EMAC SoM Presentation

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System on Module

- System on Module (SoM) is an alternative to Single Board Computers for Embedded Systems offering a more flexible & contoured solution.

- An SoM approach is also an alternative to Full Custom engineering offering a much faster time to market at reduced cost and risk.

- With an SoM approach you get the best aspects of both buying Off-the-Shelf & of a Custom Engineered solution.

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System on Module

- An SoM approach is comprised of a Processor Module that is designed to plug into a Carrier Board.

- An SoM Module contains the processor, memory, and standard I/O & is usually an Off-the-Shelf component.

- The SoM Carrier contains all the connectors, power supplies as well as any additional I/O requirements. The Carrier is usually a custom component, but can be purchased Off-the-Shelf as well.

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The Module

- Contains the Processor Core
- Contains Flash & RAM
- Contains Standard I/O
    - Serial Ports
    - Ethernet
    - Real Time Clock
- Additional I/O (depending on module type)
    - GPIO & A/D
    - USB Host & Device
    - Video & Touchscreen Controller
    - Audio
    - Timers / Counters / PWM

The Carrier

- Can be any size or shape required by the application
- Contains all connectors
  - Complete control over connector location
  - Complete control over connector type
- Contains any additional I/O required by the application
- Off-the-shelf Carriers are available as a reference & to ease early development

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SoM Benefits

- Faster time to market
- Cost savings
- Reduced risk
- Scalable Features & CPU choices
- Increased Longevity
- Decreased customer design requirements
- Small footprint

Faster Time to Market

- Since the Module is purchased Off-the-Shelf and most of the complexity is on the module, design time is reduced.

- Software Board Support Packages (BSPs) and Integrated Development Environments (IDEs) are provided with the Module and do not have to be developed.

- Reference Carrier boards with Schematics are available to allow early software development before customer Carrier board is complete.

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Cost Savings

- Since the Module is purchased Off-the-Shelf design cost is reduced.

- The Module BSP and IDE are provided and do not have to be developed.

- Multiple Modules with various processing power and I/O features allow for best-fit at lowest cost Module selection.

- Micro Pitch BGAs require many PCB layers and blind / buried vias all which are expensive. By utilizing a module, this expensive is reduced to the size of the module PCB vs. the Carrier PCB.

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Reduced Risk

- Since the Module is purchased Off-the-Shelf and most of the complexity is on the Module, design risk is reduced.

- Micro Pitch BGAs and other very fine pitch components reside on Module simplifying Carrier Board PCB layout.

- Reference Carrier boards with Schematics are available simplifying Carrier design.

- The Module BSP and IDE are provided and do not have to be developed.

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Scalable Feature & CPU Choices

- 8, 16, 32 & 64 bit Modules
- 8051, 68HC12, Blackfin, Coldfire, ARM, x86
- 30, 66, 200, 400, 600 MHz, 1.6, 2.2 GHz.
- Serial ports, SPI, I2C
- Ethernet, CAN & I2S Audio
- Video & Touchscreen
- USB Host, Device & OTG
- SD/MMC & Compact Flash Cards
- GPIO, Timer/Counters, PWM, A/D

Increased Longevity

- Module contains most components (CPU, RAM, Flash) with accelerated End-Of-Life risk

- Modules are pin compatible providing an alternate replacement if a module is no longer available

- Faster Processors, more memory & additional features can be had by changing modules.

- Modules are designed to be interchangeable with minimal hardware & software changes

- Module BSPs are kept up to date

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Decreased Customer Design Requirements

- Since the Module is purchased Off-the-Shelf and most of the complexity is on the Module, design requirements are reduced.

- Micro Pitch BGAs and other very fine pitch components reside on Module simplifying Carrier Board PCB layout.

- Reference Carrier boards with Schematics are available simplifying Carrier design.

- The Module BSP & IDE are provided and do not have to be developed.

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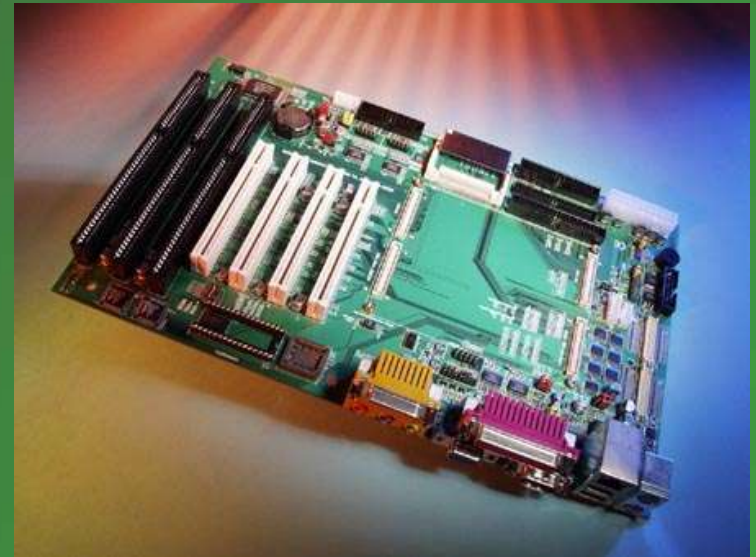EQUIPMENT MONITOR AND CONTROL

Small Footprint

- Different size Modules available depending on Features & Processing Power required

- Different Module Mounting options (depending on module type) allowing Module to stand off the Carrier board

- Components can be placed under module to reduce Carrier board space

- Carrier PCB routing is reduced allowing tighter component placement

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SoM Types

- ETX – x86 popular standard provides PCI & ISA buses

- COM Express – x86 popular standard provides PCI & PCI Express buses

- Q7 – x86 small size standard provides LPC & PCI Express buses

- EMAC SODIMM – Non x86 RISC provides processor local bus

- For product listings & information on the above SoMs go to: www.emacinc.com/som

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x86 SoM Advantages

- x86 PC Compatible Modules
- Modules are Standardized
- High-End, Fast Processing Power
- Large Memory Capacity
- Can run Win 7 & XP

EMAC SODIMM SoM Advantages

- Smaller Size
- Lower Power
- Less Expensive
- Highly Integrated
- Available in "Headless" configuration
- Available with additional I/O & Touch Controller
- Uses Well Proven SODIMM Connector

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EMAC SODIMM SoMS

144-Pin SoMs (Headless)

- **SoM-400E – 8-bit, Dallas TINI DS90C400 (8051) based module**
- **SoM-NE64 – 16-bit, Freescale MC9S12NE64 based module**
- **SoM-536E – 16-bit, Blackfin DSP ADSP-BF536 based module**
- **SoM-5282 – 32-bit, Freescale Coldfire MCF5282 based module**
- **SoM-9260 – 32-bit, Atmel ARM9 SAM9260 based module**
- **SoM-9G20 – 32-bit, Atmel ARM9 SAM9G20 based module**

200-Pin SoMs (with Video & Touch)

- **SoM-9307 – 32-bit, Cirrus ARM9 EP9307 based module**
- **SoM-9G45 – 32-bit, Atmel ARM9 SAM9G45 based module**
- **SoM-9G45 – 32-bit, Atmel ARM9 SAM9M10 based module**

SoM-400EM

- Dallas DS80C400 TINI 30MHz Processor
- Up to 2MB of Flash & battery backed RAM
- 1 Ethernet Port, 1 CAN Port & MMC/SD Card
- 3 Serial Ports, 1-Wire Port & SPI
- Typical Power Requirements 3.3V @ 200ma.
- Timer/Counters & GPIO
- Programs in Java or C with File System in RAM

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SoM-NE64

- Freescale MC9S12NE64 50MHz Processor
- Up to 64KB of Flash & 512KB of RAM
- 1 Ethernet Port & MMC/SD Card
- 2 Serial Ports, 1-Wire Port, I2C & SPI
- Typical Power Requirements 3.3V @ 200ma.
- Timer/Counters, PWM, A/D & GPIO
- Runs FreeRTOS & Programs in C
- Low Cost

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SoM-536EM

- AD Blackfin ADSP-BF536 400/600 MHz CPU
- Up to 4MB of Flash & 64MB of SDRAM
- 1 Ethernet Port, 1 CAN Port & MMC/SD Card
- 2 Serial Ports, 1-Wire Port, I2C, I2S & SPI
- Typical Power Requirements 3.3V @ 300ma.
- Timer/Counters, PWM & GPIO
- Runs uClinux with Real Time Extensions & Programs in C

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SoM-5282M

- Freescale Coldfire MCF5282 66MHz CPU
- Up to 4MB of Flash & 16MB of SDRAM
- 1 Ethernet Port, 1 CAN Port & MMC/SD Card
- 3 Serial Ports, I2C & SPI
- Typical Power Requirements 3.3V @ 300ma.
- Timer/Counters, PWM, A/D & GPIO
- Runs uClinux & Programs in C

SoM-9260M

- Atmel ARM9 AT91SAM9260 200MHz CPU

- Up to 64MB of Flash & 128MB of SDRAM

- 1 Ethernet Port, 2 SPIs, Audio & MMC/SD Card

- 6 Serial Ports, 2 USB Hosts & 1 USB Device

- Typical Power Requirements 3.3V @ 300ma.

- Timer/Counters, PWM, A/D & GPIO

- Runs Linux with Real Time Extensions or WinCE 6.0 & Programs in C, C# or Java

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SoM-9G20M

- Atmel ARM9 AT91SAM9G20 400MHz CPU

- Up to 1GB of Flash & 64MB of SDRAM

- 1 Ethernet Port, 2 SPIs, Audio & MMC/SD Card

- 7 Serial Ports, 2 USB Hosts & 1 USB Device

- Typical Power Requirements 3.3V @ 200ma.

- Timer/Counters, PWM, A/D & GPIO

- Runs Linux with Real Time Extensions or WinCE 6.0 & Programs in C, C# or Java

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SoM-9307M

- Cirrus ARM9 200MHz CPU

- Up to 64MB of Flash & 64MB of SDRAM

- 3 Serial Ports & 3 USB Hosts

- 1 Ethernet Port, SPI, Audio & MMC/SD Card

- Video/Graphic LCD with Touchscreen interface

- Typical Power Requirements 3.3V @ 300ma.

- Timers, PWM, A/D & GPIO

- Runs Linux or WinCE 6.0 & Programs in C, C# or Java

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SoM-9G45M

- Atmel ARM9 400MHz CPU
- 256MB of Flash & 128MB of DDR2 RAM
- Timers, PWM, A/D & GPIO
- 1 Ethernet Port, SPI, Audio & on-module MMC/SD Card
- Video/Graphic LCD with Touchscreen interface
- Typical Power Requirements 3.3V @ 260ma.
- 4 Serial Ports, 1 USB Host & 1 USB OTG
- Runs Linux or WinCE 6.0 & Programs in C, C# or Java

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SoM-9M10M

- Atmel ARM9 400MHz CPU
- Up to 1GB of Flash & 256MB of DDR2 RAM
- Timers, PWM, A/D & GPIO
- 1 Ethernet Port, SPI, Audio & on-module MMC/SD Card
- Video/Graphic LCD with Touchscreen interface
- Typical Power Requirements 3.3V @ 260ma.
- 4 Serial Ports, 1 USB Host & 1 USB OTG
- Runs Linux or WinCE 6.0 & Programs in C, C# or Java

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EMAC SoM COTS Carriers

144-Pin SoM SODIMM Carriers

- **SoM-100ES – Recommended for the following SoMs**
  - **SoM-400EM**
  - **SoM-NE64M**
  - **SoM-5282M**

- **SoM-150ES – Recommended for the following SoMs**
  - **SoM-536EM**
  - **SoM-9260M**
  - **SoM-9G45M**

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EMAC SoM COTS Carriers

200-Pin SoM SODIMM Carriers

- **SoM-200ES – Recommended for the following SoMs**
  - **SoM-9307M**
  - **SoM-9G45M**
  - **SoM-9M10M**

- **SoM-210ES – Recommended for the following SoMs**
  - **SoM-9307M**
  - **SoM-9G45M (only 1 USB Port)**
  - **SoM-9M10M (only 1 USB Port)**

- **SoM-250ES – Recommended for the following SoMs**
  - **SoM-9G45M**
  - **SoM-9M10M**

SoM-100ES

- CAN & 1-Wire Ports
- 25 SoM Specific I/O Lines
- 24 Key, Keypad Interface
- Character LCD Interface
- MMC/SD Flash Card Socket & RJ45 Ethernet
- 2 Serial RS232 Ports & 1 RS232/422/485 Port
- Dial-up or Wireless Modem Socket
- 32 General Purpose (PLD) I/O Lines including 8 High-Drive (500ma sink) lines
- Optional 12-bit A/D & D/A

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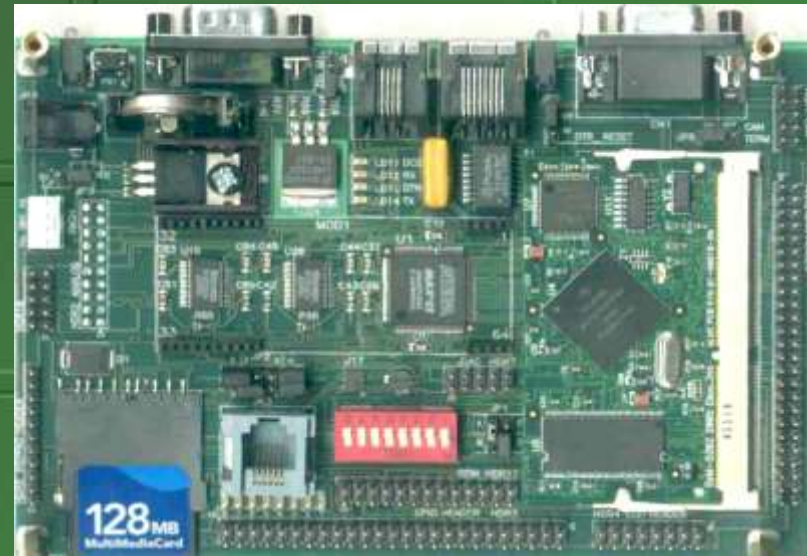
SoM-150ES

- CAN & 1-Wire Ports

- 24 SoM Specific I/O Lines

- 24 Key, Keypad Interface

- Character LCD Interface

- MMC/SD Flash Card Socket & RJ45 Ethernet

- 4 Serial RS232 Ports & 1 RS232/422/485 Port

- Dual USB Host & USB Device Jacks

- 24 General Purpose (PLD) I/O Lines including 8 High-Drive (500ma sink) lines

- Optional 12-bit A/D, D/A & I2S Audio In/Out

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SoM-200ES
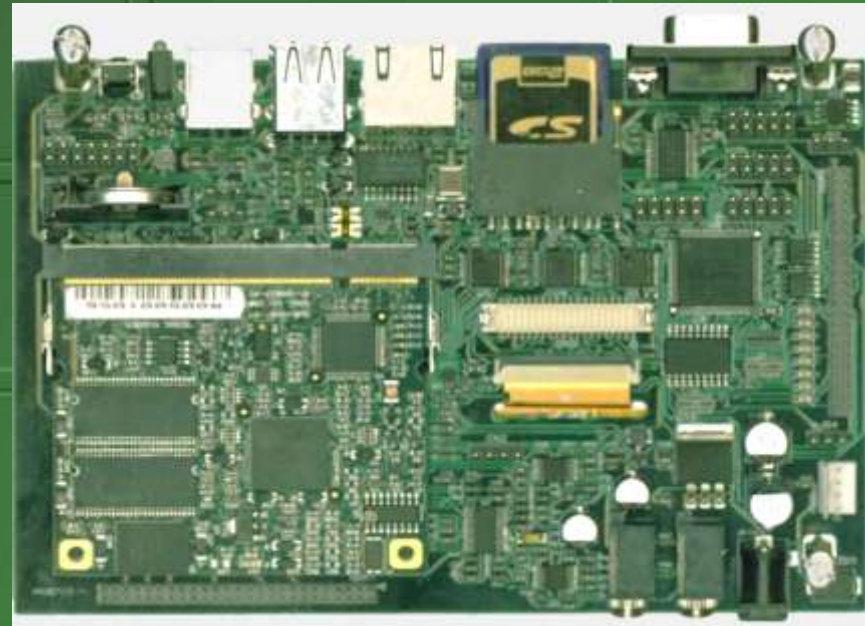
- 32 SoM Specific I/O Lines

- Dual USB Host & USB OTG Jacks

- Graphic WQVGA LCD with Touchscreen

- MMC/SD Flash Card Socket RJ45 Ethernet

- 3 Serial RS232 Ports & 1 RS232/422/485 Port

- 24 General Purpose (PLD) I/O Lines including 8 High-Drive (500ma sink) lines

- Optional I2S Audio In/Out & CAN

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SoM-210ES

- 32 SoM Specific I/O Lines
- RJ45 Ethernet
- Graphic WQVGA LCD with Touchscreen

Back Side

- Dual USB Host Jacks
- Audio Beeper
- 5V only Operation
- Small Form Factor
- Micro MMC/SD Flash Card Socket
- 2 Serial RS232 Ports & 1 RS232/422/485 Port

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SoM-250ES

- 32 SoM Specific I/O Lines
- RJ45 Ethernet
- Graphic WVGA LCD with Touchscreen
- USB Host & OTG Jacks
- Audio In / Out
- 12V to 28V Operation
- 2 Micro MMC/SD Flash Card Socket
- 3 Serial RS232 Ports & 1 RS232/422/485 Port

Back Side

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Custom Carriers by EMAC

- **EMAC has designed & manufactured a variety of Custom SoM Carriers for a number of different Industries. These Industries include:**
  - Medical
  - Gaming
  - Environmental Control
  - Metering
  - Homeland Security
  - Military
  - Real Time Data Acquisition & Control
  - Robotics

Custom Carriers by EMAC

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EMAC SODIMM SoM Roadmap

3Q11   200-Pin SoMs (with Video & Touch)

- **SoM-3517 – 32-bit, TI ARM Cortex A8 AM3517 based module**
  - 600MHz ARM Cortex-A8 core with NEON SIMD Coprocessor
  - 3D Graphic engine with hardware video scaling & Touchscreen
  - 4 serial ports, 10/100 Ethernet, CAN, SPI, I2S Audio, & I2C
  - High Speed USB Hosts & OTG
  - SD/MMC Flash Card Interface
  - Video Input Port

1Q12

- **SoM-3894 – 32-bit, TI ARM Cortex A8 AM3894 based module**
  - 1GHz ARM Cortex-A8 core with NEON SIMD Coprocessor
  - 3D Graphic engine with hardware video CODECs & Touchscreen
  - 4 serial ports, 10/100 Ethernet, SPI, I2S Audio, & I2C
  - High Speed USB Hosts & OTG
  - SD/MMC Flash Card Interface

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