

# PC87431MAT/SAT/CAT mini-Baseboard Management Controller (mBMC)

## General Description

The Winbond PC87431x family of mini-Baseboard Management Controllers (mBMC) is a light version of the IPMI v1.5 BMC. It is targeted for a wide range of remote-controlled platforms such as servers, workstations, hubs and printers.

The PC87431x incorporates an embedded microcontroller, three System Management Bus (SMBus<sup>®</sup>) interfaces, a Chassis Management interface, Bi-Color LED control, an integrated flash, Fan control, 12 ADC channels, and Digital Input Event and General-Purpose Output pins.

The PC87431x interfaces with the host via the SMBus System Interface (SSIF); it interfaces with the LAN On Motherboard (LOM) and with peripherals via two independent master SMBus interfaces.

The PC87431x also supports distributed management architecture via the Intelligent Platform Management Bus (IPMB).

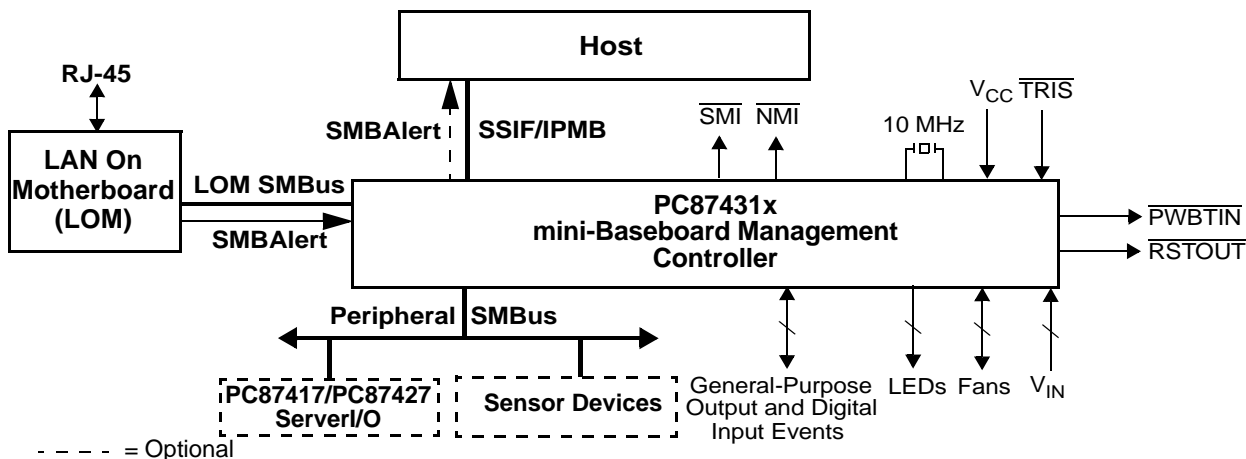
In addition, the PC87431x includes an inhibit strap to enable the system to work with the daughter board of an advanced BMC.

The PC87431x, like other members of Winbond's Advanced I/O family, is PC2001 and ACPI compliant.

## Outstanding Features

- Canned solution
- LAN commands follow IPMI v1.5
- MD5 secure authentication
- Support for a variety of popular LOMs
- Field Replaceable Unit (FRU) Inventory
- System Event Log (SEL)
- Sensor Data Record (SDR) Repository
- Platform Event Filtering (PEF)
- Remote secure reset, Power On/Off
- Remote settable BIOS boot options
- BIOS Alerting interface
- System health monitoring using SMBus-based sensors
- LAN Alerting in PET format
- Watchdog Timer
- Host (SSIF), LOM and Peripheral interfaces, via SMBus
- Intelligent Platform Management Bus (PC87431CAT)
- Digital Input Event pins and General-Purpose Output pins
- Integrated Fan control and ADC (PC87431xSAT)
- Integrated flash, to reduce system cost
- Two LEDs, with Bi-Color LED control
- Inhibit (TRI-STATE<sup>®</sup>) and Enable straps, to enable to work with the daughter board of an advanced BMC

## PC87431x System Connection Diagram



Notes: IPMB interface is supported by PC87431CAT only.  
Integrated ADC and Fan are supported by PC87431SAT only.

## Device-Specific Information

The following table shows the main differences between the devices in the PC87431x family.

Function	PC87431MAT	PC87431SAT	PC87431CAT
Remote Chassis Control	✓	✓	✓
Remote Boot Options	✓	✓	✓
LAN Configuration and Alerting	✓	✓	✓
System Health Monitoring	✓	✓	✓
System Event Log (SEL)	✓	✓	✓
Field Replaceable Unit (FRU) Inventory	✓	✓	✓
Platform Event Filtering	✓	✓	✓
Watchdog and Fault Resilient Booting (FRB)	✓	✓	✓
External Sensors Interface	✓	✓	✓
Internal Sensors: ADC Channels and Fan		✓	
Authentication	MD5	MD5	MD5
IPMB support on host interface			✓

The package type is specified by a letter (L or T) that follows the part number:

- LLP Tray package: PC87431xxx/L
- LLP Tape and Reel package: PC87431xxx/LX
- TSSOP Tray package - PC87431xxx/T
- TSSOP Tape and Reel package - PC87431xxx/TX

## Features

- Three SMBus Interfaces (SMBus 2.0 compatible; support polling and interrupt-controlled operation)
  - LOM interface: master only
  - Peripheral interface: master only
  - SSIF/IPMB interface: master and slave
- Chassis Control
  - Power Control Signal, ACPI-compliant 4-second assertion
  - Reset Signal generation
  - IRQ /  $\overline{\text{NMI}}$  and  $\overline{\text{SMI}}$  generation
  - Front Panel lockout of reset and power buttons
- Digital Input Events and General-Purpose Output
  - Provides eight configurable digital inputs and general-purpose outputs
  - Provides user-selectable trigger conditions using internal flash configuration
- Bi-Color LED Control
  - Supports two LEDs for identification and fault event notification
  - Supports 1 Hz and 3 Hz blink frequencies
  - Supports color control
- Supports SMBus System Interface (SSIF), based on the *Intelligent Platform Management Interface (IPMI) Specification v2.0 (revision 1.0)*, June 01, 2004
- Supports *Intelligent Platform Management Bus (IPMB) Specification v1.0*, September 16, 1998
- Supports LAN Alert sending as SNMP Trap in *IPMI Platform Event Trap Format v1.0*, December 7, 1998
- Secure Authentication, based on *RFC 1321, The MD5 Message-Digest Algorithm*, R. Rivest, MIT Laboratory for Computer Science and RSA Data Security, Inc., April 1992
- IPMI Privilege Levels: User, Operator, Administrator
- Remote Management Control Protocol (RMCP) Ping and Pong Response
- IPMI Device and Messaging Commands
  - Get BMC Global Enables
  - Set BMC Global Enables
  - Clear Message Flags
  - Get Message Flags
  - Get Message
  - Send Message
  - Get Channel Authentication Capabilities
  - Get Session Challenge
  - Set Session Privilege Level
  - Activate Session
  - Close Session

## IPMI Support

- Supports *Intelligent Platform Management Interface (IPMI) Specification v1.5 (revision 1.1)*, February 20, 2002

## Features (Continued)

- Get Session Info
- Get System GUID
- Master Write-Read
- Get User Access
- Set User Access
- Get Channel Access
- Set Channel Access
- Get Channel Info
- Get User Name
- Set User Password
- IPMI Chassis Device Commands
  - Get Chassis Capabilities
  - Set Chassis Capabilities
  - Get Chassis Status
  - Chassis Control
  - Get System Restart Cause
  - Set Power Restore Policy
  - Get System Boot Options
  - Set System Boot Options
- IPMI Device 'Global' Commands
  - Cold Reset
  - Get Device ID
  - Get Self-Test Result
  - Get ACPI Power State
  - Set ACPI Power State
- IPMI LAN Commands
  - Get LAN Configuration
  - Set LAN Configuration
  - Suspend BMC Address Resolution Protocols (ARPs)
- IPMI Watchdog Timer Commands
  - Reset Watchdog Timer
  - Get Watchdog Timer
  - Set Watchdog Timer
- IPMI FRU Inventory Commands
  - Get FRU Inventory Area Info
  - Read/Write FRU Data
- IPMI System Event Log (SEL) Support
  - Get SEL Info
  - Reserve SEL
  - Get SEL Entry
  - Add SEL Entry
  - Clear SEL
  - Get/Set SEL Time
  - 92 log entries
- IPMI Platform Event Filtering (PEF) and PET Alerting Support
  - Get PEF Capabilities
  - Get PEF Configuration Parameters
  - Set PEF Configuration Parameters
  - Arm PEF Postpone Timer
  - Set Last Processed Event ID
- Get Last Processed Event ID
- Alert Immediate
- PET Acknowledge
- 30 PEF Entries
- OEM PEF actions:
  - Soft shut-down
  - Fault LED action
  - Identification LED action
  - External and internal device feedback action
  - IPMB message
- IPMI Event Commands
  - Get Event Receiver
  - Set Event Receiver
  - Platform Event Message
  - IPMB Event Message
- IPMI Sensor Device Support
  - Get Device Sensor Data Record (SDR) info
  - Get Device SDR
  - Reserve Device SDR Repository
  - Get Sensor Threshold
  - Set Sensor Threshold
  - Get Sensor Event Enable
  - Set Sensor Event Enable
  - Re-Arm Sensor Events
  - Get Sensor Event Status
  - Get Sensor Reading
  - Run Initialization Agent
  - Get Sensor Type
- IPMI SDR Repository Support
  - Get SDR Repository Info
  - Get SDR
  - Partial Add SDR
  - Clear SDR Repository
  - Get SDR Repository Time
  - Set SDR Repository Time
  - Built-in compact sensor and FRU locator records
  - 2175 bytes in internal flash for OEM SDR repository
- Device-Specific Commands
  - Get DEIO status
  - DEIO Control
  - Get LED Status
  - LED Control
  - Get User Password

## Host Interface

- SMBus System Interface (SSIF)
- OEM Commands
  - Enable BIOS to access internal flash memory
- Fault Resilient Booting (FRB) support with autonomous system reset, power cycling and CPU or BIOS switch.

## Features (Continued)

### Peripheral Interface

- Up to 48 sensor channels
- Configurable sensor access SMBus transactions:
  - Single 8-bit offset
  - Auto-increment 8-bit offset
  - Single 16-bit offset
  - Banked access
  - 8-bit raw data
  - 16-bit raw data
  - Access to  $V_{SB}$ -powered sensors
  - PC8741x and PC8742x device access
- Automatic sensor initialization upon system power-up or system reset
- Sensor bridging
- SMBus device action as result of PEF filtering

### Integrated ADC Channels and Fan Control (PC87431SAT)

- 10-bit successive approximation Analog to Digital converter (up to 12 channels)
- Fan Speed Control for three fans
  - Output signal in the range of 10 Hz to 100 Hz
  - Duty cycle resolution of 1/10
- Fan Speed Monitor for two fans

### Internal Flash

- High endurance - 100,000 Read/Write Cycles
- Superior data retention - 100 years
- Stores the following configuration:
  - Sensor Access table
  - Sensor Configuration table
  - IPMI user password
  - General-Purpose Output pin configuration
  - LOM interface configuration
  - 256 bytes for FRU Inventory or OEM data

### Clocking, Supply and Package Information

- Inhibit mode (TRI-STATE) strap
- Enable strap
- IPMB Slave Address strap (PC87431xC)
- Single 10 MHz crystal oscillator
- Single supply operation: 5V
- Package Options
  - 48-pin TSSOP, Tray, Tape and Reel
  - 44-pin LLP, Tray, Tape and Reel



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