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## Keyboard and Embedded Controller for Notebook PC

- GPIO and Core Logic supports 3.3V and 1.8V Operation.
- Analog and PLL are 3.3V Operation only.
- ACPI Compliant
- VTR (standby) and VBAT Power Planes
  - Low Standby Current in Sleep Mode
- Configuration Register Set
  - Compatible with ISA Plug-and-Play Standard
  - EC-Programmable Base Address
- ARM® Cortex®-M4 Processor Core
  - 32-Bit ARM v7-M Instruction Set Architecture
  - Hardware Floating Point Unit (FPU)
  - Single 4GByte Addressing Space (Von Neumann Model)
  - Little-Endian Byte Ordering
  - Bit-Banding Feature Included
  - NVIC Nested Vectored Interrupt Controller
    - Up to 240 Individually-Vectored Interrupt Sources Supported
    - 8 Levels of Priority, Individually Assignable By Vector
    - Chip-Level Interrupt Aggregator supported, to expand number of interrupt sources or reduce number of vectors
  - System Tick Timer
  - Complete ARM-Standard Debug Support
    - JTAG-Based DAP Port, Comprised of SWJ-DP and AHB-AP Debugger Access Functions
    - Full DWT Hardware Functionality: 4 Data Watchpoints and Execution Monitoring
    - Full FPB Hardware Breakpoint Functionality: 6 Execution Breakpoints and 2 Literal (Data) Breakpoints
  - Comprehensive ARM-Standard Trace Support
    - Full DWT Hardware Trace Functionality for Watchpoint and Performance Monitoring
    - Full ITM Hardware Trace Functionality for Instrumented Firmware Support and Profiling
    - Full ETM Hardware Trace Functionality for Instruction Trace
    - Full TPIU Functionality for Trace Output Communication
  - MPU Feature
  - 1µS Delay Register
- Internal Memory
  - 64k Boot ROM
  - Two blocks of SRAM, totaling 256KB, 320KB or 480KB
    - Each block can be used for either program or data
    - One block 32KB or 64KB
    - One block 224KB, 288KB or 416KB
  - 128 Bytes Battery Powered SRAM
  - Non-volatile Read/Write Memory
    - 2KB of EEPROM
    - Single byte read/write access
    - 32 Byte page size
    - 1,000,000 write cycle endurance
- LPC Interface
  - Supports LPC Bus frequencies of 19MHz to 33MHz
  - 1.8V and 3.3V Support
  - LPC I/O Cycles Decoded
  - LPC Memory Cycles Decoded
  - Clock Run Support
  - Serial IRQ
  - ACPI SCI interface
  - SMI# output
- Enhanced Serial Peripheral Interface (eSPI)
  - Intel eSPI Specification compliant
  - Supports four channels/interfaces:
    - Peripheral channel Interface
    - Virtual Wire Interface
    - Out of Band Channel Interface
    - Flash Channel Interface
  - Supports EC Bus Master to Host Memory
- Legacy Support
  - Fast GATEA20 and Fast CPU\_RESET
- System to EC Message Interface
  - 8042 Style Host Interface
  - ACPI Embedded Controller Interface
    - Five Instances
      - 1 or 4 Byte Data transfer capable
      - Full-duplex Register Access
    - ACPI Power Management Interface
      - SCI Event-Generating Functions
    - Mailbox Registers Interface
      - Thirty-two 8-Bit Scratch Registers
      - Two Register Mailbox Command Interface
      - Two Register SMI Source Interface
    - Three Embedded Memory Interface Instances
      - Host Serial or Parallel IRQ Source
      - Provides Two Windows to On-Chip SRAM for Host Access
      - Two Register Mailbox Command Interface
      - Host Access of Virtual Registers Without EC Intervention
- Battery Backed Resources
  - Power-Fail Status Register
  - 32 KHz Clock Generator
  - Week Alarm Timer Interface
  - Real Time Clock
  - VBAT-Powered Control Interface
    - Five Wake-up Input Signals
    - Optional Latching of Wake-up Inputs
  - VBAT-Backed 128 Byte Memory

# MEC170x

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- Four EC-based SMBus 2.0 Host Controllers
  - Allows Master or Dual Slave Operation
  - Fully Operational on Standby Power
  - DMA-driven I<sup>2</sup>C Network Layer Hardware
  - I<sup>2</sup>C Datalink Compatibility Mode
  - Multi-Master Capable
  - Supports Clock Stretching
  - Programmable Bus Speed up to 1MHz
  - Hardware Bus Access “Fairness” Interface
  - SMBus Time-outs Interface
  - AMD-TSI Port
  - 12 Ports Assignable to Any Controller
  - All ports 1.8V-capable
- Five independent Hardware Driven PS/2 Ports
  - Three controllers
  - Fully functional on Main and/or Suspend Power
  - PS/2 Edge Wake Capable
  - Two ports 5V tolerant
- Two General Purpose Serial Peripheral Interface Controllers (ECGP-SPI)
  - One 3-pin EC-driven Full Duplex Serial Communication Interface
  - One Full Duplex Serial Communication Interface Accessible by Host over LPC
  - Flexible Clock Rates
  - SPI Burst Capable
- One Quad Serial Peripheral Interface (SPI) Controller
  - Master Only SPI Controller
  - Mappable to two ports (only 1 port active at a time)
  - Dual and Quad I/O Support
  - Flexible Clock Rates
  - SPI Burst Capable
  - SPI Controller Operates with Internal DMA Controller with CRC Generation
- 18 x 8 Interrupt Capable Multiplexed Keyboard Scan Matrix
  - Optional Push-Pull Drive for Fast Signal Switching
- Four Breathing/Blinking LED Interfaces
  - Supports three modes of operation:
    - Blinking Mode with Programmable Blink Rates
    - Breathing LED Output
    - 8-bit PWM
  - Breathing LED Supports Piecewise-linear Brightness Curves, Symmetric or Asymmetric
  - Supports Low Power Operation in Blinking and Breathing Modes
    - Operates on Standby Power
    - Operates in Chip's Heavy Sleep State on 32kHz standby clock
    - Operational in EC Sleep State
  - Pin buffers capable of sinking up to 12 mA
- Three Resistor/Capacitor Identification Detection (RC\_ID) ports
  - Single Pin Interface to External Inexpensive RC Circuit
  - Replacement for Multiple GPIO's
  - Provides 8 Quantized States on One Pin
- General Purpose I/O Pins
  - Up to 148 GPIOs
  - 8 GPIO Pass-Through Port (GPTP)
  - Glitch protection on most GPIO pins
  - 6 Battery-powered General Purpose Outputs
  - All GPIOs can be powered by 1.8V
  - Programmable Drive Strength and Slew Rate on all GPIOs
- Programmable 16-bit Counter/Timer Interface
  - Four 16-bit Auto-reloading Counter/Timer Instances
  - Four Operating Modes per Instance: Timer, One-shot, Event and Measurement
    - 4 External Inputs, 4 External Outputs
- Hibernation Timer Interface
  - Two 32.768 KHz Driven 16-bit Timers
    - Programmable Wake-up from 0.5ms to 128 Minutes
  - One 32.768 KHz Driven 32-bit RTOS Timer
    - Programmable Wake-up from 30µS to 35 Hours
    - Auto Reload Option
- System Watch Dog Timer (WDT)
- Input Capture and Compare Timer
  - 32-bit Free-running timer
  - Six 32-bit Capture Registers
  - Two 32-bit Compare Registers
  - Capture, Compare and Overflow Interrupts
  - Toggle Output on Compare Timers
- Week Timer
  - Power-up Event Output
  - Week Alarm Interrupt with 1 Second to 8.5 Year Time-out
  - Sub-Week Alarm Interrupt with 0.50 Seconds - 72.67 hours time-out
  - 1 Second and Sub-second Interrupts
- Real Time Clock (RTC)
  - VBAT Powered
  - 32KHz Crystal Oscillator
  - Time-of-Day and Calendar Registers
  - Programmable Alarms
  - Supports Leap Year and Daylight Savings Time
- Two Microchip BC-Link Interconnection Bus
  - Programmable Bus Clock Rate
- PECL Interface 3.0
- FAN Support
  - Eleven Programmable Pulse-Width Modulator (PWM) Outputs
    - Multiple Clock Rates
    - 16-Bit 'On' and 16-Bit 'Off' Counters
  - Three Fan Tachometer Inputs
  - Two RPM-Based Fan Speed Controllers
    - Each includes one Tach input and one PWM output
    - 3% accurate from 500 RPM to 16k RPM
    - Automatic Tachometer feedback
    - Aging Fan or Invalid Drive Detection
    - Spin Up Routine
    - Ramp Rate Control
    - RPM-based Fan Speed Control Algorithm



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- ADC Interface
    - 10-bit Conversion in 1 $\mu$ s
    - 16 Channels
    - Integral Non-Linearity of  $\pm 1.5$  LSB; Differential Non-Linearity of  $\pm 1.0$  LSB
  - Two Standard 16C550 UARTs
    - Accessible from Host and EC
    - One UART with full 8-pin Modem Control
    - One UART with 4-pin Interface
    - Programmable Input/output Pin Polarity Inversion
    - Programmable Main Power or Standby Power Functionality
  - Two Port 80h Debug Ports for BIOS Debug
    - Ports, Assignable to Any LPC IO Address
    - 24-bit Timestamp with Adjustable Timebase
    - 16-Entry FIFO
  - Trace FIFO Debug Port (TFDP)
  - Integrated Standby Power Reset Generator
    - Reset Input Pin
    - Reset Output Pin
  - Clock Generator
    - 32.768KHz Clock Source
      - Low power 32KHz crystal oscillator
      - Optional use of a crystal-free silicon oscillator with  $\pm 2\%$  Accuracy
      - Optional use of 32.768 KHz input Clock
      - Operational on Suspend Power
    - Programmable Clock Power Management Control and Distribution
    - 48 MHz PLL
  - Multi-purpose AES Cryptographic Engine
    - Hardware support for ECB, CTR, CBC and OFB AES modes
    - Support for 128-bit, 192-bit and 256-bit key length
    - DMA interface to SRAM, shared with Hash engine
  - Cryptographic Hash Engine
    - Support for SHA-1, SHA-256, SHA-384, SHA-512
    - DMA interface to SRAM, shared with AES engine
  - Public Key Cryptographic Engine
    - Hardware support for RSA and Elliptic Curve public key algorithms
    - RSA keys length of 1024 or 2048 bits
    - ECC Prime Field and Binary Field keys up to 640 bits
    - Microcoded support for standard public key algorithms
  - Cryptographic Features
    - True Random Number Generator
      - 1K bit FIFO
    - Monotonic Counter
  - Packages
    - 144 Pin WFBGA RoHS Compliant package
    - 169 Pin WFBGA RoHS Compliant package

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# MEC170x

## 1.0 GENERAL DESCRIPTION

The MEC170x is a family of keyboard and embedded controller designs customized for notebooks and tablet platforms. The family is a highly-configurable, mixed signal, advanced I/O controller architecture. Every device in the family incorporates a 32-bit ARM Cortex M4F Microcontroller core with a closely-coupled SRAM for code and data. A secure boot-loader is used to download the custom firmware image from the system's shared SPI Flash device, thereby allowing system designers to customize the device's behavior.

The MEC170x products may be configured to communicate with the system host through one of three host interfaces: Intel Low Pin Count (LPC), eSPI, or I<sup>2</sup>C. Note that this functionality is product dependent. To see which features apply to a specific part in the family see [Table 1-1, "MEC170x Feature List by Package"](#). The document defines the features for all devices in the family.

The MEC170x products are designed to operate as either a stand-alone I/O device or as an EC Base Component of a split-architecture Advanced I/O Controller system which uses BC-Link communication protocol to access up to two BC bus companion components. The BC-Link protocol is peer-to-peer providing communication between the MEC170x embedded controller and registers located in a companion device.

The MEC170x is directly powered by a minimum of two separate suspend supply planes (VBAT and VTR) and senses a third runtime power plane (VCC) to provide "instant on" and system power management functions. There are three voltage supply regions for all GPIO pins. Each region may be either 3.3V or 1.8V. The LPC interface may be operated at either 1.8V or 3.3V; the eSPI interface operates at 1.8V. All the devices are equipped with a Power Management Interface that supports low-power states and are capable of operating in a Connected Standby system.

The MEC170x family of devices offer a software development system interface that includes a Trace FIFO Debug port, a host accessible serial debug port with a 16C550A register interface, a Port 80 BIOS Debug Port, and a JTAG/SWD debug interface.

## 1.1 Family Features

**TABLE 1-1: MEC170X FEATURE LIST BY PACKAGE**

| MEC170x Product Family             | MEC1701           | MEC1701           | MEC1701           | MEC1703           | MEC1703           | MEC1703           | MEC1703           | MEC1704           | MEC1705           |
|------------------------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|
| Package                            | 128 WFBGA-TF      | 144 WFBGA-SZ      | 169 WFBGA-TN      | 128 WFBGA-TF      | 144 WFBGA-GA_SZ   | 169 WFBGA-TN      | 169 WFBGA-XY      | 144 WFBGA-SZ      | 144 WFBGA-SZ      |
| Device ID                          | 2Dh               | 2Dh               | 2Dh               | 2Eh               | 2Eh               | 2Eh               | 2Eh               | 33h               | 32h               |
| Boundary Scan JTAG ID              | 021B2445h         | 021B2445h         | 021B2445h         | 021B2445h         | 021C2445h         | 021B2445h         | 021C2445h         | 02202445h         | 02202445h         |
| SRAM Block (Primary use: code)     | 224KB/288KB/416KB | 224KB/288KB/416KB | 224KB/288KB/416KB | 224KB/288KB/416KB | 224KB/288KB/416KB | 224KB/288KB/416KB | 224KB/288KB/416KB | 224KB/288KB/416KB | 224KB/288KB/416KB |
| SRAM Block (Primary use: data)     | 32KB/64KB         | 32KB/64KB         | 32KB/64KB         | 32KB/64KB         | 32KB/64KB         | 32KB/64KB         | 32KB/64KB         | 32KB/64KB         | 32KB/64KB         |
| Battery Backed SRAM                | 128 bytes         | 128 bytes         | 128 bytes         | 128 bytes         | 128 bytes         | 128 bytes         | 128 bytes         | 128 bytes         | 128 bytes         |
| EEPROM                             | 0                 | 0                 | 0                 | 2K bytes          | 2K bytes          | 2K bytes          | 2K bytes          | 0                 | 2K bytes          |
| LPC Host Interface                 | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               |
| eSPI Host Interface                | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               |
| 8042 Emulated Keyboard Controller  | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               |
| Embedded Memory Interface (EMI)    | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 | 3                 |
| Mailbox Register Interface         | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 | 1                 |
| ACPI Embedded Controller Interface | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 | 5                 |
| ACPI PM1 Block Interface           | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               |
| Trace FIFO Debug Port              | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               | Yes               |
| Internal DMA Channels              | 14                | 14                | 14                | 14                | 14                | 14                | 14                | 14                | 14                |

**TABLE 1-1: MEC170X FEATURE LIST BY PACKAGE (CONTINUED)**

| MEC170x Product Family                          | MEC1701                           | MEC1701                           | MEC1701                           | MEC1703                           | MEC1703                           | MEC1703                           | MEC1703                           | MEC1704                           | MEC1705                           |
|---|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|
| Package   | 128 WFBGA-TF                      | 144 WFBGA-SZ                      | 169 WFBGA-TN                      | 128 WFBGA-TF                      | 144 WFB-GA_SZ                     | 169 WFBGA-TN                      | 169 WFBGA-XY                      | 144 WFBGA-SZ                      | 144 WFBGA-SZ                      |
| 16-bit Basic Timer                              | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 |
| 32-bit Basic Timer                              | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 |
| 16-bit Counter/Timer                            | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 |
| Capture Timer                                   | 6                                 | 6                                 | 6                                 | 6                                 | 6                                 | 6                                 | 6                                 | 6                                 | 6                                 |
| Compare Timer                                   | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 |
| Watchdog Timer (WDT)                            | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 |
| Hibernation Timer                               | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 |
| Week Timer                                      | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 |
| RTC   | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 | 1                                 |
| Battery-Powered General Purpose Output (BGPO)   | 1                                 | 4                                 | 6                                 | 1                                 | 4                                 | 6                                 | 6                                 | 4                                 | 4                                 |
| Active Low VBAT-Powered Control Interface (VCI) | 4                                 | 4                                 | 6                                 | 4                                 | 4                                 | 6                                 | 6                                 | 4                                 | 4                                 |
| Keyboard Matrix Scan Support                    | Yes                               | Yes                               | Yes                               | Yes                               | Yes                               | Yes                               | Yes                               | Yes                               | Yes                               |
| Port 80 BIOS Debug Port                         | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 |
| I2C Host Controllers                            | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 |
| I2C Ports                                       | 10                                | 10                                | 11                                | 10                                | 10                                | 11                                | 11                                | 10                                | 10                                |
| PECI 3.1 Interface                              | Yes                               | Yes                               | Yes                               | Yes                               | Yes                               | Yes                               | Yes                               | Yes                               | Yes                               |
| PS/2 Device Interface                           | 3 controller/ 4 ports             | 3 controller/ 4 ports             | 3 controller/ 5 ports             | 3 controller/ 4 ports             | 3 controller/ 4 ports             | 3 controller/ 5 ports             | 3 controller/ 5 ports             | 3 controller/ 4 ports             | 3 controller/ 4 ports             |
| GPIOs   | 107                               | 123                               | 148                               | 107                               | 123                               | 148                               | 148                               | 123                               | 123                               |
| Pass-through GPIOs                              | 6                                 | 6                                 | 8                                 | 6                                 | 6                                 | 8                                 | 8                                 | 6                                 | 6                                 |
| Blinking/Breathing PWM                          | 3                                 | 4                                 | 4                                 | 3                                 | 4                                 | 4                                 | 4                                 | 4                                 | 4                                 |
| General Purpose SPI Master Controller           | 1                                 | 2                                 | 2                                 | 1                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 |
| Quad SPI Master Controller                      | 1 controller/ 1 port              | 1 controller/ 2 ports             | 1 controller/ 2 ports             | 1 controller/ 1 port              | 1 controller/ 2 ports             | 1 controller/ 2 ports             | 1 controller/ 2 ports             | 1 controller/ 2 ports             | 1 controller/ 2 ports             |
| 10-bit ADC Channels                             | 8                                 | 8                                 | 16                                | 8                                 | 8                                 | 16                                | 16                                | 8                                 | 8                                 |
| 16-bit PWMs                                     | 8                                 | 8                                 | 11                                | 8                                 | 8                                 | 11                                | 11                                | 8                                 | 8                                 |
| 16-bit TACHs                                    | 3                                 | 3                                 | 3                                 | 3                                 | 3                                 | 3                                 | 3                                 | 3                                 | 3                                 |
| UARTs   | 2<br>UART0: 2-pin<br>UART1: 2-pin | 2<br>UART0: 2-pin<br>UART1: 2-pin | 2<br>UART0: 8-pin<br>UART1: 4-pin | 2<br>UART0: 2-pin<br>UART1: 2-pin | 2<br>UART0: 2-pin<br>UART1: 2-pin | 2<br>UART0: 8-pin<br>UART1: 4-pin | 2<br>UART0: 8-pin<br>UART1: 4-pin | 2<br>UART0: 8-pin<br>UART1: 4-pin | 2<br>UART0: 8-pin<br>UART1: 4-pin |
| BC-Link   | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 | 2                                 |
| AES Hardware Support                            | 128-256 bit                       | 128-256 bit                       | 128-256 bit                       | 128-256 bit                       | 128-256 bit                       | 128-256 bit                       | 128-256 bit                       | 128-256 bit                       | 128-256 bit                       |
| SHA Hashing Support                             | SHA-1 to SHA-512                  | SHA-1 to SHA-512                  | SHA-1 to SHA-512                  | SHA-1 to SHA-512                  | SHA-1 to SHA-512                  | SHA-1 to SHA-512                  | SHA-1 to SHA-512                  | SHA-1 to SHA-512                  | SHA-1 to SHA-512                  |
| Public Key Cryptography Support                 | RSA: 4K bit<br>ECC: 640 bit       | RSA: 4K bit<br>ECC: 640 bit       | RSA: 4K bit<br>ECC: 640 bit       | RSA: 4K bit<br>ECC: 640 bit       | RSA: 4K bit<br>ECC: 640 bit       | RSA: 4K bit<br>ECC: 640 bit       | RSA: 4K bit<br>ECC: 640 bit       | RSA: 4K bit<br>ECC: 640 bit       | RSA: 4K bit<br>ECC: 640 bit       |



# MEC170x

**TABLE 1-1: MEC170X FEATURE LIST BY PACKAGE (CONTINUED)**

| MEC170x Product Family       | MEC1701      | MEC1701      | MEC1701      | MEC1703      | MEC1703       | MEC1703      | MEC1703      | MEC1704      | MEC1705      |
|------------------------------|--------------|--------------|--------------|--------------|---------------|--------------|--------------|--------------|--------------|
| Package                      | 128 WFBGA-TF | 144 WFBGA-SZ | 169 WFBGA-TN | 128 WFBGA-TF | 144 WFB-GA_SZ | 169 WFBGA-TN | 169 WFBGA-XY | 144 WFBGA-SZ | 144 WFBGA-SZ |
| True Random Number Generator | 1K bit       | 1K bit       | 1K bit       | 1K bit       | 1K bit        | 1K bit       | 1K bit       | 1K bit       | 1K bit       |
| UPD Dead Battery Support     | No           | No           | Yes          | No           | No            | Yes          | Yes          | No           | No           |

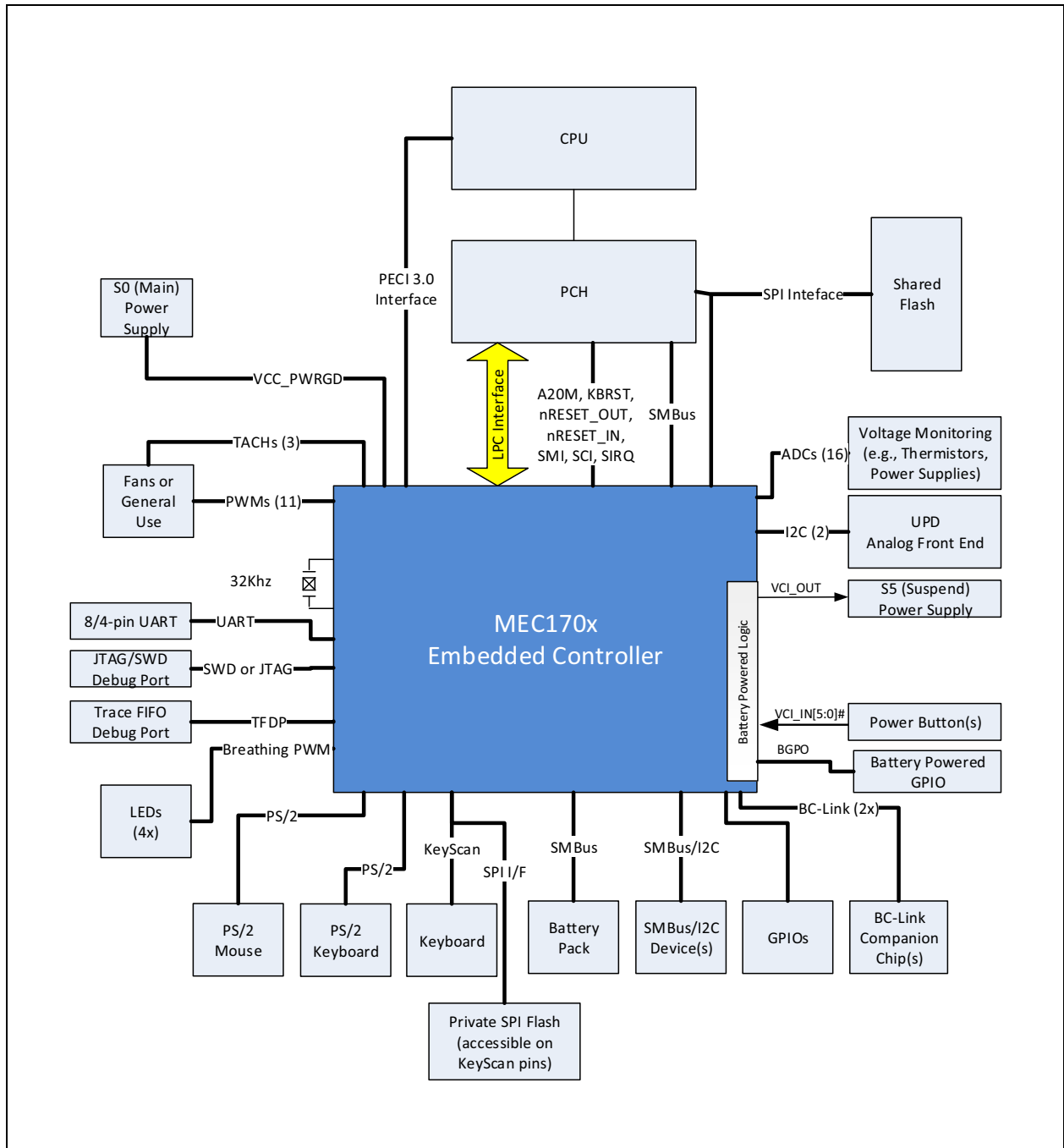
## 1.2 Boot ROM

Following the release of the [RESET\\_EC](#) signal, the processor will start executing code in the Boot ROM. The Boot ROM executes the SPI Flash Loader, which downloads User Code from an external SPI Flash and stores it in the internal Code RAM. Upon completion, the Boot ROM jumps into the User Code and starts executing as defined in the Boot Loader document.

The Boot ROM call load code from an external SPI Flash device via the Shared Flash Interface, the Private Flash Interface or via the eSPI Flash Channel. The downloaded code must configure the device's pins according to the platform's needs. If the Boot ROM loads code via the eSPI Flash Channel, the pins that constitute the eSPI interface are left in the eSPI state; otherwise, the Boot ROM leaves all pins in their default initial state.

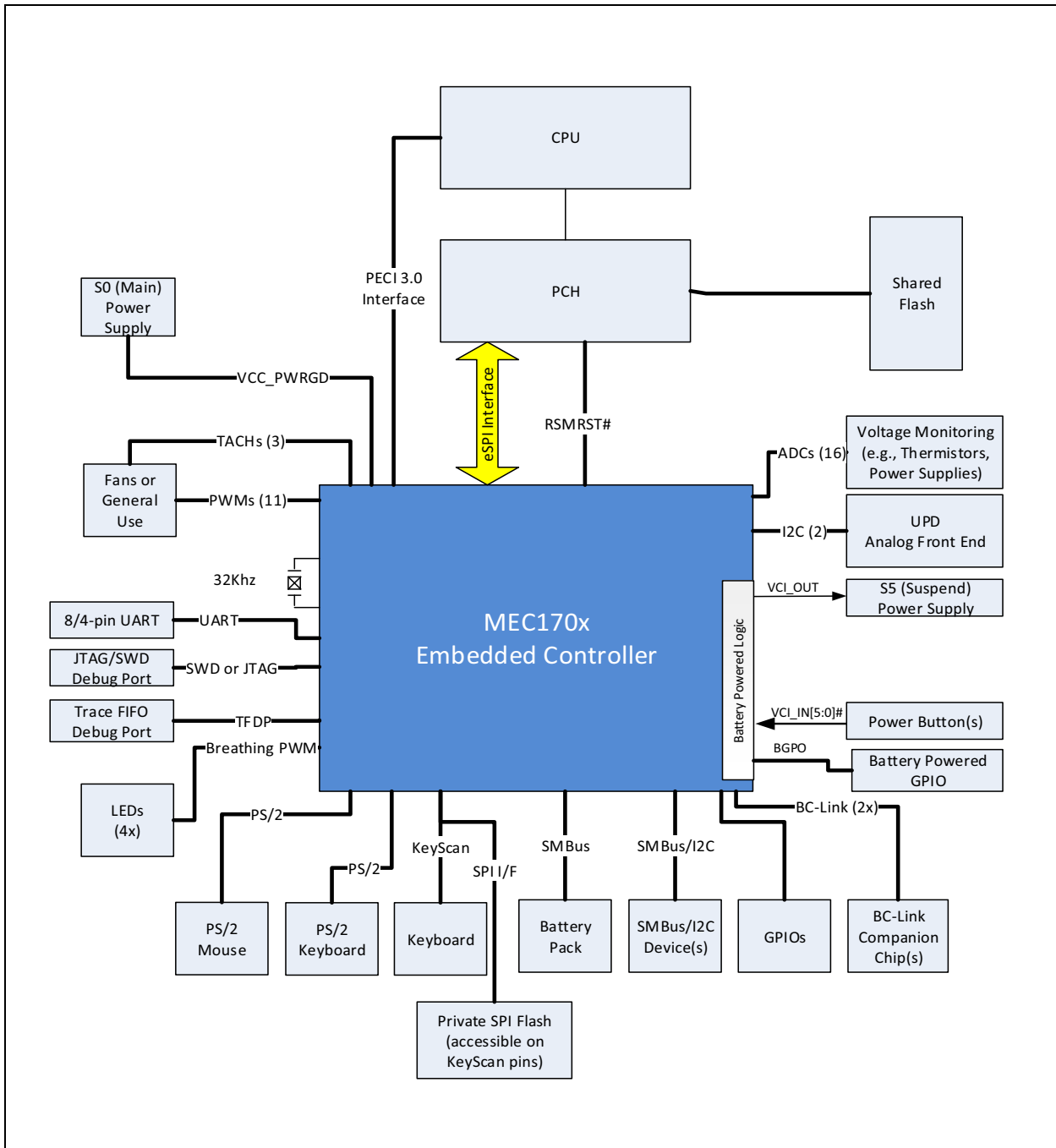
## 1.3 System Block Diagrams

### 1.3.1 LPC HOST SYSTEM BLOCK DIAGRAM



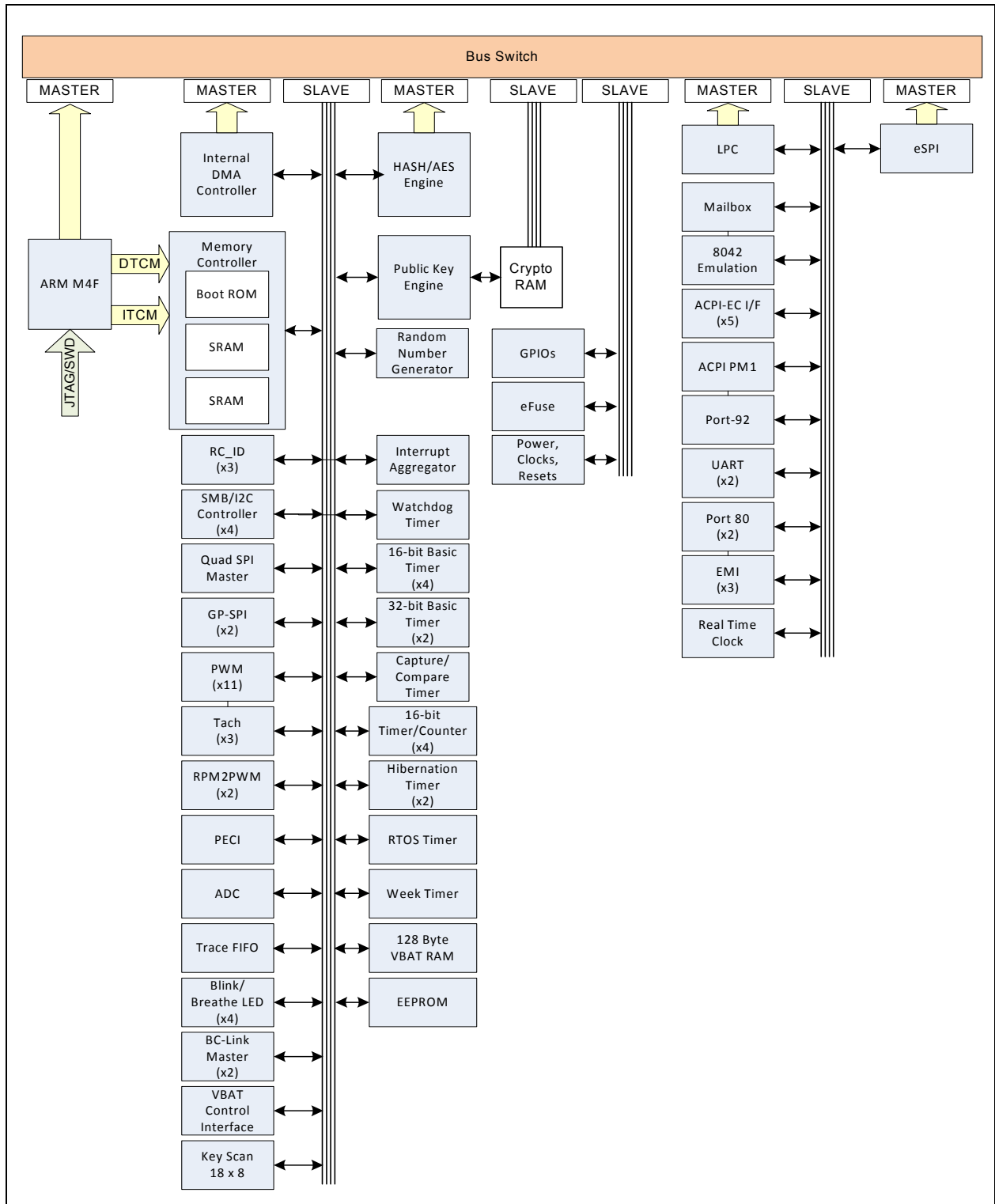
# MEC170x

## 1.3.2 ESPI HOST SYSTEM BLOCK DIAGRAM



## 1.4 MEC170x Block Diagram

**Note:** Not all features shown are available on all devices. Refer to [Table 1-1, "MEC170x Feature List by Package"](#) for a list of the features by device.



# MEC170x

## 2.0 PIN CONFIGURATION

### 2.1 Description

The Pin Configuration chapter includes [Pin List By Pin Name](#), [Signal Description by Signal](#), [Notes for Tables in this Chapter](#), [Pin Default State Through Power Transitions](#), and [Packages](#).

### 2.2 Terminology and Symbols for Pins/Buffers

#### 2.2.1 BUFFER TERMINOLOGY

| Term   | Definition   |
|--------|--|
| #      | The '#' sign at the end of a signal name indicates an active-low signal  |
| n      | The lowercase 'n' preceding a signal name indicates an active-low signal   |
| PWR    | Power  |
| PIO    | Programmable as Input, Output, Open Drain Output, Bi-directional or Bi-directional with Open Drain Output. Configurable drive strength from 2ma to 12ma.<br><b>Note:</b> All GPIOs have programmable drive strength options of 2ma, 4ma, 8ma and 12ma. GPIO pin drive strength is determined by the <a href="#">DRIVE_STRENGTH</a> field in the <a href="#">Pin Control 2 Register</a> . |
| In     | I Type Input Buffer.   |
| O2ma   | O-2 mA Type Buffer.  |
| PCI    | PCI pin. These pins meet the PCI 3.3V AC and DC Characteristics. ( <a href="#">Note 1</a> )  |
| PECI   | PECI Input/Output. These pins operate at the processor voltage level (VREF_VTT)  |
| SB-TSI | SB-TSI Input/Output. These pins operate at the processor voltage level (VREF_VTT)  |

**Note 1:** See the "PCI Local Bus Specification," Revision 2.1, Section 4.2.2.

**2:** See the "PCI Local Bus Specification," Revision 2.1, Section 4.2.2 and 4.2.3.

#### 2.2.2 PIN NAMING CONVENTIONS

- Pin Name is composed of the multiplexed options separated by '/'. E.g., GPIOxxxx/SignalA/SignalB.
- Parenthesis '(') are used to list aliases or alternate functionality for a single mux option. For example, GPIO062/(RESETO#) has only a single mux option, GPIO062, but the signal GPIO062 can also be used or interpreted as RESETO#.
- Signal Names appended with a numeric value indicates the Instance Number E.g., PWM0, PWM1, etc. indicates that PWM0 is the PWM output for PWM Instance 0, PWM1 is the PWM output for PWM Instance 1, etc. Note that this same instance number is shown in the Register Base Address tables linking the specific PWM block instance to a specific signal on the pinout. The instance number may be omitted if there is only one instance of the IP block implemented.

### 2.3 Notes for Tables in this Chapter

| Note   | Description  |
|--------|--|
| Note 1 | The nEC_SCI pin can be controlled by hardware and EC firmware. The nEC_SCI pin can drive either the ACPI Run-time GPE Chipset input or the Wake GPE Chipset input. Depending how the nEC_SCI pin is used, other ACPI-related SCI functions may be best supplied by other general purpose outputs that can be configured as open-drain drivers. |
| Note 2 | These pins require an external weak pull-up resistors of 10k-100k ohms.  |
| Note 3 | A weak pull-up resistor is recommended on the BC-Link data line (100KΩ).   |
| Note 4 | The UARTs can be used by the Host or EC. This pin can be VCC protected or not VCC protected under program control by the POWER bit in the Configuration Select Register in Host configuration space (also accessible by the EC).   |

| Note    | Description  |
|---------|--|
| Note 5  | When the JTAG_RST# pin is not asserted (logic'1'), the pins for the signal functions in the JTAG/SWD interface are unconditionally routed to the interface; the Pin Control register for these pins has no effect. When the JTAG_RST# pin is asserted (logic'0'), the signal functions in the JTAG/SWD interface are not routed to the interface and the Pin Control Register for these pins controls the muxing. The pin control registers can not route the JTAG interface to the pins. System Board Designer should terminate this pin in all functional state using jumpers and pull-up or pull down resistors, etc. |
| Note 6  | PS/2 ports ending with signal functions ending with "A" or "B" are muxed to a single controller. Only one set of clock and data are intended to be used at a time (either "A" or "B" not both). The unused port segment should have its associated pin control register's, Mux Control Field programmed away from the PS2 controller.  |
| Note 7  | The GPIO062 pin defaults to output 'low' on RESET_SYS to support the firmware controlled RESETO# feature. RESETO# is not a GPIO alternate function; it is controlled by firmware as a GPIO function.   |
| Note 8  | The BGPO pins have a GPIO signal for interrupt/wake-only signal functions. The BGPO alternate function is not selected through the GPIO Pin Control register. Instead, the BGPO alternate function is configured by programming the Week Timer Control register. When configured as the BGPO function the pad is powered by VBAT.  |
| Note 9  | The VREF_VTT pin should be disabled by the <a href="#">PECI Disable Register</a> if Peci or SB-TSI are not used.   |
| Note 10 | The UART_CLK external baud clock input is connected to all the UARTs in the design. Each UART may select either the external UART_CLK baud clock or the internally generated baud clock.   |
| Note 11 | The nEM_INT signal is asserted low if any of the EMI blocks have their nEM_INT signal asserted low. This signal can be routed to nSMI and nPME inputs in the system as required.   |
| Note 12 | The Private SPI Interface may be used for Crisis Recovery. Crisis Recovery offers a way to load a SPI Flash image from an external SPI Flash device connected via the Keyboard Scan Interface pins. The GPIO045/KSO01 pin requires a weak external pull-up for normal operation. If this pin is not detected as a high input following a POR the device could enter Crisis Recovery mode in error and fail to boot.  |
| Note 13 | VCI_IN# function works even when configured as GPIO.   |
| Note 14 | I2C/SMBus Port pins can be mapped to any SMB-I2C Controller. The number in the I2C/SMBus signal names (I2Cxx_DATA) indicates the port value. E.g. I2C01_DATA represents I2C/SMBus Data Port 1  |
| Note 15 | The Voltage Regulator Capacitor (VR_CAP) pin requires an external 1uF capacitor.   |
| Note 16 | The GPTP-OUT always drives at the level of the output buffer regardless of the voltage at the GPTP-IN pin. If GPTP-OUT buffer is powered by 1.8V the signal out will be 1.8V regardless of the voltage on the GPTP-IN pin. So, if GPTP-IN pin is 3.3V then the output essentially level-shifts the voltage down to 1.8V. Similarly if GPTP-OUT is 3.3V then the signal will be 3.3V regardless of the voltage on the GPTP-IN pin. If the GPTP-IN pin is 1.8V the output essentially level-shifts the voltage up to 3.3V.   |

## 2.4 Pin List By Pin Name

### 2.4.1 DEFAULT STATE

The default state for analog pins is Input. The default state for all pins that default to a GPIO function is also input, with pull-up and pull-down resistors disabled. The default state for pins that differ is shown in the following table. Entries for the Default State column are

- O2ma-Low: Push-Pull output, Slow slew rate, 2ma drive strength, grounded
- O2ma-High: Push-Pull output, Slow slew rate, 2ma drive strength, high output
- In-PU: Input, with pull-up resistor enabled



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| MEC1701/MEC1703-128 WFBGA-TF | MEC1704-144 WFBGA-SZ | MEC1705-144 WFBGA-SZ | MEC1701/MEC1703-144 WFBGA-SZ | MEC1701-169 WFBGA-TN | MEC1703-169 WFBGA-TN | MEC1703-169 WFBGA-XY | Pin Name                      | Default<br>(if not GPIO) | Default<br>State<br>(if not In) |
|------------------------------|----------------------|----------------------|------------------------------|----------------------|----------------------|----------------------|-------------------------------|--------------------------|---------------------------------|
| A3                           | A5                   | A5                   | A5                           | B4                   | C6                   | D6                   | BGPO0                         | BGPO0                    | O2ma-Low                        |
| D2                           | B3                   | B3                   | B3                           | C2                   | D4                   | C3                   | GPIO000/VCI_IN3#              | VCI_IN3#                 |                                 |
|                              |                      |                      |                              | N11                  | M9                   | R12                  | GPIO001/PWM4                  |                          |                                 |
| K8                           | M8                   | M8                   | M8                           | N13                  | L8                   | L9                   | GPIO002/PWM5                  |                          |                                 |
| B5                           | F5                   | F5                   | F5                           | C6                   | D7                   | B7                   | GPIO003/I2C00_SDA/SPI0_CS#    |                          |                                 |
| D7                           | C6                   | C6                   | C6                           | B5                   | B6                   | D7                   | GPIO004/I2C00_SCL/SPI0_MOSI   |                          |                                 |
|                              |                      |                      |                              | A5                   | B4                   | E7                   | GPIO005/I2C01_SDA/GPTP-OUT4   |                          |                                 |
|                              |                      |                      |                              | B6                   | A6                   | A7                   | GPIO006/I2C01_SCL/GPTP-OUT7   |                          |                                 |
| B11                          | B12                  | B12                  | B12                          | B10                  | A13                  | A14                  | GPIO007/I2C03_SDA/PS2_CLK0B   |                          |                                 |
| B10                          | C10                  | C10                  | C10                          | C10                  | B11                  | D11                  | GPIO010/I2C03_SCL/PS2_DAT0B   |                          |                                 |
| J4                           | J6                   | J6                   | J6                           | L5                   | K6                   | K6                   | GPIO011/nSMI                  |                          |                                 |
| M8                           | N6                   | N6                   | N6                           | L7                   | N3                   | P8                   | GPIO012/I2C07_SDA/TOUT3       |                          |                                 |
| K5                           | M7                   | M7                   | M7                           | H7                   | N4                   | R8                   | GPIO013/I2C07_SCL/TOUT2       |                          |                                 |
| M10                          | M9                   | M9                   | M9                           | M10                  | N9                   | P11                  | GPIO014/PWM6/GPTP-IN6         |                          |                                 |
| K7                           | J7                   | J7                   | J7                           | M12                  | L9                   | J9                   | GPIO015/PWM7                  |                          |                                 |
| N6                           | N3                   | N3                   | N3                           | N8                   | M5                   | M7                   | GPIO016/GPTP-IN7/SHD_IO3/ICT3 |                          |                                 |
| H9                           | J8                   | J8                   | J8                           | J9                   | N10                  | K11                  | GPIO017/GPTP-IN5/KSI0         |                          |                                 |
| K6                           | L7                   | L7                   | L7                           | L9                   | M6                   | R9                   | GPIO020/KSI1                  |                          |                                 |
| N9                           | N9                   | N9                   | N9                           | M9                   | M8                   | P10                  | GPIO021/LPCPD#/KSI2           |                          |                                 |
| C2                           | E2                   | E2                   | E2                           | D2                   | F2                   | D2                   | GPIO022/GPTP-IN0              |                          |                                 |
| F2                           | C3                   | C3                   | C3                           | F4                   | E5                   | F5                   | GPIO023/GPTP-IN1              |                          |                                 |
| B1                           | C2                   | C2                   | C2                           | E2                   | E2                   | G4                   | GPIO024/GPTP-IN2              |                          |                                 |
| L13                          | M12                  | M12                  | M12                          | K12                  | L11                  | H11                  | GPIO025/TIN0/nEM_INT/UART_CLK |                          |                                 |
| N13                          | N13                  | N13                  | N13                          | L11                  | M12                  | P12                  | GPIO026/TIN1/KSI3             |                          |                                 |
| K13                          | K11                  | K11                  | K11                          | F13                  | L13                  | P15                  | GPIO027/TIN2/KSI4             |                          |                                 |
| K12                          | J9                   | J9                   | J9                           | J13                  | J9                   | N14                  | GPIO030/TIN3/KSI5             |                          |                                 |
| N11                          | M11                  | M11                  | M11                          | M13                  | M11                  | M11                  | GPIO031/GPTP-OUT1/KSI6        |                          |                                 |
| J9                           | L10                  | L10                  | L10                          | K9                   | L10                  | M10                  | GPIO032/GPTP-OUT0/KSI7        |                          |                                 |
| E2                           | B2                   | B2                   | B2                           | C1                   | E4                   | B1                   | GPIO033/RC_ID0                |                          |                                 |
|                              | H12                  | H12                  | H12                          | E13                  | H12                  | H15                  | GPIO034/RC_ID1/SPI0_CLK       |                          |                                 |
| G12                          |                      |                      | E13                          | G11                  | G12                  | G15                  | GPIO035/PWM8/CTOUT1           |                          |                                 |
|                              | H13                  | H13                  | H13                          | F12                  | H13                  | J12                  | GPIO036/RC_ID2/SPI0_MISO      |                          |                                 |
| M11                          | M10                  | M10                  | M10                          | M11                  | N11                  | L11                  | GPIO040/GPTP-OUT2/KSO00       |                          |                                 |
|                              |                      |                      |                              | F2                   | C1                   | H4                   | GPIO041                       |                          |                                 |

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| MEC1701/MEC1703-128 WFBGA-TF | MEC1704-144 WFBGA-SZ | MEC1705-144 WFBGA-SZ | MEC1701/MEC1703-144 WFBGA-SZ | MEC1701-169 WFBGA-TN | MEC1703-169 WFBGA-TN | MEC1703-169 WFBGA-XY | Pin Name                       | Default<br>(if not GPIO) | Default<br>State<br>(if not In) |
|------------------------------|----------------------|----------------------|------------------------------|----------------------|----------------------|----------------------|--------------------------------|--------------------------|---------------------------------|
| J10                          | J12                  | J12                  | J12                          | H10                  | H9                   | J15                  | GPIO042/PECI_DAT/SB-TSI_DAT    |                          |                                 |
| H10                          | J13                  | J13                  | J13                          | H11                  | H10                  | J14                  | GPIO043/SB-TSI_CLK             |                          |                                 |
| H12                          | H11                  | H11                  | H11                          | G9                   | H11                  | K12                  | GPIO044/REF_VTT                |                          |                                 |
| A9                           | E8                   | E8                   | E8                           | E8                   | E8                   | A11                  | GPIO045/KSO01                  |                          |                                 |
| E10                          | E9                   | E9                   | E9                           | E10                  | F11                  | F10                  | GPIO046/BCM1_DAT/KSO02         |                          |                                 |
| B13                          | F13                  | F13                  | F13                          | A12                  | D13                  | E15                  | GPIO047/BCM1_CLK/KSO03         |                          |                                 |
| G4                           | F3                   | F3                   | F3                           | G2                   | G4                   | H5                   | GPIO050/FAN_TACH0/GTACH0       |                          |                                 |
| F1                           | B1                   | B1                   | B1                           | F3                   | B1                   | F2                   | GPIO051/FAN_TACH1/GTACH1       |                          |                                 |
| H4                           | L8                   | L8                   | L8                           | K8                   | N6                   | L8                   | GPIO052/FAN_TACH2/LRESET#      |                          |                                 |
| L12                          | M13                  | M13                  | M13                          | K11                  | L12                  | P14                  | GPIO053/PWM0/GPWM0             |                          |                                 |
| K9                           | L12                  | L12                  | L12                          | K10                  | K10                  | N15                  | GPIO054/PWM1/GPWM1             |                          |                                 |
| N8                           | N4                   | N4                   | N4                           | M8                   | L7                   | M8                   | GPIO055/PWM2/SHD_CS#/(RSMRST#) |                          |                                 |
| N7                           | N5                   | N5                   | N5                           | N9                   | J7                   | M9                   | GPIO056/PWM3/SHD_CLK           |                          |                                 |
| B2                           | D1                   | D1                   | D1                           | F1                   | D2                   | G2                   | GPIO057/VCC_PWRGD              |                          |                                 |
| F4                           | D2                   | D2                   | D2                           | G5                   | F5                   | H7                   | GPIO060/KBRST/48MHZ_OUT        |                          |                                 |
| N1                           | N1                   | N1                   | N1                           | M1                   | L3                   | M6                   | GPIO061/LPCPD#/ESPI_RESET#     |                          |                                 |
| D4                           | A2                   | A2                   | A2                           | D3                   | E3                   | C2                   | GPIO062/(RESETO#)              |                          | O2ma-Low                        |
| M5                           | M4                   | M4                   | M4                           | N5                   | J6                   | P6                   | GPIO063/SER_IRQ/ESPI_ALERT#    |                          |                                 |
| M1                           | J5                   | J5                   | J5                           | M3                   | L2                   | M5                   | GPIO064/LRESET#                | LRESET#                  |                                 |
| M3                           | M2                   | M2                   | M2                           | N2                   | K5                   | R2                   | GPIO065/PCI_CLK/ESPI_CLK       |                          |                                 |
| M2                           | M1                   | M1                   | M1                           | N1                   | L4                   | P3                   | GPIO066/LFRAME#/ESPI_CS#       |                          |                                 |
|                              | L2                   | L2                   | L2                           | M5                   | L1                   | K5                   | GPIO067/CLKRUN#                |                          |                                 |
| M4                           | L3                   | L3                   | L3                           | M4                   | L5                   | R3                   | GPIO070/LAD0/ESPI_IO0          |                          |                                 |
| N2                           | N2                   | N2                   | N2                           | N3                   | M1                   | R4                   | GPIO071/LAD1/ESPI_IO1          |                          |                                 |
| N3                           | M3                   | M3                   | M3                           | N4                   | N1                   | P5                   | GPIO072/LAD2/ESPI_IO2          |                          |                                 |
| N4                           | L4                   | L4                   | L4                           | M6                   | M2                   | R5                   | GPIO073/LAD3/ESPI_IO3          |                          |                                 |
| K4                           | H7                   | H7                   | H7                           | L4                   | N2                   | L6                   | GPIO100/nEC_SCI                |                          |                                 |
|                              | A4                   | A4                   | A4                           | C5                   | E6                   | F6                   | GPIO101/BGPO1                  |                          |                                 |
|                              | B5                   | B5                   | B5                           | B3                   | C5                   | A5                   | GPIO102/BGPO2                  |                          |                                 |
| F13                          | F11                  | F11                  | F11                          | A13                  | E12                  | F15                  | GPIO104/UART0_TX               |                          |                                 |
| F10                          | F9                   | F9                   | F9                           | F9                   | F13                  | F11                  | GPIO105/UART0_RX               |                          |                                 |
| E4                           | E3                   | E3                   | E3                           | H6                   | F3                   | G7                   | GPIO106/PWROK                  |                          |                                 |
| K10                          | L13                  | L13                  | L13                          | H13                  | J10                  | M14                  | GPIO107/nSMI/KSO04             |                          |                                 |
|                              |                      |                      |                              | G13                  | J11                  | L15                  | GPIO110/PS2_CLK2               |                          |                                 |

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| MEC1701/MEC1703-128 WFBGA-TF | MEC1704-144 WFBGA-SZ | MEC1705-144 WFBGA-SZ | MEC1701/MEC1703-144 WFBGA-SZ | MEC1701-169 WFBGA-TN | MEC1703-169 WFBGA-TN | MEC1703-169 WFBGA-XY | Pin Name  | Default<br>(if not GPIO) | Default<br>State<br>(if not In) |
|------------------------------|----------------------|----------------------|------------------------------|----------------------|----------------------|----------------------|---|--------------------------|---------------------------------|
|                              |                      |                      |                              | G12                  | K12                  | L12                  | GPIO111/PS2_DAT2                                      |                          |                                 |
| J12                          | K13                  | K13                  | K13                          | J12                  | J12                  | K15                  | GPIO112/PS2_CLK1A/KSO05                               |                          |                                 |
| H13                          | J11                  | J11                  | J11                          | J11                  | K13                  | L14                  | GPIO113/PS2_DAT1A/KSO06                               |                          |                                 |
| G13                          | H9                   | H9                   | H9                           | J10                  | J13                  | K14                  | GPIO114/PS2_CLK0A/nEC_SCI                             |                          |                                 |
| M12                          | N12                  | N12                  | N12                          | L13                  | N13                  | P13                  | GPIO115/PS2_DAT0A                                     |                          |                                 |
| J13                          | K12                  | K12                  | K12                          | H12                  | K11                  | M15                  | GPIO120/KSO07   |                          |                                 |
| E12                          | F12                  | F12                  | F12                          | D13                  | F10                  | F12                  | GPIO121/PVT_IO0/KSO08                                 |                          |                                 |
| E13                          | E11                  | E11                  | E11                          | D12                  | D12                  | F14                  | GPIO122/BCM0_DAT/PVT_IO1/KSO09                        |                          |                                 |
| D12                          | E12                  | E12                  | E12                          | C13                  | F9                   | G12                  | GPIO123/BCM0_CLK/PVT_IO2/KSO10                        |                          |                                 |
| C12                          | C11                  | C11                  | C11                          | B13                  | E11                  | E12                  | GPIO124/GPTP-OUT6/PVT_CS#/KSO11                       |                          |                                 |
| D13                          | D11                  | D11                  | D11                          | B12                  | C12                  | D14                  | GPIO125/GPTP-OUT5/PVT_CLK/KSO12                       |                          |                                 |
| C13                          | D12                  | D12                  | D12                          | C12                  | C13                  | E14                  | GPIO126/PVT_IO3/KSO13                                 |                          |                                 |
| A13                          | D13                  | D13                  | D13                          | A11                  | B13                  | D15                  | GPIO127/A20M/UART0_CTS#                               |                          |                                 |
| J6                           | N8                   | N8                   | N8                           | J8                   | N5                   | P9                   | GPIO130/I2C10_SDA/TOUT1                               |                          |                                 |
| M9                           | N7                   | N7                   | N7                           | N10                  | N7                   | R10                  | GPIO131/I2C10_SCL/TOUT0                               |                          |                                 |
| N12                          | N11                  | N11                  | N11                          | L10                  | N12                  | R14                  | GPIO132/I2C06_SDA/KSO14                               |                          |                                 |
|                              |                      |                      |                              | C11                  | C11                  | C14                  | GPIO133/PWM9  |                          |                                 |
|                              | E13                  | E13                  |                              | D11                  | E13                  | G14                  | GPIO134/PWM10/UART1_RTS#                              |                          |                                 |
|                              | G9                   | G9                   |                              | E12                  | G13                  | G9                   | GPIO135/UART1_CTS#                                    |                          |                                 |
| M13                          | L11                  | L11                  | L11                          | K13                  | M13                  | J11                  | GPIO140/I2C06_SCL/ICT5                                |                          |                                 |
| A6                           | B7                   | B7                   | B7                           | A7                   | A7                   | B8                   | GPIO141/I2C05_SDA/SPI1_-<br>CLK/UART0_DCD#/TRACEDAT0  |                          |                                 |
| B6                           | F7                   | F7                   | F7                           | F7                   | A5                   | D8                   | GPIO142/I2C05_SCL/SPI1_-<br>MOSI/UART0_DSR#/TRACEDAT1 |                          |                                 |
| A5                           | A7                   | A7                   | A7                           | A6                   | B7                   | A8                   | GPIO143/I2C04_SDA/SPI1_MISO/UART0_DT<br>R#/TRACEDAT2  |                          |                                 |
| D8                           | E7                   | E7                   | E7                           | D4                   | B5                   | E8                   | GPIO144/I2C04_SCL/SPI1_CS#/UART0_RI#/T<br>RACEDAT3    |                          |                                 |
| A8                           | A8                   | A8                   | A8                           | D7                   | C8                   | G8                   | GPIO145/I2C09_SDA/JTAG_TDI                            |                          |                                 |
| A7                           | G8                   | G8                   | G8                           | F8                   | D8                   | B9                   | GPIO146/I2C09_SCL/JTAG_TDO                            |                          |                                 |
| B7                           | C7                   | C7                   | C7                           | C7                   | B8                   | D9                   | GPIO147/I2C08_SDA/JTAG_CLK                            |                          |                                 |
| D9                           | F8                   | F8                   | F8                           | E7                   | E7                   | A9                   | GPIO150/I2C08_SCL/JTAG_TMS                            |                          |                                 |
| J7                           | L9                   | L9                   | L9                           | H9                   | K9                   | K10                  | GPIO151/ICT4/KSO15                                    |                          |                                 |
| N10                          | N10                  | N10                  | N10                          | N12                  | M10                  | R13                  | GPIO152/GPTP-OUT3/KSO16                               |                          |                                 |
| A11                          |                      |                      | C12                          | E9                   | D10                  | B14                  | GPIO153/LED2  |                          |                                 |

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| MEC1701/MEC1703-128 WFBGA-TF | MEC1704-144 WFBGA-SZ | MEC1705-144 WFBGA-SZ | MEC1701/MEC1703-144 WFBGA-SZ | MEC1701-169 WFBGA-TN | MEC1703-169 WFBGA-TN | MEC1703-169 WFBGA-XY | Pin Name                             | Default<br>(if not GPIO) | Default<br>State<br>(if not In) |
|------------------------------|----------------------|----------------------|------------------------------|----------------------|----------------------|----------------------|--------------------------------------|--------------------------|---------------------------------|
| A10                          | A12                  | A12                  | A12                          | A9                   | A12                  | B13                  | GPIO154/I2C02_SDA/PS2_CLK1B          |                          |                                 |
| B9                           | C9                   | C9                   | C9                           | C9                   | A11                  | E10                  | GPIO155/I2C02_SCL/PS2_DAT1B          |                          |                                 |
| B12                          | C12                  | C12                  | A13                          | D9                   | D11                  | B15                  | GPIO156/LED0                         |                          |                                 |
| A12                          | B13                  | B13                  | B13                          | B11                  | B12                  | C15                  | GPIO157/LED1                         |                          |                                 |
| B3                           | C4                   | C4                   | C4                           | C3                   | D5                   | E5                   | GPIO161/VCI_IN2#                     | VCI_IN2#                 |                                 |
| D5                           | A6                   | A6                   | A6                           | A4                   | C4                   | A6                   | GPIO162/VCI_IN1#                     | VCI_IN1#                 |                                 |
| D6                           | E6                   | E6                   | E6                           | F6                   | C7                   | B6                   | GPIO163/VCI_IN0#                     | VCI_IN0#                 |                                 |
| B8                           | A9                   | A9                   | A9                           | B7                   | A8                   | A10                  | GPIO165/32KHZ_IN/CTOUT0/TRACECLK     |                          |                                 |
|                              |                      |                      |                              | G1                   | B2                   | E2                   | GPIO166                              |                          |                                 |
| G10                          | G13                  | G13                  | G12                          | F11                  | G11                  | H12                  | GPIO170/TFCLK/UART1_TX               |                          |                                 |
| G9                           | G12                  | G12                  | G9                           | E11                  | G9                   | H9                   | GPIO171/TFDATA/UART1_RX/(JTAG_STRAP) |                          | In-PU                           |
|                              | B6                   | B6                   | B6                           | F5                   | D6                   | E6                   | GPIO172/BGPO3                        |                          |                                 |
|                              |                      |                      |                              | A2                   | C3                   | B5                   | GPIO173/BGPO4                        |                          |                                 |
|                              |                      |                      |                              | E4                   | A3                   | B3                   | GPIO174/BGPO5                        |                          |                                 |
| D10                          | C13                  | C13                  | C13                          | D10                  | E10                  | E11                  | GPIO175/KSO17                        |                          |                                 |
| H2                           | H3                   | H3                   | H3                           | G3                   | G3                   | J2                   | GPIO200/ADC00                        | ADC00                    |                                 |
| H1                           | J3                   | J3                   | J3                           | H4                   | G2                   | K4                   | GPIO201/ADC01                        | ADC01                    |                                 |
| J2                           | J2                   | J2                   | J2                           | H3                   | H4                   | L4                   | GPIO202/ADC02                        | ADC02                    |                                 |
| J1                           | J1                   | J1                   | J1                           | K2                   | J1                   | K2                   | GPIO203/ADC03                        | ADC03                    |                                 |
| K1                           | H2                   | H2                   | H2                           | J3                   | J2                   | L1                   | GPIO204/ADC04                        | ADC04                    |                                 |
| K2                           | K3                   | K3                   | K3                           | L2                   | J4                   | M2                   | GPIO205/ADC05                        | ADC05                    |                                 |
| L2                           | L1                   | L1                   | L1                           | M2                   | K2                   | P1                   | GPIO206/ADC06                        | ADC06                    |                                 |
| L1                           | K2                   | K2                   | K2                           | L3                   | K1                   | N3                   | GPIO207/ADC07                        | ADC07                    |                                 |
|                              |                      |                      |                              | H2                   | H3                   | J4                   | GPIO210/ADC08                        | ADC08                    |                                 |
|                              |                      |                      |                              | J2                   | H2                   | H1                   | GPIO211/ADC09                        | ADC09                    |                                 |
|                              |                      |                      |                              | K1                   | H1                   | J1                   | GPIO212/ADC10                        | ADC10                    |                                 |
|                              |                      |                      |                              | J4                   | H5                   | K1                   | GPIO213/ADC11                        | ADC11                    |                                 |
|                              |                      |                      |                              | J5                   | J3                   | L2                   | GPIO214/ADC12                        | ADC12                    |                                 |
|                              |                      |                      |                              | K3                   | J5                   | N1                   | GPIO215/ADC13                        | ADC13                    |                                 |
|                              |                      |                      |                              | K4                   | K3                   | N2                   | GPIO216/ADC14                        | ADC14                    |                                 |
|                              |                      |                      |                              | K5                   | K4                   | P2                   | GPIO217/ADC15                        | ADC15                    |                                 |
| C1                           | C1                   | C1                   | C1                           | G7                   | D3                   | E1                   | GPIO221/GPTP-IN3/32KHZ_OUT           |                          |                                 |
|                              | L5                   | L5                   | L5                           | L6                   | L6                   | L7                   | GPIO222/SER_IRQ                      |                          |                                 |
| N5                           | M6                   | M6                   | M6                           | M7                   | K7                   | R7                   | GPIO223/SHD_IO0                      |                          |                                 |

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| MEC1701/MEC1703-128 WFBGA-TF | MEC1704-144 WFBGA-SZ | MEC1705-144 WFBGA-SZ | MEC1701/MEC1703-144 WFBGA-SZ | MEC1701-169 WFBGA-TN | MEC1703-169 WFBGA-TN | MEC1703-169 WFBGA-XY | Pin Name                 | Default (if not GPIO) | Default State (if not In) |
|------------------------------|----------------------|----------------------|------------------------------|----------------------|----------------------|----------------------|--------------------------|-----------------------|---------------------------|
| M7                           | M5                   | M5                   | M5                           | N6                   | M3                   | R6                   | GPIO224/GPTP-IN4/SHD_IO1 |                       |                           |
|                              | A13                  | A13                  |                              | A10                  | E9                   | C13                  | GPIO225/UART0_RTS#       |                       |                           |
|                              | F2                   | F2                   | F2                           | E3                   | C2                   | F1                   | GPIO226/LED3             |                       |                           |
| M6                           | L6                   | L6                   | L6                           | N7                   | M4                   | P7                   | GPIO227/SHD_IO2          |                       |                           |
|                              |                      |                      |                              | L8                   | N8                   | R11                  | GPIO230                  |                       |                           |
|                              |                      |                      |                              | K7                   | M7                   | J8                   | GPIO231                  |                       |                           |
|                              |                      |                      |                              | G8                   | K8                   | L10                  | GPIO233                  |                       |                           |
|                              |                      |                      |                              | B1                   | A1                   | E4                   | GPIO234/VCI_IN4#         |                       |                           |
|                              |                      |                      | G13                          | G10                  | G10                  | H14                  | GPIO240                  |                       |                           |
|                              | B8                   | B8                   | B8                           | D6                   | D9                   | B10                  | GPIO241                  |                       |                           |
|                              | A10                  | A10                  | A10                          | D5                   | A9                   | A12                  | GPIO242                  |                       |                           |
|                              | C8                   | C8                   | C8                           | D8                   | C9                   | E9                   | GPIO243                  |                       |                           |
|                              | A11                  | A11                  | A11                          | B8                   | B10                  | A13                  | GPIO244                  |                       |                           |
|                              | B11                  | B11                  | B11                          | C8                   | A10                  | B12                  | GPIO245                  |                       |                           |
|                              | B10                  | B10                  | B10                          | B9                   | C10                  | D10                  | GPIO246                  |                       |                           |
|                              | B9                   | B9                   | B9                           | A8                   | B9                   | B11                  | GPIO254                  |                       |                           |
| F12                          | G11                  | G11                  | G11                          | F10                  | F12                  | G11                  | JTAG_RST#                | JTAG_RST#             |                           |
| A1                           | D3                   | D3                   | D3                           | G6                   | F4                   | G5                   | RESETI#                  | RESETI#               |                           |
| E5                           | E5                   | E5                   | E5                           | E6                   | F7                   | D5                   | VBAT                     | VBAT                  |                           |
| B4                           | C5                   | C5                   | C5                           | B2                   | B3                   | B4                   | VCI_OUT                  | VCI_OUT               | O2ma-High                 |
| D1                           | F1                   | F1                   | F1                           | E1                   | E1                   | D1                   | VFLT_PLL                 | VFLT_PLL              |                           |
| G1                           | H1                   | H1                   | H1                           | J1                   | F1                   | G1                   | VR_CAP                   | VR_CAP                |                           |
| G2                           | G2                   | G2                   | G2                           | H5                   | G1                   | J5                   | VREF_ADC                 | VREF_ADC              |                           |
| E7                           | F6                   | F6                   | F6                           | E5                   | H8                   | B2                   | VSS1                     | VSS1                  |                           |
| F9                           | G3                   | G3                   | G3                           | J7                   | G7                   | H8                   | VSS2                     | VSS2                  |                           |
| E8                           | H5                   | H5                   | H5                           | K6                   | G6                   | J7                   | VSS3                     | VSS3                  |                           |
| H5                           | K1                   | K1                   | K1                           | L1                   | H6                   | M1                   | VSS_ADC                  | VSS_ADC               |                           |
| E6                           | B4                   | B4                   | B4                           | C4                   | F6                   | A3                   | VSS_ANALOG               | VSS_ANALOG            |                           |
| E9                           | G5                   | G5                   | G5                           | G4                   | F8                   | F4                   | VTR1                     | VTR1                  |                           |
| J8                           | H8                   | H8                   | H8                           | L12                  | J8                   | N13                  | VTR2                     | VTR2                  |                           |
| J5                           | H6                   | H6                   | H6                           | J6                   | H7                   | P4                   | VTR3                     | VTR3                  |                           |
| F5                           | G6                   | G6                   | G6                           | H8                   | G8                   | L5                   | VTR_ANALOG               | VTR_ANALOG            |                           |

| MEC1701/MEC1703-128 WFBGA-TF | MEC1704-144 WFBGA-SZ | MEC1705-144 WFBGA-SZ | MEC1701/MEC1703-144 WFBGA-SZ | MEC1701-169 WFBGA-TN | MEC1703-169 WFBGA-TN | MEC1703-169 WFBGA-XY | Pin Name | Default<br>(if not GPIO) | Default<br>State<br>(if not In) |
|------------------------------|----------------------|----------------------|------------------------------|----------------------|----------------------|----------------------|----------|--------------------------|---------------------------------|
| E1                           | E1                   | E1                   | E1                           | D1                   | D1                   | C1                   | VTR_PLL  | VTR_PLL                  |                                 |
| G5                           | G1                   | G1                   | G1                           | H1                   | G5                   | H2                   | VTR_REG  | VTR_REG                  |                                 |
| A4                           | A3                   | A3                   | A3                           | A3                   | A2                   | A4                   | XTAL1    | XTAL1                    |                                 |
| A2                           | A1                   | A1                   | A1                           | A1                   | A4                   | A2                   | XTAL2    | XTAL2                    |                                 |

## 2.5 Pin List by Pin Number

### 2.5.1 POWER RAIL

The Power Rail column defines the power pin that provides I/O power for the signal pin.

### 2.5.2 PAD TYPES

The Pad Type column defines the type of pad associated with each signal. Some pins have signals with two different pad types sharing the pin; in this case, the pin is shown with the Pin Name but no pad type, followed by rows showing the pad type for each of the signals that share the pin. Pad Types are defined in the [Section 50.0, "Electrical Specifications," on page 602](#).

- I/O Pad Types are defined in [Section 50.2.4, "DC Electrical Characteristics for I/O Buffers," on page 605](#).
- The abbreviation "PWR" is used to denote power pins. The power supplies are defined in [Section 50.2.1, "Power Supply Operational Characteristics," on page 603](#).

### 2.5.3 GLITCH PROTECTION

Pins with glitch protection are glitch-free tristate pins and will not drive out while their associated power rail is rising. These glitch-free tristate pins require either an external pull-up or pull-down to set the state of the pin high or low.

**Note:** If the pin needs to default low, a 1M ohm (max) external pull-down is required.

Pins without glitch protection may be susceptible to transitory changes as the power rail is rising.

**Note:** The power rail must rise monotonically in order for glitch protection to operate.

### BGPO GLITCH PROTECTION

All BGPO pins are glitch protected while VBAT power is applied.

The BGPO outputs are glitch protected on VBAT power as well as VTR power. As VBAT rises from ground, the BGPOx output are not driven until the VBAT power rail reaches approximately 1V. Once the VBAT power rail reaches approximately 1V, the BGPO outputs drive low.

**Note:** It is recommended that a pull-down resistor be added to the BGPO pins.



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## 2.5.4 OVER-VOLTAGE PROTECTION

For pins that have Over-voltage protection and the VTRx power rail that is supplying the pin is 3.3V, the pin can tolerate an input voltage of up to 5.5V without causing an error.

**Note:** Pins with over-voltage protection may be pulled up externally to 5V supply. It is recommended to select strong pull-up resistor values (less than 10k ohms) that keep the pull-up voltage on the pin less than 3.8V and above 4.5V. If the voltage is  $3.8V \leq x \leq 4.5V$  the pad current will be higher (65ua -nominal).

For pins with Over-voltage protection and the VTRx power rail that is supplying the pin is 1.8V, the pin can tolerate an input voltage of up to 3.6V without causing an error.

An input level that exceeds 105% of the power rail on a pin without Over-voltage protection may cause errors in the logic and may additionally damage internal circuitry.

## 2.5.5 UNDER-VOLTAGE PROTECTION

Pins that are identified as having Under-voltage PROTECTION may be configured so they will not sink excess current if powered by 3.3V and externally pulled up to 1.8V. The following configuration requirements must be met.

- If the pad is an output only pad type and it is configured as either open drain or the output is disabled.
- If the pin is a GPIO pin with a PIO pad type then it must be configured as open drain output with the input disabled. The input is disabled by setting the GPIO [POWER\\_GATING](#) bits to 11b.

## 2.5.6 BACKDRIVE PROTECTION

Assuming that the external voltage on the pin is within the parameters defined for the specific pad type, the backdrive protected pin will not sink excess current when it is at a lower potential than the external circuit. There are two cases where this occurs:

- The pad power is off and the external circuit is powered
- The pad power is on and the external circuitry is pulled to a higher potential than the pad power. This may occur on 3.3V powered pads that are 5V tolerant or on 1.8V powered pads that are 3.6V tolerant.

## 2.5.7 CONFIGURABLE SIGNAL ROUTING

Several sideband signals associated with the LPC bus are routed on two pins, one that is powered by VTR3 and the second powered by VTR2. By connecting VTR3 to 3.3V, VTR2 to 1.8V and using the sideband signals in the VTR2 region, the LPC bus can operate at 3.3V while sideband signals can operate at 1.8V. This configuration corresponds to Intel Atom platforms where the LPC bus can operate at 3.3V, but the sideband signals must be powered at 1.8V. If the sideband signals operate at the same voltage level as the LPC bus, then the VTR3 powered sideband signals should be used and the alternatives in the VTR2 region can be used as GPIOs or other functions.

The signal routing is determined by the alternate function multiplexer programmed in the pin's GPIO [Pin Control Register](#). Software should not enable signals on more than one pin.

The signals are:

- SER\_IRQ
- LRESET#
- LPCPD#
- nSMI
- nEC\_SCI

## 2.5.8 MEC1701/MEC1703-128 WFBGA-TF

| MEC1701-128 WFBGA-TF | MEC1703-128 WFBGA-TF | Signal   | Power Rail | Pad Type | Glitch Prot | Over-voltage Prot | Under-voltage Prot | Backdrive Prot |
|----------------------|----------------------|--|------------|----------|-------------|-------------------|--------------------|----------------|
| A1                   | A1                   | RESETI#  | VTR1       | In       | X           |                   | X                  | X              |
| A2                   | A2                   | XTAL2  | VBAT       | I_AN     |             |                   |                    |                |
| A3                   | A3                   | BGPO0  | VBAT       | O2ma     | X           |                   | X                  | X              |
| A4                   | A4                   | XTAL1  | VBAT       | I_AN     |             |                   |                    |                |
| A5                   | A5                   | GPIO143/I2C04_SDA/SPI1_MISO/UART0_DTR#/TRACEDAT2 | VTR1       | PIO      | X           |                   | X                  | X              |
| A6                   | A6                   | GPIO141/I2C05_SDA/SPI1_CLK/UART0_DCD#/TRACEDAT0  | VTR1       | PIO      | X           |                   | X                  | X              |
| A7                   | A7                   | GPIO146/I2C09_SCL/JTAG_TDO                       | VTR1       | PIO      | X           |                   | X                  | X              |
| A8                   | A8                   | GPIO145/I2C09_SDA/JTAG_TDI                       | VTR1       | PIO      | X           |                   | X                  | X              |
| A9                   | A9                   | GPIO045/KSO01                                    | VTR1       | PIO      | X           |                   | X                  | X              |
| A10                  | A10                  | GPIO154/I2C02_SDA/PS2_CLK1B                      | VTR1       | PIO      | X           | X                 | X                  | X              |
| A11                  | A11                  | GPIO153/LED2                                     | VTR1       | PIO      | X           | X                 | X                  | X              |
| A12                  | A12                  | GPIO157/LED1                                     | VTR1       | PIO      | X           | X                 | X                  | X              |
| A13                  | A13                  | GPIO127/A20M/UART0_CTS#                          | VTR1       | PIO      | X           |                   | X                  | X              |
| B1                   | B1                   | GPIO024/GPTP-IN2                                 | VTR1       | PIO      | X           |                   | X                  | X              |
| B2                   | B2                   | GPIO057/VCC_PWRGD                                | VTR1       | PIO      | X           |                   | X                  | X              |
| B3                   | B3                   | GPIO161/VCI_IN2#                                 | VBAT       | PIO      | X           |                   | X                  | X              |
| B4                   | B4                   | VCI_OUT  | VBAT       | O2ma     |             |                   | X                  | X              |
| B5                   | B5                   | GPIO003/I2C00_SDA/SPI0_CS#                       | VTR1       | PIO      | X           |                   | X                  | X              |
| B6                   | B6                   | GPIO142/I2C05_SCL/SPI1_MOSI/UART0_DSR#/TRACEDAT1 | VTR1       | PIO      | X           |                   | X                  | X              |
| B7                   | B7                   | GPIO147/I2C08_SDA/JTAG_CLK                       | VTR1       | PIO      | X           |                   | X                  | X              |
| B8                   | B8                   | GPIO165/32KHZ_IN/CTOUT0/TRACECLK                 | VTR1       | PIO      | X           |                   | X                  | X              |
| B9                   | B9                   | GPIO155/I2C02_SCL/PS2_DAT1B                      | VTR1       | PIO      | X           | X                 | X                  | X              |
| B10                  | B10                  | GPIO010/I2C03_SCL/PS2_DAT0B                      | VTR1       | PIO      | X           | X                 | X                  | X              |
| B11                  | B11                  | GPIO007/I2C03_SDA/PS2_CLK0B                      | VTR1       | PIO      | X           | X                 | X                  | X              |
| B12                  | B12                  | GPIO156/LED0                                     | VTR1       | PIO      | X           | X                 | X                  | X              |
| B13                  | B13                  | GPIO047/BCM1_CLK/KSO03                           | VTR1       | PIO      | X           |                   | X                  | X              |
| C1                   | C1                   | GPIO221/GPTP-IN3/32KHZ_OUT                       | VTR1       | PIO      | X           |                   | X                  | X              |
| C2                   | C2                   | GPIO022/GPTP-IN0                                 | VTR1       | PIO      | X           |                   | X                  | X              |
| C12                  | C12                  | GPIO124/GPTP-OUT6/PVT_CS#/KSO11                  | VTR1       | PIO      | X           |                   | X                  | X              |
| C13                  | C13                  | GPIO126/PVT_IO3/KSO13                            | VTR1       | PIO      | X           |                   | X                  | X              |
| D1                   | D1                   | VFLT_PLL   |            | PWR      |             |                   |                    |                |
| D2                   | D2                   | GPIO000/VCI_IN3#                                 | VBAT       | PIO      | X           |                   | X                  | X              |
| D4                   | D4                   | GPIO062/(RESET0#)                                | VTR1       | PIO      | X           |                   | X                  |                |
| D5                   | D5                   | GPIO162/VCI_IN1#                                 | VBAT       | PIO      | X           |                   | X                  | X              |
| D6                   | D6                   | GPIO163/VCI_IN0#                                 | VBAT       | PIO      | X           |                   | X                  | X              |

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| MEC1701-128 WFBGA-TF | MEC1703-128 WFBGA-TF | Signal   | Power Rail | Pad Type | Glitch Prot | Over-voltage Prot | Under-voltage Prot | Backdrive Prot |
|----------------------|----------------------|--|------------|----------|-------------|-------------------|--------------------|----------------|
| D7                   | D7                   | GPIO004/I2C00_SCL/SPI0_MOSI                    | VTR1       | PIO      | X           |                   | X                  | X              |
| D8                   | D8                   | GPIO144/I2C04_SCL/SPI1_CS#/UART0_RI#/TRACEDAT3 | VTR1       | PIO      | X           |                   | X                  | X              |
| D9                   | D9                   | GPIO150/I2C08_SCL/JTAG_TMS                     | VTR1       | PIO      | X           |                   | X                  | X              |
| D10                  | D10                  | GPIO175/KSO17                                  | VTR1       | PIO      | X           |                   | X                  | X              |
| D12                  | D12                  | GPIO123/BCM0_CLK/PVT_IO2/KSO10                 | VTR1       | PIO      | X           |                   | X                  | X              |
| D13                  | D13                  | GPIO125/GPTP-OUT5/PVT_CLK/KSO12                | VTR1       | PIO      | X           |                   | X                  | X              |
| E1                   | E1                   | VTR_PLL  |            | PWR      |             |                   |                    |                |
| E2                   | E2                   | GPIO033/RC_ID0                                 | VTR1       |          |             |                   |                    |                |
| E4                   | E4                   | GPIO106/PWROK                                  | VTR1       | PIO      | X           |                   | X                  | X              |
| E5                   | E5                   | VBAT   |            | PWR      |             |                   |                    |                |
| E6                   | E6                   | VSS_ANALOG                                     |            | PWR      |             |                   |                    |                |
| E7                   | E7                   | VSS1   |            | PWR      |             |                   |                    |                |
| E8                   | E8                   | VSS3   |            | PWR      |             |                   |                    |                |
| E9                   | E9                   | VTR1   |            | PWR      |             |                   |                    |                |
| E10                  | E10                  | GPIO046/BCM1_DAT/KSO02                         | VTR1       | PIO      | X           |                   | X                  | X              |
| E12                  | E12                  | GPIO121/PVT_IO0/KSO08                          | VTR1       | PIO      | X           |                   | X                  | X              |
| E13                  | E13                  | GPIO122/BCM0_DAT/PVT_IO1/KSO09                 | VTR1       | PIO      | X           |                   | X                  | X              |
| F1                   | F1                   | GPIO051/FAN_TACH1/GTACH1                       | VTR1       | PIO      | X           | X                 | X                  | X              |
| F2                   | F2                   | GPIO023/GPTP-IN1                               | VTR1       | PIO      | X           |                   | X                  | X              |
| F4                   | F4                   | GPIO060/KBRST/48MHZ_OUT                        | VTR1       | PIO      | X           |                   | X                  | X              |
| F5                   | F5                   | VTR_ANALOG                                     |            | PWR      |             |                   |                    |                |
| F9                   | F9                   | VSS2   |            | PWR      |             |                   |                    |                |
| F10                  | F10                  | GPIO105/UART0_RX                               | VTR1       | PIO      | X           |                   | X                  | X              |
| F12                  | F12                  | JTAG_RST#                                      | VTR1       | In       | X           |                   | X                  | X              |
| F13                  | F13                  | GPIO104/UART0_TX                               | VTR1       | PIO      | X           |                   | X                  | X              |
| G1                   | G1                   | VR_CAP   |            | PWR      |             |                   |                    |                |
| G2                   | G2                   | VREF_ADC                                       |            | PWR      |             |                   | X                  |                |
| G4                   | G4                   | GPIO050/FAN_TACH0/GTACH0                       | VTR1       | PIO      | X           | X                 | X                  | X              |
| G5                   | G5                   | VTR_REG  |            | PWR      |             |                   |                    |                |
| G9                   | G9                   | GPIO171/TFDATA/UART1_RX/(JTAG_STRAP)           | VTR1       | PIO      | X           |                   | X                  | X              |
| G10                  | G10                  | GPIO170/TFCLK/UART1_TX                         | VTR1       | PIO      | X           |                   | X                  | X              |
| G12                  | G12                  | GPIO035/PWM8/CTOUT1                            | VTR1       | PIO      | X           | X                 | X                  | X              |
| G13                  | G13                  | GPIO114/PS2_CLK0A/nEC_SCI                      | VTR2       | PIO      | X           |                   | X                  | X              |
| H1                   | H1                   | GPIO201/ADC01                                  | VTR1       | PIO      | X           |                   | X                  |                |
|                      |                      | GPIO201  |            |          |             |                   |                    |                |
|                      |                      | ADC01  |            |          |             |                   |                    |                |

# MEC170x

| MEC1701-128 WFBGA-TF | MEC1703-128 WFBGA-TF | Signal                      | Power Rail | Pad Type | Glitch Prot | Over-voltage Prot | Under-voltage Prot | Backdrive Prot |
|----------------------|----------------------|-----------------------------|------------|----------|-------------|-------------------|--------------------|----------------|
| H2                   | H2                   | GPIO200/ADC00               | VTR1       |          |             |                   |                    |                |
|                      |                      | GPIO200                     |            | PIO      | X           |                   | X                  |                |
|                      |                      | ADC00                       |            | I_AN     | X           |                   | X                  |                |
| H4                   | H4                   | GPIO052/FAN_TACH2/LRESET#   | VTR2       | PIO      | X           |                   | X                  | X              |
| H5                   | H5                   | VSS_ADC                     |            | PWR      |             |                   |                    |                |
| H9                   | H9                   | GPIO017/GPTP-IN5/KSI0       | VTR2       | PIO      | X           |                   | X                  | X              |
| H10                  | H10                  | GPIO043/SB-TSI_CLK          | VTR1       |          |             |                   |                    |                |
|                      |                      | GPIO043                     |            | PIO      | X           |                   | X                  |                |
|                      |                      | SB-TSI_CLK                  |            | PECI     | X           |                   | X                  |                |
| H12                  | H12                  | GPIO044/VREF_VTT            | VTR1       |          |             |                   |                    |                |
|                      |                      | GPIO044                     |            | PIO      | X           |                   | X                  |                |
|                      |                      | VREF_VTT                    |            | I_AN     | X           |                   | X                  |                |
| H13                  | H13                  | GPIO113/PS2_DAT1A/KSO06     | VTR2       | PIO      | X           |                   | X                  | X              |
| J1                   | J1                   | GPIO203/ADC03               | VTR1       |          |             |                   |                    |                |
|                      |                      | GPIO203                     |            | PIO      | X           |                   | X                  |                |
|                      |                      | ADC03                       |            | I_AN     | X           |                   | X                  |                |
| J2                   | J2                   | GPIO202/ADC02               | VTR1       |          |             |                   |                    |                |
|                      |                      | GPIO202                     |            | PIO      | X           |                   | X                  |                |
|                      |                      | ADC02                       |            | I_AN     | X           |                   | X                  |                |
| J4                   | J4                   | GPIO011/nSMI                | VTR3       | PIO      | X           |                   | X                  | X              |
| J5                   | J5                   | VTR3                        |            | PWR      |             |                   |                    |                |
| J6                   | J6                   | GPIO130/I2C10_SDA/TOUT1     | VTR2       | PIO      | X           |                   | X                  | X              |
| J7                   | J7                   | GPIO151/ICT4/KSO15          | VTR2       | PIO      | X           |                   | X                  | X              |
| J8                   | J8                   | VTR2                        |            | PWR      |             |                   |                    |                |
| J9                   | J9                   | GPIO032/GPTP-OUT0/KSI7      | VTR2       | PIO      | X           |                   | X                  | X              |
| J10                  | J10                  | GPIO042/PECI_DAT/SB-TSI_DAT | VTR1       |          |             |                   |                    |                |
|                      |                      | GPIO042                     |            | PIO      | X           |                   | X                  |                |
|                      |                      | PECI_DAT/SB-TSI_DAT         |            | PECI     | X           |                   | X                  |                |
| J12                  | J12                  | GPIO112/PS2_CLK1A/KSO05     | VTR2       | PIO      | X           |                   | X                  | X              |
| J13                  | J13                  | GPIO120/KSO07               | VTR2       | PIO      | X           |                   | X                  | X              |
| K1                   | K1                   | GPIO204/ADC04               | VTR1       |          |             |                   |                    |                |
|                      |                      | GPIO204                     |            | PIO      | X           |                   | X                  |                |
|                      |                      | ADC04                       |            | I_AN     | X           |                   | X                  |                |
| K2                   | K2                   | GPIO205/ADC05               | VTR1       |          |             |                   |                    |                |
|                      |                      | GPIO205                     |            | PIO      | X           |                   | X                  |                |
|                      |                      | ADC05                       |            | I_AN     | X           |                   | X                  |                |
| K4                   | K4                   | GPIO100/nEC_SCI             | VTR3       | PIO      | X           |                   | X                  | X              |

# MEC170x

| MEC1701-128 WFBGA-TF | MEC1703-128 WFBGA-TF | Signal                        | Power Rail | Pad Type | Glitch Prot | Over-voltage Prot | Under-voltage Prot | Backdrive Prot |
|----------------------|----------------------|-------------------------------|------------|----------|-------------|-------------------|--------------------|----------------|
| K5                   | K5                   | GPIO013/I2C07_SCL/TOUT2       | VTR2       | PIO      | X           |                   | X                  | X              |
| K6                   | K6                   | GPIO020/KSI1                  | VTR2       | PIO      | X           |                   | X                  | X              |
| K7                   | K7                   | GPIO015/PWM7                  | VTR2       | PIO      | X           |                   | X                  | X              |
| K8                   | K8                   | GPIO002/PWM5                  | VTR2       | PIO      | X           |                   | X                  | X              |
| K9                   | K9                   | GPIO054/PWM1/GPWM1            | VTR2       | PIO      | X           | X                 | X                  | X              |
| K10                  | K10                  | GPIO107/nSMI/KSO04            | VTR2       | PIO      | X           |                   | X                  | X              |
| K12                  | K12                  | GPIO030/TIN3/KSI5             | VTR2       | PIO      | X           |                   | X                  | X              |
| K13                  | K13                  | GPIO027/TIN2/KSI4             | VTR2       | PIO      | X           |                   | X                  | X              |
| L1                   | L1                   | GPIO207/ADC07                 | VTR1       |          |             |                   |                    |                |
|                      |                      | GPIO207                       |            | PIO      | X           |                   | X                  |                |
|                      |                      | ADC07                         |            | I_AN     | X           |                   | X                  |                |
| L2                   | L2                   | GPIO206/ADC06                 | VTR1       |          |             |                   |                    |                |
|                      |                      | GPIO206                       |            | PIO      | X           |                   | X                  |                |
|                      |                      | ADC06                         |            | I_AN     | X           |                   | X                  |                |
| L12                  | L12                  | GPIO053/PWM0/GPWM0            | VTR2       | PIO      | X           | X                 | X                  | X              |
| L13                  | L13                  | GPIO025/TIN0/nEM_INT/UART_CLK | VTR2       | PIO      | X           |                   | X                  | X              |
| M1                   | M1                   | GPIO064/LRESET#               | VTR3       | PIO      | X           |                   | X                  | X              |
| M2                   | M2                   | GPIO066/LFRAME#/ESPI_CS#      | VTR3       | PIO      | X           |                   | X                  | X              |
| M3                   | M3                   | GPIO065/PCI_CLK/ESPI_CLK      | VTR3       | PIO      | X           |                   | X                  | X              |
| M4                   | M4                   | GPIO070/LAD0/ESPI_IO0         | VTR3       |          |             |                   |                    |                |
|                      |                      | GPIO070/ESPI_IO0              |            | PIO      |             |                   |                    |                |
|                      |                      | LAD0                          |            | PCI      |             |                   |                    |                |
| M5                   | M5                   | GPIO063/SER_IRQ/ESPI_ALERT#   | VTR3       |          |             |                   |                    |                |
|                      |                      | GPIO063/ESPI_ALERT#           |            | PIO      |             |                   |                    |                |
|                      |                      | SER_IRQ                       |            | PCI      |             |                   |                    |                |
| M6                   | M6                   | GPIO227/SHD_IO2               | VTR2       | PIO      | X           |                   | X                  | X              |
| M7                   | M7                   | GPIO224/GPTP-IN4/SHD_IO1      | VTR2       | PIO      | X           |                   | X                  | X              |
| M8                   | M8                   | GPIO012/I2C07_SDA/TOUT3       | VTR2       | PIO      | X           |                   | X                  | X              |
| M9                   | M9                   | GPIO131/I2C10_SCL/TOUT0       | VTR2       | PIO      | X           |                   | X                  | X              |
| M10                  | M10                  | GPIO014/PWM6/GPTP-IN6         | VTR2       | PIO      | X           |                   | X                  | X              |
| M11                  | M11                  | GPIO040/GPTP-OUT2/KSO00       | VTR2       | PIO      | X           |                   | X                  | X              |
| M12                  | M12                  | GPIO115/PS2_DAT0A             | VTR2       | PIO      | X           |                   | X                  | X              |
| M13                  | M13                  | GPIO140/I2C06_SCL/ICT5        | VTR2       | PIO      | X           |                   | X                  | X              |
| N1                   | N1                   | GPIO061/LPCPD#/ESPI_RESET#    | VTR3       | PIO      | X           |                   | X                  | X              |
| N2                   | N2                   | GPIO071/LAD1/ESPI_IO1         | VTR3       |          |             |                   |                    |                |
|                      |                      | GPIO071/ESPI_IO1              |            | PIO      |             |                   |                    |                |
|                      |                      | LAD1                          |            | PCI      |             |                   |                    |                |

# MEC170x

| MEC1701-128 WFBGA-TF | MEC1703-128 WFBGA-TF | Signal                         | Power Rail | Pad Type | Glitch Prot | Over-voltage Prot | Under-voltage Prot | Backdrive Prot |
|----------------------|----------------------|--------------------------------|------------|----------|-------------|-------------------|--------------------|----------------|
| N3                   | N3                   | GPIO072/LAD2/ESPI_IO2          | VTR3       | PIO      |             |                   |                    |                |
|                      |                      | GPIO072/ESPI_IO2               |            | PCI      |             |                   |                    |                |
|                      |                      | LAD2                           |            |          |             |                   |                    |                |
| N4                   | N4                   | GPIO073/LAD3/ESPI_IO3          | VTR3       | PIO      |             |                   |                    |                |
|                      |                      | GPIO073/ESPI_IO3               |            | PCI      |             |                   |                    |                |
|                      |                      | LAD3                           |            |          |             |                   |                    |                |
| N5                   | N5                   | GPIO223/SHD_IO0                | VTR2       | PIO      | X           |                   | X                  | X              |
| N6                   | N6                   | GPIO016/GPTP-IN7/SHD_IO3/ICT3  | VTR2       | PIO      | X           |                   | X                  | X              |
| N7                   | N7                   | GPIO056/PWM3/SHD_CLK           | VTR2       | PIO      | X           |                   | X                  | X              |
| N8                   | N8                   | GPIO055/PWM2/SHD_CS#/(RSMRST#) | VTR2       | PIO      | X           |                   | X                  | X              |
| N9                   | N9                   | GPIO021/LPCPD#/KSI2            | VTR2       | PIO      | X           |                   | X                  | X              |
| N10                  | N10                  | GPIO152/GPTP-OUT3/KSO16        | VTR2       | PIO      | X           |                   | X                  | X              |
| N11                  | N11                  | GPIO031/GPTP-OUT1/KSI6         | VTR2       | PIO      | X           |                   | X                  | X              |
| N12                  | N12                  | GPIO132/I2C06_SDA/KSO14        | VTR2       | PIO      | X           |                   | X                  | X              |
| N13                  | N13                  | GPIO026/TIN1/KSI3              | VTR2       | PIO      | X           |                   | X                  | X              |