lists all IPMI sensors available on the PrAMC-7311.

*Table 4-1 IPMI Sensors Overview*

Sensor Number	Sensor Name	Sensor Type	Detailed SDR Description
0	Module Hot Swap	(PICMG) Module Hot Swap	See <a href="#">Table 4-2 on page 34</a>
1	MP +3.3V	Voltage	See <a href="#">Table 4-3 on page 34</a>
2	+12V	Voltage	See <a href="#">Table 4-4 on page 35</a>
3	UCD3V3	Voltage	See <a href="#">Table 4-5 on page 36</a>
4	VCCCORE	Voltage	See <a href="#">Table 4-6 on page 37</a>
5	MMC Health	Management Subsystem Health	See <a href="#">Table 4-7 on page 38</a>
6	Version Change	Version Change	See <a href="#">Table 4-8 on page 38</a>
7	BMC Watchdog	Watchdog2	See <a href="#">Table 4-9 on page 39</a>
8	Processor	Processor	See <a href="#">Table 4-10 on page 39</a>
9	ALLPGOOD	Power Supply / Converters	See <a href="#">Table 4-11 on page 40</a>
10	F/W Progress	System Firmware Progress	See <a href="#">Table 4-12 on page 41</a>
11	PCH Temp	Temperature	See <a href="#">Table 4-13 on page 41</a>
12	Inlet Temp	Temperature	See <a href="#">Table 4-14 on page 42</a>
13	Power Temp	Temperature	See <a href="#">Table 4-15 on page 43</a>
14	Ethernet Temp	Temperature	See <a href="#">Table 4-16 on page 44</a>
15	CPU Temp	Temperature	See <a href="#">Table 4-17 on page 44</a>
16	Boot Error	Boot Error	See <a href="#">Table 4-18 on page 45</a>

## Sensor Overview

*Table 4-1 IPMI Sensors Overview (continued)*

Sensor Number	Sensor Name	Sensor Type	Detailed SDR Description
17	OS Boot	OS Boot	See <a href="#">Table 4-19 on page 46</a>
18	Boot Bank	(SMART EC) OEM Type D2	See <a href="#">Table 4-20 on page 46</a>

*Table 4-2 Module Hot Swap*

Feature	Raw Value	Description
Sensor Name	Module Hot Swap	
Sensor Number	0	
Sensor Description	Module Hot Swap	
Sensor Type Code	0xF2	(PICMG) Module Hot Swap
Sensor Event Reading Type Code	0x6F	Sensor Specific
Lower Threshold Reading Mask Code	0x001F	Assertion Event Mask: Offset 4 through 0
Upper Threshold Reading Mask Code	0x0000	Deassertion Event Mask: None
Settable Threshold Mask, Readable Threshold Mask Code	0x001F	Discrete Reading Mask: State bits 0 through 4
Unit	Discrete	

*Table 4-3 MP +3.3V*

Feature	Raw Value	Description
Sensor Name	MP +3.3V	
Sensor Number	1	
Sensor Description	Management Power	
Sensor Type Code	0x02	Voltage

Table 4-3 MP +3.3V (continued)

Feature	Raw Value	Description
Sensor Event Reading Type Code	0x01	Threshold
Lower Threshold Reading Mask Code	0x7A14	Lower Threshold Reading Mask: LNR, LC, LNC Assertion Event Mask: UNR-GH, UC-GH, LNR-GL, LC-GL
Upper Threshold Reading Mask Code	0x7A14	Upper Threshold Reading Mask: UNR, UC, UNC Deassertion Event Mask: UNR-GH, UC-GH, LNR-GL, LC-GL
Settable Threshold Mask, Readable Threshold Mask Code	0x3F3F	Settable Threshold Mask: UNR, UC, UNC, LNR, LC, LNC Readable Threshold Mask: UNR, UC, UNC, LNR, LC, LNC
Unit	Volts	

Table 4-4 +12V

Feature	Raw Value	Description
Sensor Name	+12V	
Sensor Number	2	
Sensor Description	Payload Power	
Sensor Type Code	0x02	Voltage
Sensor Event Reading Type Code	0x01	Threshold

## Sensor Overview

Table 4-4 +12V (continued)

Feature	Raw Value	Description
Lower Threshold Reading Mask Code	0x7A14	Lower Threshold Reading Mask: LNR, LC, LNC Assertion Event Mask: UNR-GH, UC-GH, LNR-GL, LC-GL
Upper Threshold Reading Mask Code	0x7A14	Upper Threshold Reading Mask: UNR, UC, UNC Deassertion Event Mask: UNR-GH, UC-GH, LNR-GL, LC-GL
Settable Threshold Mask, Readable Threshold Mask Code	0x3F3F	Settable Threshold Mask: UNR, UC, UNC, LNR, LC, LNC Readable Threshold Mask: UNR, UC, UNC, LNR, LC, LNC
Unit	Volts	

Table 4-5 UCD3V3

Feature	Raw Value	Description
Sensor Name	UCD3V3	
Sensor Number	3	
Sensor Description	Internal Voltage	
Sensor Type Code	0x02	Voltage
Sensor Event Reading Type Code	0x01	Threshold
Lower Threshold Reading Mask Code	0x7A14	Lower Threshold Reading Mask: LNR, LC, LNC Assertion Event Mask: UNR-GH, UC-GH, LNR-GL, LC-GL

Table 4-5 UCD3V3

Feature	Raw Value	Description
Upper Threshold Reading Mask Code	0x7A14	Upper Threshold Reading Mask: UNR, UC, UNC Deassertion Event Mask: UNR-GH, UC-GH, LNR-GL, LC-GL
Settable Threshold Mask, Readable Threshold Mask Code	0x3F3F	Settable Threshold Mask: UNR, UC, UNC, LNR, LC, LNC Readable Threshold Mask: UNR, UC, UNC, LNR, LC, LNC
Unit	Volts	

Table 4-6 VCCCORE

Feature	Raw Value	Description
Sensor Name	VCCCORE	
Sensor Number	4	
Sensor Description	Internal Voltage	
Sensor Type Code	0x02	Voltage
Sensor Event Reading Type Code	0x01	Threshold
Lower Threshold Reading Mask Code	0x0000	Lower Threshold Reading Mask: None Assertion Event Mask:None
Upper Threshold Reading Mask Code	0x0000	Upper Threshold Reading Mask: None Deassertion Event Mask:None
Settable Threshold Mask, Readable Threshold Mask Code	0x0000	Settable Threshold Mask: None Readable Threshold Mask:None
Unit	Volts	

## Sensor Overview

Table 4-7 MMC Health

Feature	Raw Value	Description
Sensor Name	MMC Health	
Sensor Number	5	
Sensor Description	Management Health	
Sensor Type Code	0x28	Management Subsystem Health
Sensor Event Reading Type Code	0x6F	Sensor Specific
Lower Threshold Reading Mask Code	0x000F	Assertion Event Mask: Offset 3 through 0
Upper Threshold Reading Mask Code	0x0000	Deassertion Event Mask: None
Settable Threshold Mask, Readable Threshold Mask Code	0x000F	Discrete Reading Mask: State bit 0 through 3
Unit	Discrete	

Table 4-8 Version Change

Feature	Raw Value	Description
Sensor Name	Version Change	
Sensor Number	6	
Sensor Description	Main Payload Power	
Sensor Type Code	0x2B	Version Change
Sensor Event Reading Type Code	0x6F	Sensor Specific
Lower Threshold Reading Mask Code	0x00FF	Assertion Event Mask: Offset 7 through 1
Upper Threshold Reading Mask Code	0x0000	Deassertion Event Mask: None

*Table 4-8 Version Change (continued)*

Feature	Raw Value	Description
Settable Threshold Mask, Readable Threshold Mask Code	0x00FF	Discrete Reading Mask: State bit 0 through 7
Unit	Discrete	

*Table 4-9 BMC Watchdog*

Feature	Raw Value	Description
Sensor Name	BMC Watchdog	
Sensor Number	7	
Sensor Description	BMC Watchdog	
Sensor Type Code	0x23	Watchdog2
Sensor Event Reading Type Code	0x6F	Sensor Specific
Lower Threshold Reading Mask Code	0x010F	Assertion Event Mask: Offset 8, 3, 2, 1, and 0
Upper Threshold Reading Mask Code	0x0000	Deassertion Event Mask: None
Settable Threshold Mask, Readable Threshold Mask Code	0x010F	Discrete Reading Mask: State bit 0, 1, 2, 3, and 8
Unit	Discrete	

*Table 4-10 Processor*

Feature	Raw Value	Description
Sensor Name	8	
Sensor Number	Processor	
Sensor Description	Processor (THERMTRIP#, PROCHOT#, CATERR#)	
Sensor Type Code	0x07	Processor

## Sensor Overview

Table 4-10 Processor (continued)

Feature	Raw Value	Description
Sensor Event Reading Type Code	0x6F	Sensor Specific
Lower Threshold Reading Mask Code	0x0403	Assertion Event Mask: Offset 10, 1, and 0
Upper Threshold Reading Mask Code	0x0403	Deassertion Event Mask: Offset 10, 1, and 0
Settable Threshold Mask, Readable Threshold Mask Code	0x0403	Discrete Reading Mask: State bit 0, 1, and 10
Unit	Discrete	

Table 4-11 ALLPGOOD

Feature	Raw Value	Description
Sensor Name	ALLPGOOD	
Sensor Number	9	
Sensor Description	Power Good Indicator	
Sensor Type Code	0x08	Power Supply / Converters
Sensor Event Reading Type Code	0x03	Digital State
Lower Threshold Reading Mask Code	0x0003	Assertion Event Mask: Offset 1 and 0
Upper Threshold Reading Mask Code	0x0000	Deassertion Event Mask: None
Settable Threshold Mask, Readable Threshold Mask Code	0x0003	Discrete Reading Mask: State bit 0 and 1
Unit	Discrete	



Table 4-12 F/W Progress

Feature	Raw Value	Description
Sensor Name	F/W Progress	
Sensor Number	10	
Sensor Description	Boot Firmware Progress	
Sensor Type Code	0x0F	System Firmware Progress
Sensor Event Reading Type Code	0x6F	Sensor Specific
Lower Threshold Reading Mask Code	0x0007	Assertion Event Mask: Offset 2, 1, and 0
Upper Threshold Reading Mask Code	0x0000	Deassertion Event Mask: None
Settable Threshold Mask, Readable Threshold Mask Code	0x0007	Discrete Reading Mask: State bit 0, 1, and 2
Unit	Discrete	

Table 4-13 PCH Temp

Feature	Raw Value	Description
Sensor Name	PCH Temp	
Sensor Number	11	
Sensor Description	PCH Temperature	
Sensor Type Code	0x01	Temperature
Sensor Event Reading Type Code	0x01	Threshold
Lower Threshold Reading Mask Code	0x0A80	Lower Threshold Reading Mask: None Assertion Event Mask: UNR-GH, UC-GH,UNC-GH

## Sensor Overview

Table 4-13 PCH Temp (continued)

Feature	Raw Value	Description
Upper Threshold Reading Mask Code	0x7A80	Upper Threshold Reading Mask: UNR, UC, UNC Deassertion Event Mask: UNR-GH, UC-GH,UNC-GH
Settable Threshold Mask, Readable Threshold Mask Code	0x0038	Settable Threshold Mask: None Readable Threshold Mask: UNR, UC, UNC
Unit	degrees C	

Table 4-14 Inlet Temp

Feature	Raw Value	Description
Sensor Name	Inlet Temp	
Sensor Number	12	
Sensor Description	Inlet Air Temperature	
Sensor Type Code	0x01	Temperature
Sensor Event Reading Type Code	0x01	Threshold
Lower Threshold Reading Mask Code	0x0A80	Lower Threshold Reading Mask: None Assertion Event Mask: UNR-GH, UC-GH,UNC-GH
Upper Threshold Reading Mask Code	0x7A80	Upper Threshold Reading Mask: UNR, UC, UNC Deassertion Event Mask: UNR-GH, UC-GH,UNC-GH

*Table 4-14 Inlet Temp (continued)*

Feature	Raw Value	Description
Settable Threshold Mask, Readable Threshold Mask Code	0x0038	Settable Threshold Mask: None Readable Threshold Mask: UNR, UC, UNC
Unit	degrees C	

*Table 4-15 Power Temp*

Feature	Raw Value	Description
Sensor Name	Power Temp	
Sensor Number	13	
Sensor Description	Power Module Temp	
Sensor Type Code	0x01	Temperature
Sensor Event Reading Type Code	0x01	Threshold
Lower Threshold Reading Mask Code	0x0A80	Lower Threshold Reading Mask: None Assertion Event Mask: UNR-GH, UC-GH,UNC-GH
Upper Threshold Reading Mask Code	0x7A80	Upper Threshold Reading Mask: UNR, UC, UNC Deassertion Event Mask: UNR-GH, UC-GH,UNC-GH
Settable Threshold Mask, Readable Threshold Mask Code	0x0038	Settable Threshold Mask: None Readable Threshold Mask: UNR, UC, UNC
Unit	degrees C	

## Sensor Overview

*Table 4-16 Ethernet Temp*

<b>Feature</b>	<b>Raw Value</b>	<b>Description</b>
Sensor Name	Ethernet Temp	
Sensor Number	14	
Sensor Description	Ethernet Chipset Temperature	
Sensor Type Code	0x01	Temperature
Sensor Event Reading Type Code	0x01	Threshold
Lower Threshold Reading Mask Code	0x0A80	Lower Threshold Reading Mask: None Assertion Event Mask: UNR-GH, UC-GH,UNC-GH
Upper Threshold Reading Mask Code	0x7A80	Upper Threshold Reading Mask: UNR, UC, UNC Deassertion Event Mask: UNR-GH, UC-GH,UNC-GH
Settable Threshold Mask, Readable Threshold Mask Code	0x0038	Settable Threshold Mask: None Readable Threshold Mask: UNR, UC, UNC
Unit	degrees C	

*Table 4-17 CPU Temp*

<b>Feature</b>	<b>Raw Value</b>	<b>Description</b>
Sensor Name	CPU Temp	
Sensor Number	15	
Sensor Description	CPU PECI Temp	
Sensor Type Code	0x01	Temperature
Sensor Event Reading Type Code	0x01	Sensor Specific

Table 4-17 CPU Temp (continued)

Feature	Raw Value	Description
Lower Threshold Reading Mask Code	0x0A80	Lower Threshold Reading Mask: None Assertion Event Mask: UNR-GH, UC-GH,UNC-GH
Upper Threshold Reading Mask Code	0x7A80	Upper Threshold Reading Mask: UNR, UC, UNC Deassertion Event Mask: UNR-GH, UC-GH,UNC-GH
Settable Threshold Mask, Readable Threshold Mask Code	0x0038	Settable Threshold Mask: None Readable Threshold Mask: UNR, UC, UNC
Unit	degrees C	

Table 4-18 Boot Error

Feature	Raw Value	Description
Sensor Name	Boot Error	
Sensor Number	16	
Sensor Description	Boot Error	
Sensor Type Code	0x1E	Boot Error
Sensor Event Reading Type Code	0x6F	Sensor Specific
Lower Threshold Reading Mask Code	0x001F	Assertion Event Mask: Offset 4 through 0
Upper Threshold Reading Mask Code	0x0000	Deassertion Event Mask: None
Settable Threshold Mask, Readable Threshold Mask Code	0x001F	Discrete Reading Mask: State bits 0 through 4

## Sensor Overview

*Table 4-18 Boot Error (continued)*

Feature	Raw Value	Description
Unit	Discrete	

*Table 4-19 OS Boot*

Feature	Raw Value	Description
Sensor Name	OS Boot	
Sensor Number	17	
Sensor Description	OS Boot	
Sensor Type Code	0x1F	OS Boot
Sensor Event Reading Type Code	0x6F	Sensor Specific
Lower Threshold Reading Mask Code	0x007F	Assertion Event Mask: Offset 6 through 0
Upper Threshold Reading Mask Code	0x0000	Deassertion Event Mask: None
Settable Threshold Mask, Readable Threshold Mask Code	0x007F	Discrete Reading Mask: State bits 0 through 6
Unit	Discrete	

*Table 4-20 Boot Bank*

Feature	Raw Value	Description
Sensor Name	Boot Bank	
Sensor Number	18	
Sensor Description	Boot Firmware Flash Bank Selection	
Sensor Type Code	0xD2	(SMART EC) OEM Type D2
Sensor Event Reading Type Code	0x6F	Sensor Specific
Lower Threshold Reading Mask Code	0x0001	Assertion Event Mask: Offset 0

*Table 4-20 Boot Bank (continued)*

Feature	Raw Value	Description
Upper Threshold Reading Mask Code	0x0001	Deassertion Event Mask: Offset 0
Settable Threshold Mask, Readable Threshold Mask Code	0x0001	Discrete Reading Mask: State bit 0
Unit	Discrete	

## 4.2 External Sensor Values

The following sections provide examples of the sensors' values and their meanings.

### 4.2.1 Firmware Progress Sensor Values

The following table describes the firmware progress sensor values.

*Table 4-21 Firmware Progress Sensor Values*

Value	Description
01h	Memory initialization
02h	Hard-Disk initialization
07h	PCI Resource Configuration
13h	Starting operating system boot process, For example: calling Int 0x19

### 4.2.2 Firmware Progress Error Codes

The following table describes the firmware progress error codes.

*Table 4-22 Firmware Progress Error Codes*

Value	Description
01h	No system memory is physically installed in the system
02h	No usable system memory
04h	Unrecoverable system-board failure





# 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 Embedded Computing Publications*

Document Title	Publication Number
PrAMC-7311 Installation and Use	6806800P34
Basic Blade Services Software on PrAMC-7311 Programmer's Reference	6806800P92

## A.2 Manufacturers' Documents

Visit the manufacturer's web site to search for a data sheet on the following components.

*Table A-2 Manufacturers' Documents*

Document Title	Source
BMR-H8S-AMCm Reference Design Board Management Reference Design for AdvancedMC Modules	<i>Pigeon Point Systems</i>
H8S 2472 Data sheet: Renesas	<i>Renesas Electronics</i>
DS75 Digital Thermometer and Thermostat Sensor with SMBus Serial Interface	<i>Dallas Semiconductor MAXIM</i>

## A.3 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-3 Related Specifications*

Document Title	Source
IPMI Specifications <a href="http://www.intel.com/design/servers/ipmi">http://www.intel.com/design/servers/ipmi</a>	
IPMI-Intelligent Platform Management Interface Specification, v1.5 and v2.0	Intel Corporation, Hewlett-Packard, NEC Corporation, Dell Computer Corporation

## Related Specifications

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*Table A-3 Related Specifications*

<b>Document Title</b>	<b>Source</b>
IPMB-Intelligent Platform Management Interface Specification, v1.0	Intel Corporation, Hewlett-Packard, NEC Corporation, Dell Computer Corporation
FRU-Field Replaceable Unit, v1.0, Document Revision 1.1	Intel Corporation, Hewlett-Packard, NEC Corporation, Dell Computer Corporation
PCI Industrial Manufacturers Group (PICMG) Specifications <a href="http://www.picmg.com">http://www.picmg.com</a>	
ATCA PICMG 3.0 Specification, Rev 3.0	PICMG
PICMG AMC.0 Advanced Mezzanine Card Core Specification Rev 2.0	PICMG
PICMG AMC.1 PCI Express and Advanced Switching Specification, Rev 2.0	PICMG
PICMG AMC.2 AMC Gigabit Ethernet/10 Gigabit XAUI Ethernet Specification, Rev 1.0	PICMG
PICMG AMC.3 AMC Storage Specification, Rev 1.0	PICMG
PICMG 3.0 HPM.1 Specification Rev 1.0	PICMG
PCI Special Interest Group (PCI SIG) Specifications <a href="http://www.pcisig.com">http://www.pcisig.com</a>	
PCI-Express Base Specification, Rev 1.0a: PCI-SIG	PCISIG



