

## Pigeon Point® BMR-H8S-AMC Reference Design Board Management Reference Design Add-on for AdvancedMC™ Carriers

The BMR-H8S-AMC design is one of a series of Pigeon Point Board Management Reference designs. This member of the series augments the BMR-H8S-ATCA IPM Controller to enable it to manage and represent Advanced Mezzanine Cards (AdvancedMCs or AMCs) installed on an ATCA-based AMC carrier. This reference design is based on the H8S/2168 controller family from Renesas Technology.

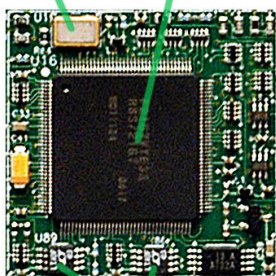
This reference design is delivered in a Pigeon Point Board Management Starter Kit Add-on (which is detailed in a separate Product Brief). The kit includes:

- Schematics for the Carrier IPMC additions, ready for integration into the design of your AMC carrier, with adaptation as necessary. The BMR-H8S-ATCA reference design is licensed separately as a base for these additions.
- Firmware for that subsystem, delivered in source form and ready for simple and quick adaptation to the specific requirements of your product.
- One-stop support for hardware, firmware and software used in developing and delivering your Pigeon Point BMR-based Carrier IPMC.

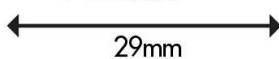
The following photo shows the core of the H8S-based Carrier IPMC, essentially the same as an H8S-based ATCA IPM Controller. The active components are:

- The H8S/2167 highly integrated micro controller.
- Dual IPMB buffers to isolate the IPMC from the dual redundant IPMB-0 implemented on the backplane.
- An external oscillator to provide the operating frequency.

Oscillator H8S Processor



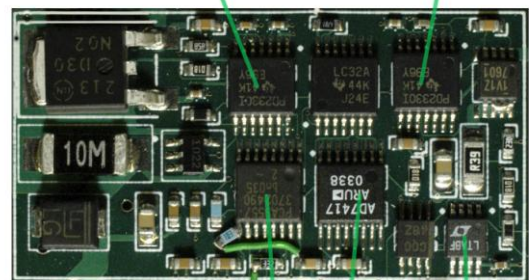
I<sup>2</sup>C Buffers



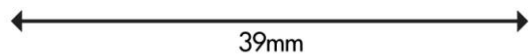
The next photo shows an example AMC site—the carrier-based logic that hosts an AMC position. The active components of each such site include:

- Two in-rush management and payload power controllers, one each for the payload and management power.
- The required IPMB buffer so that a malfunctioning AMC can be isolated from IPMB-L.
- An I<sup>2</sup>C-accessed GPIO array for the site-specific management signals.
- An alternate AMC site design (not shown) assumes small number of AMC sites and uses H8S GPIOs for site-specific management signals.

Management and Payload Power Controllers



GPIO ADC IPMB-L Buffer



### Specification compliant and interoperability tested

- AMC.0 R2.0, the AdvancedMC base specification
- PICMG 3.0 R3.0, the AdvancedTCA base specification (the underlying foundation for AMC.0), plus HPM.1, the IPM Controller Firmware Upgrade specification
- IPMI v1.5, document revision 1.1 and the relevant subset of IPMI v2.0, document revision 1.0, plus relevant errata
- Thoroughly tested with other management components at PICMG TCA-IWs (Interoperability Workshops)
- Compliance tested with Polaris Networks' AMC and ATCA Testers

## Full support for additional core hardware requirements of an AMC carrier

- Supports H8S/2167 and H8S/2166 variants, with 384K and 512Kbytes of Flash, respectively.
- AMC payload and management power control / monitoring, both for all AMC sites on a carrier and for each particular site
- Two implementation variants for AMC site control: 1) based on H8S GPIOs, usable for one or two sites, and 2) based on I<sup>2</sup>C GPIOs, scalable to full eight sites
- Control of fabric E-Keying governed interfaces, both for AMCs and for on-carrier switches terminating AMC links.
- Control of clock E-Keying governed interfaces, both for AMCs and for on-carrier clock-related devices
- Optional persistence of above controls across Carrier IPMC resets
- Management of on-carrier IPMB-L, the primary management communication path with the Module Management Controllers (MMCs) of installed AMCs

## Small footprint and low power

- Carrier IPMC core can fit in 29mm x 29mm footprint
- AMC site-specific logic can fit in 15mm x 34mm (H8S GPIO control) or 15mm x 42mm (I<sup>2</sup>C GPIO control)
- Active components consume only 79mA plus 6.625mA per implemented AMC site, max

## Comprehensive, readily adaptable firmware additions for carrier responsibilities

- All mandatory and many optional IPMI/ATCA/AMC commands supported over IPMB-L
- Carrier IPMC manages installed AMCs and represents them to the Shelf Manager as defined by AMC.0, with similar representation extended to the carrier payload
- Supplementary Pigeon Point extension commands, primarily used over the payload and serial debug interfaces
- Simple—but highly flexible—configuration of firmware features

## Simple, but powerful, firmware configuration mechanisms

- Additional configuration variables in a single `config.h` source file parameterize and determine inclusion/exclusion of carrier-related subsystems during firmware image build
- Binary configuration files for FRU Information and Sensor Data Records (SDR), with carrier-related additions, merged into firmware image
- FRU Information and SDR files produced from textual representations by special compilers included with underlying BMR-AVR-ATCA Starter Kit

## Comprehensive H8S development environment

- Already provided in underlying BMR-H8S-ATCA Starter Kit, ready for use with the Carrier IPMC firmware

## Enhancements to BMR-H8S-ATCA IPMC functionality

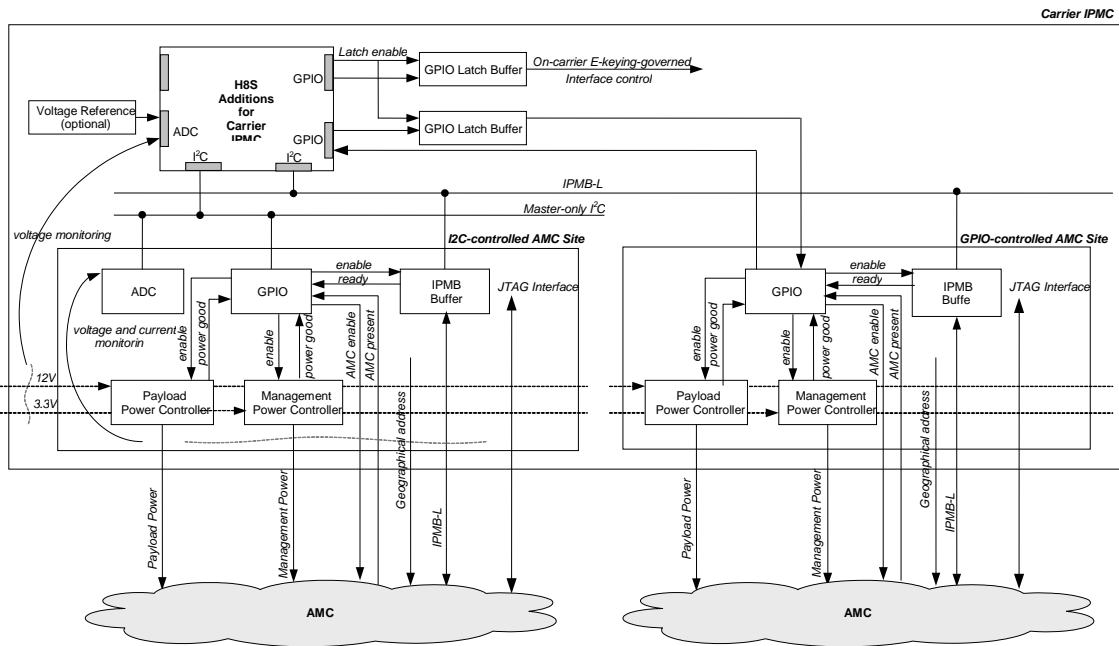
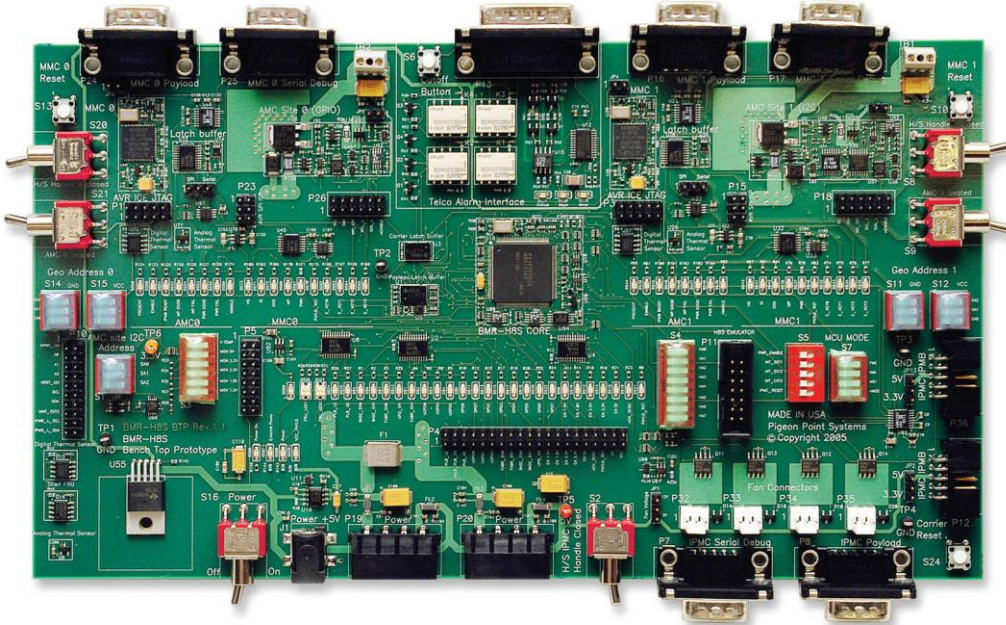
- Implicit bridging of IPMI/PICMG/SIPL commands referencing AMC resources, along with corresponding command replies
- Explicit bridging via IPMI Send Message commands, each containing an embedded command destined for an AMC, with appropriate forwarding of corresponding command replies
- Common sensor management framework for all sensors on the carrier, including those in installed AMCs
- Tracking the state of AMCs and notifying higher level entities (e.g., the Shelf Manager) of state changes
- Managing the hardware resources of the carrier, including power budget and E-Keying governed resources (including both fabric and clock E-Keying)
- Managing non-AMC modules equipped with MMCs, such as Rear Transition Modules

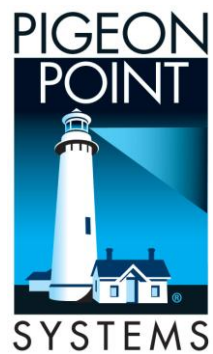
## Additional Pigeon Point extension commands for AMC modules and sites

- Get Module State
- Enable AMC Site
- Disable AMC Site

## Reference Implementation

The bench top implementation of this reference design is the same H8S-based bench top used with the BMR-H8S-ATCA reference design. This board already includes the needed Carrier IPMC functionality supporting two AMC sites. In addition, the bench top board implements an MMC at each site, based on the BMR-AVR-AMCm reference design. Thus, this board serves as a bench top implementation of both the BMR-H8S-AMCc (Carrier) and BMR-AVR-AMCm (Module) reference designs. In addition to the core facilities of those reference designs, the board includes example implementations of the optional controller features and numerous LEDs, switches and headers to allow lab experimentation with the behavior of the controllers, including pre-supported options and any desired firmware customizations. Below the photo is a high level block diagram of the Carrier IPMC extensions and the two AMC site variants.





For more information, visit our website at <http://www.pigeonpoint.com>

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