QorIQ Development Systems with COM Express® Modules

Ease the “make vs. buy” decision for OEMs

Overview

OEMs face increasing challenges in new product development. These include diminishing hardware engineering resources, a rise in processor complexity and the perpetual demand for bringing solutions to market faster and at a lower cost. Today, design decisions often include buying silicon and designing a custom board around it, or personalizing an off-the-shelf board from a single-board computing (SBC) vendor. Thankfully, SBC vendors can ease these challenges by providing the engineering and manufacturing expertise to jump start the OEM’s design.

Freescale’s modular development systems provide OEMs with yet more design decision flexibility. Production-ready COM Express® compatible boards from Emerson Network Power and Eurotech are designed around Freescale’s P4080, P2020, P1022 and P1021 QorIQ multicore communications processors. These development systems help eliminate the board-level design step from the architecture decision process, easing the “make vs. buy” decision.

Features and Benefits of QorIQ Processors on COM Express Modules

- Off-the-shelf: Emerson and Eurotech take the complexity of designing with multicore processors and provides production-ready solutions.
- Extended temperature range: Emerson and Eurotech QorIQ processor modules are suitable for industrial automation, medical, networking, telecom and military applications.
- Embedded graphics: Integrated on-board support for VGA and LVDS further simplifies the design process while providing for human-machine interface (HMI) applications.
- Future-proof: QorIQ processors are part of Freescale’s Product Longevity Program—ensuring a long life cycle.

COM Express Development System Components

The Freescale development systems provide an I/O-rich carrier blade whose personality comes from the QorIQ processor embedded in a plug-in COM Express module. This module/carrier combination provides unparalleled development flexibility.

Each development system contains the following:

- Hardware
  - o COM Express module with QorIQ processor and memory
  - o Carrier blade
  - o Chassis enclosure
  - o Universal bench ATX power supply
  - o Cables (serial UART, USB, CAT5 Ethernet)
  - o CodeWarrior USB TAP
- Software
  - o U-boot
  - o Linux® BSP from Mentor Graphics Embedded
  - o GCC tools (compiler, debugger)
  - o CodeWarrior evaluation copy
- Documentation
  - o Quick start guide
  - o Design workbook
    - Block diagram of hardware
    - Programming model
    - System configurations
  - o Linux OS and CodeWarrior tools manuals

Carrier Blade

Freescale designed the carrier blade to support the full family of COM Express modules based on QorIQ processors. Additional development systems are planned to support modules from the growing number of QorIQ processors. The ATX form factor carrier blade accepts/supports compact (95 mm x 95 mm) and basic (95 mm x 125 mm) COM Express board sizes through its COM Express connectors.

Carrier blade connectors and supported functions include:

- One SD/MMC card connector
- Two dual CAN connectors
- Five PCI Express® (PCIe) x4 connectors (Connector “A” through Connector “F”) which could support up to four lanes of PCIe 2.0/1.0, SGMII, Serial RapidIO® (sRIO) and XAUI interconnects (depending on the processor used)
- Two PCIe x1 connectors (used as sideband connectors for the PCIe x4 connectors) and one PCIe x1 connector used for TDM riser to support SLIC function
- Eight USB 2.0 connectors
- Four SATA II connectors
- One DVI-I connector to support either digital DVI or analog VGA (via an adapter) connector
- Two TFT display connectors
- Two dual DB-9 RS-232 connectors for UART
- RS-485 can be added by adding an adapter to the DB-9 RS-232 connector
- Stereo audio jacks

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- RJ-11 phone connectors can be added using TDM riser card into slot 5 and the TDM riser sideband connector
- One dual RMII (100/10 MHz) connector, one dual and one single GMII (1 GHz) RJ-45 Ethernet connector
- 50-pin connector for IXXAT Industrial Ethernet module via SPI bus
- Tamper detect circuitry to test P4080, P5020 and P3041 security mode

Additional features

- Standard barrel ATX power supply
- Touch screen capabilities
- OS support from Green Hills, Mentor Graphics, QNX and Wind River
- Supports IXXAT Industrial Ethernet module for evaluating industrial communication protocols

COM Express Modules

Each module plugs onto the carrier blade to provide embedded functions. All connections, including custom I/O, are via the carrier card. Inherently rugged pin and socket connections make these modules suitable for industrial and military use. Off-the-shelf software helps reduce cost and complexity.

About the COM Express Standard

COM Express is a PCI Industrial Computer Manufacturers Group (PICMG) standard for a computer-on-module (COM) form factor with PCI Express interconnects. Originally developed for X86 processors, the COM Express specification supports the push toward high-speed serial interfaces and supports more interfaces than PMC boards. Freescale's COM Express development kits do not change any physical form factors of the standard. However, Freescale has created a Power Architecture® friendly pinout for the COM Express module that takes advantage of our QorIQ system-on-chip (SoC) solutions.

Development System and Module Availability

Freescale is currently offering three development systems for order at $1,499 USD per kit:

- P4080COME-DS-PB
- P2020COME-DS-PB
- P1022COME-DS-PB
- P1021COME-DS-PB

Development kits will be available from Freescale and our distribution partners. Emerson Network Power and Eurotech will sell production quantities of the COM Express modules through its distribution network, including our mutual channel partners Avnet and Arrow.

COM Express® Modules

Manufacturer: Emerson	COMX-P4080	COMX-P2020	COMX-P1022	–
Manufacturer: Eurotech	**Adbc7517**	**Adbc7519**	**–**	**Adbc7520**
Form Factor	COM Express Basic (125 mm x 95 mm)	COM Express Compact (95 mm x 95 mm)	COM Express Compact (95 mm x 95 mm)	COM Express Compact (95 mm x 95 mm)
Processor	P4080 @ 1.5 GHz	P2020 @ 1.2 GHz	P1022 @ 1.0 GHz	P1021 @ 800 MHz
Number of Cores	8	2	2	2
Memory	4 GB DDR3 (DDR3 ECC SO-UDIMM) MicroSD slot for on-board storage	2 GB DDR3 (DDR3 ECC SO-UDIMM) MicroSD slot for on-board storage	2 GB DDR3 (DDR3 ECC SO-UDIMM) MicroSD slot for on-board storage	2 GB DDR3 (DDR3 ECC SO-UDIMM) MicroSD slot for on-board storage
Ethernet	• 1x 1G with integrated PHY • 4x SGMII port available via SerDes links • 1x 10GE XAUI port available via SerDes links	3x 1G with integrated PHY	2x 1G with integrated PHY	2x 1G with integrated PHY
USB 2.0	4x with integrated PHY	4x with integrated PHY	4x with integrated PHY	4
UART	2x with flow control	2x with flow control	2x with flow control	2
SPI	1x with 4 chip selects	1x with 4 chip selects	1x with 4 chip selects	1
GPIO	8	8	8	8
I²C	4	2	4	4
PCI Express® (PCIe)/ RapidIO (sRIO)	• Up to two sRIO v2 (x4) ports available via SerDes links • Up to two PCIe v2 (x4) ports available via SerDes links	PCI (x2) + PCIe (x1)	PCI (x2) + dual PCIe (x1)	PCI (x2) + PCIe (x1)
Graphics	–	VGA/LVDS	VGA/LVDS	VGA/LVDS
SATA 2.0	–	–	2	–
IEEE® 1588	Yes	Yes	Yes	Yes
QUICC Engine Technology	No	No	No	Yes

Learn More: For more information about QorIQ development systems with COM Express modules and the "make vs. buy" process, visit **freescale.com/SBC**.

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