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# PowerQUICC<sup>®</sup> Simplifies Industrial Deterministic Protocols and Applications



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- ▶ Industrial market trends
  - Connectivity via Ethernet
- ▶ Enabling industrial protocols
  - Determinism in communications
- ▶ Industry-standard form factor
  - Commercial off-the-shelf (COTS) advantage
- ▶ Partnerships with key enablement leaders
  - IndusRAD, IXXAT, Wind River
- ▶ Comprehensive development system
  - HW, SW, protocols and tools
- ▶ Production-ready solution
  - Quick to market and revenue

# Freescale's Industrial Development System

- ▶ **Industrial Development System** will help shorten development and time to market for next generation networked industrial products
  - Evaluation copies of production-ready PROFIBUS, IEEE® 1588, ETHERNET Powerlink available with platform
  - PowerQUICC® II Pro-based Computer on Module (COM) Express development system provides the ability evaluate, productize and evolve with ever changing industrial protocols standards
    - Demonstrates graphics and touch screen capability
    - Full SW tools suite from Freescale and Wind River
  - The COM Express module is designed, manufactured and tested to be **production-ready** over the Industrial temperature range of -40C to 85C.

- ▶ Move from 8-bit architecture to 32-bit Architectures
  - Higher levels of control processing at the node
- ▶ Legacy standards (CAN, ProfiBUS) moving to Ethernet-based systems
  - Open, proven, cost-effective, worldwide standard, easy to implement and use
  - More bandwidth than most traditional field buses
  - Integration and data transparency on all **networking levels**
- ▶ **Commercial** off the Shelf (COTS) modules
  - Ready to integrate
  - Focus on end application and time to revenue
  - Reduce design cycle, inventory management, time to market

# The Protocol Advantage

	What?	Why?	Primary Markets	Applications
<b>ETHERNET Powerlink (EPL)</b>	Open deterministic real-time protocol for standard Ethernet	Higher network performance. Advances CANopen's success as an open profile (easy integration EPL and CANopen networks). Ensures ideal interoperability between systems of different manufacturers. License Free.	Medical and industrial automation	Safety applications, drives and motion control, and hybrid process automation, such as chemical, oil and gas, packaging, food and beverage, pharmaceuticals and water/wastewater treatment—"applications that use programmable logic controllers, not distributed control systems."
<b>PROFIBUS</b>	One of the largest open industrial fieldbus protocols in the world	Popular, flexible solution for a range of applications: configuration and diagnostic SW, production and manufacturing automation, process automation, safety, drives, motor control. Many devices from 300+ vendors. Established technology. 12M+ nodes shipped.	Factory and process automation	
<b>IEEE® 1588</b>	Low cost clock sync protocol that aligns master and slave clocks through Ethernet networks with nanosecond level accuracy	Very accurate, inexpensive solution	Industrial, telecommunications, power and energy, test and measurement, defense, marine	Time sensitive telecom services Powerline networks Industrial network switches and controllers Test and measurement devices

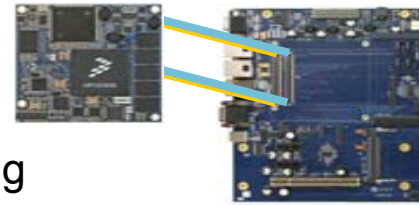
# Improving time to market and revenue

## “Reducing time to market”

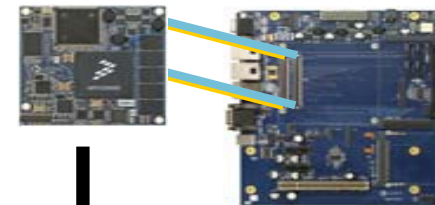
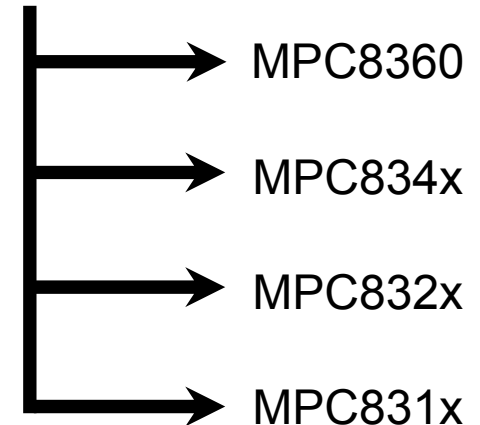
- Simplify protocol development
  - Efficient code port, development and debug
  - Optimized BSP
  - Production-optimized protocol binaries
  - Code targets entire PowerQUICC® II Pro processor family

## “Reducing time to money”

- Simplify prototype → production cycle
  - Processor module available in production quantities
  - Complete design files available
    - ▶ PDFs of schematics and layout
    - ▶ Protocol development & production licenses direct from protocol partner
    - ▶ BSP source code



## Target Processor



# Computer on Module (COM) Advantage

Develop with PowerQUICC® technology and go to production rapidly!



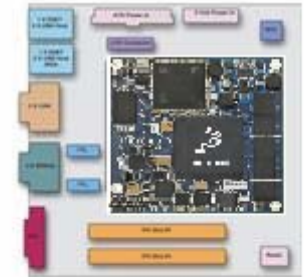
**FlexATX Carrier Board**

**PowerQUICC-based  
COM Express Module**



95 mm

95 mm



**Logic FlexATX  
or Custom  
Peripheral**




**Final Product**

**\$999 for the system:**  
Carrier board and COM Express module

# Freescale's Ecosystem of Partners

*Time Sync  
Real-time  
communication  
and diagnostics*




**IXXAT**  
IEEE® 1588 and  
ETHERNET  
Powerlink

**freescale™**  
semiconductor

MPC8360E-RDK  
CodeWarrior®



*Automation  
Control*



**IndusRAD Inc.**  
PROFIBUS

*Production Grade  
OS and RTOS*



**WIND RIVER**  
Linux® and  
VxWorks

**Industrial  
Board**



**LOGIC**  
COM Express

*Go-to-market fast  
with production-  
ready board*

# MPC8360-RDK Industrial Development System

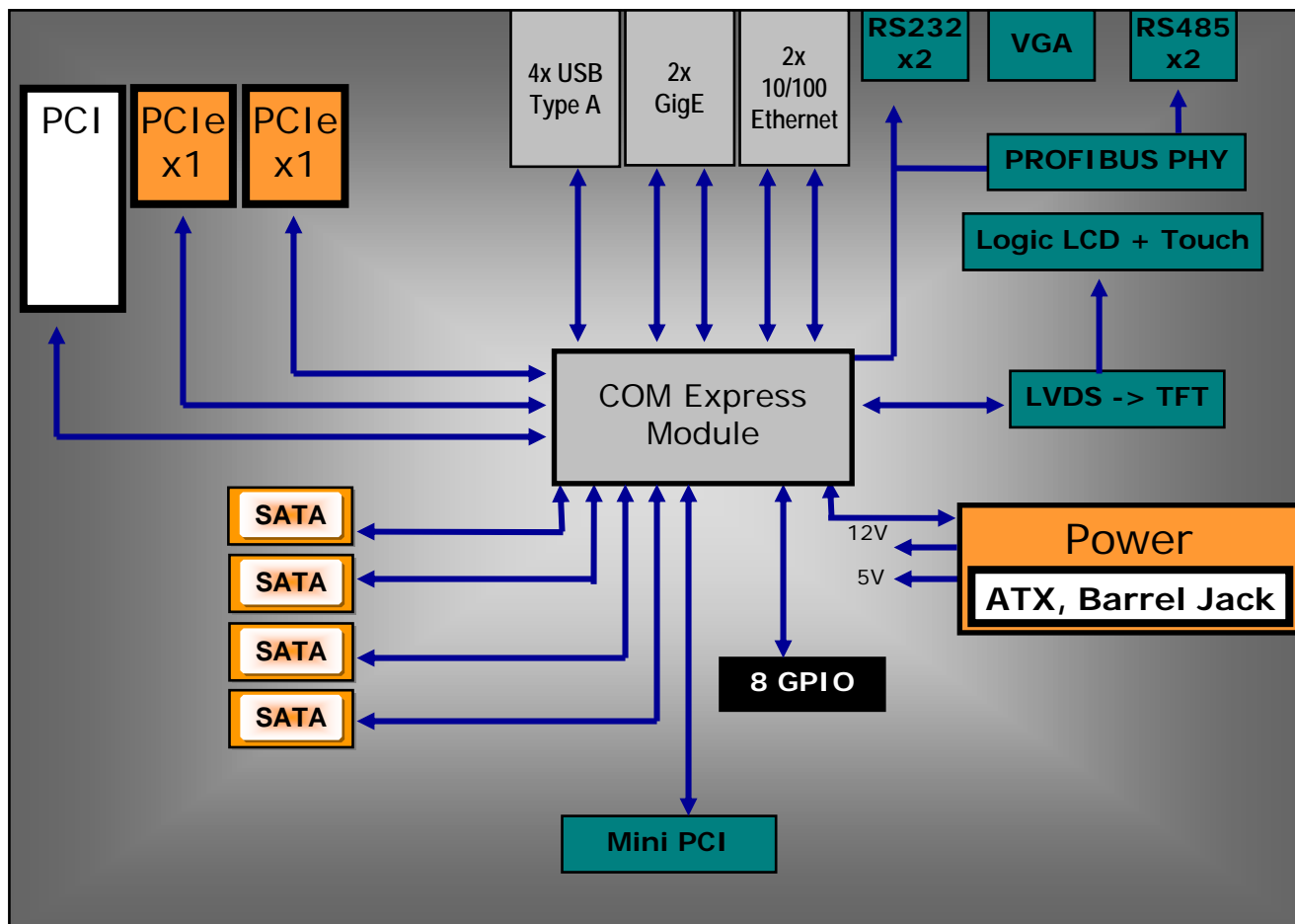
- ▶ Out of the box and into development – *Quickly*
  - P/N: MPC8349E-RDK
  - Suggested resale price: \$999
  - Availability: September 2007
- ▶ Platform
  - Carrier board FlexATX
  - MPC8360 COM Express
  - Cables and power supply
- ▶ Protocols – optimized binaries
  - PROFIBUS (IndusRAD)
  - Ethernet Powerlink (IXXAT)
  - IEEE® 1588 (IXXAT)
  - Others coming...stay tuned
- ▶ Tools
  - CodeWarrior® IDE & USB TAP for debug
  - Linux® BSP & optimized drivers
  - Wind River Linux and VxWorks
- ▶ Design Files
  - Carrier board: Full design files
  - COM Express: PDF



# MPC83xxE-CBB COM Express Carrier Board

## Features

- MPC83xx Development Carrier Board
- FlexATX Form Factor
  - standard chassis
- 2 x PCIe (x1 type)
- 1 x PCI slots (32bit/66Mhz or 33Mhz)
- Common I/O routed to back panel
  - 4 USB 2.0
  - 4 Ethernet
  - 2 RS485
  - 2 RS232
  - 4 SATA
- Wireless connectivity through 1x mini-PCI
  - 802.11 or ZigBee™



# Power Architecture™ Technology is for Embedded Applications

## MPC8360E is suited for implementation of Industrial protocols

- ▶ Advanced processor with the QUICC Engine™ technology
  - Allows multi-protocol support on one device
    - Allows implementation of future protocols and changes in specifications
    - **Programmability** allows PROFIBUS and ETHERNET Powerlink implementation
  - HW assist of the QUICC Engine technology provides and improves precision, accuracy and performance over competing ASIC and FPGA solutions
    - IEEE® 1588: ns accuracy
    - Powerlink Managing Node (MN): “Best-in-class” EPL latency performance
  - Allows I/O flexibility
- ▶ MPC8360-RDK development system allows you to evaluate all the QUICC Engine technology features with straightforward migration to the lower cost MPC8358 and MPC832x families

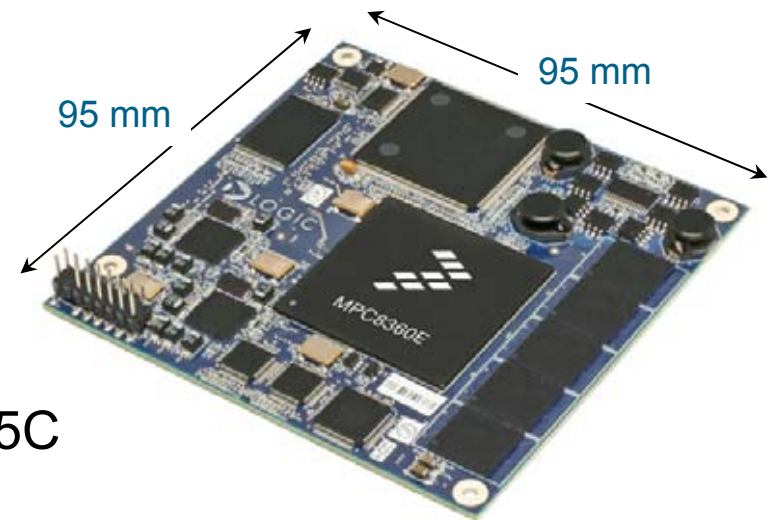
# MPC8360 COM Express Module

## ► Production-ready – *Integrate into end-product with ease*

- LogicPD part #: COMMPC8360-10-1652LCR
- 400 MHz suggested resale price: Start's at \$299 @ 2.5Kunits
- LogicPD part #: COMMPC8360E-10-2752FCR
- 667 MHz w/ graphics suggested resale: Just under \$450 @ 2.5Kunits
- Availability: September 2007

## ► COM Express

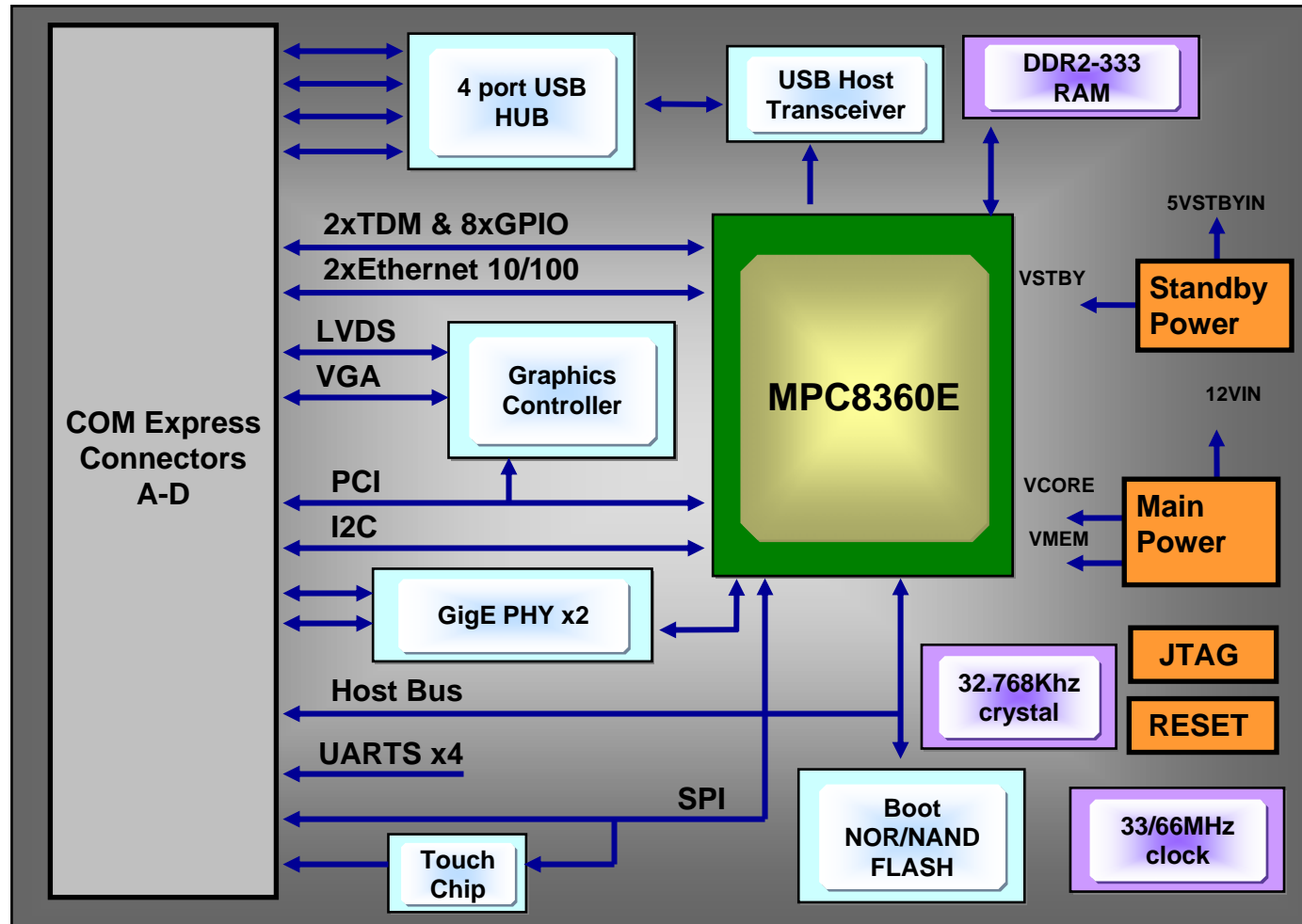
- Ships as final product
- Customizable
- Industrial temperature rated: -40C to 85C



# MPC8360E-COM Express Module (COM)

## Features

- COM Express Module
  - Type 3 Module
- 256MB of DDR2 SDRAM w/ ECC
- 8MB Boot NOR Flash
- Graphics and touch screen capable
- 2x 10/100
- 2x GigE
- 4x full functional UART
- 32-bit PCI connection
- 1x SPI
- 1x I2C
- 4 port USB HUB
- 8 pins General Purpose Input/Output
- Std. IEEE 1149.1 JTAG test access pt.
- VGA and LVDS connections.



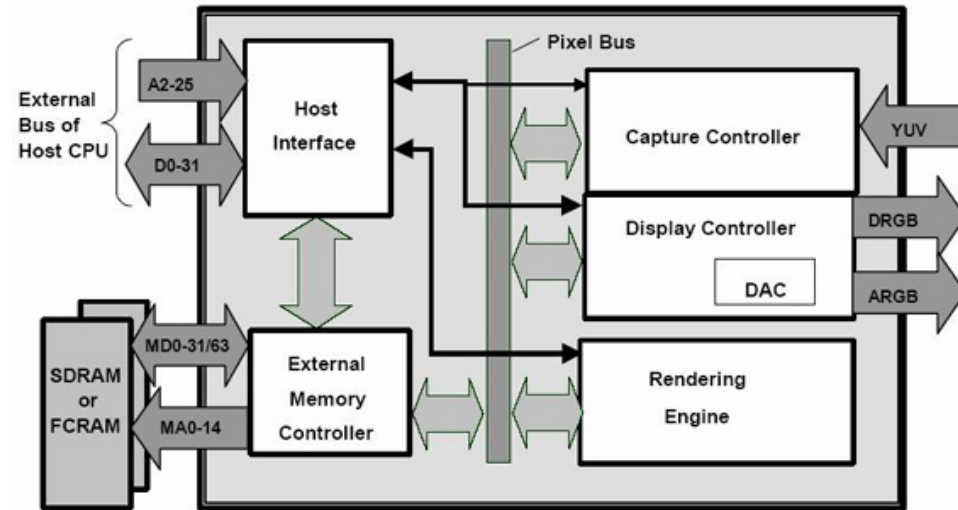
# Fujitsu 'Mint' MB86277 Graphics Chip

## ► Key features

- Display resolutions up to 1024x768
- Alpha Plane
- Digital Video input
- Video Scalar (down scaling)
- I2C interface
- RGB digital output (8bit x 3)
- RGB analog output
- 2D/3D graphic acceleration functions
- Built-in alpha blending, anti-aliasing and chroma-keying
- External SDRAM or FCRAM interface@ 100MHz for up to 64MB graphic memory
- Temperature range -40..+85 °C

## ► Application Segments

- Automotive
- Marine Instrumentation & Navigation
- Medical
- Point-of-Sale
- Flight Instrumentation
- Console-gaming



- Capable of rendering 3D graphics
- Video input unit is capable of accepting
  - TV tuner,
  - DVD player
  - Camera signals (PAL or NTSC video)

# Solving the Problem

- ▶ **PowerQUICC® simplifies industrial deterministic protocols**
  - Lowers overall system cost by providing both control and communication processing in one device
  - Flexible to the changing communication standards
  - A family of processors that provide a spectrum of price/performance/power options
- ▶ **Industrial development platform**
  - Lowers development cost and time-to-market through a comprehensive hardware and software platform for the industrial market
  - Power Architecture™ technology evaluation platform providing access to a full spectrum of ISA compatible processors
  - Broad, rich ecosystem that supports Power Architecture technology and the industrial market
- ▶ **Industry-standard production-ready form factor: COM Express**
  - Speeds time-to-money through production-ready platform(s)
  - Fully tested and certified production platform industrial temperature rated: -40C to 85C
  - COM Express allows for a variety of end customer form factors

## ▶ Target Markets

- Test and instrumentation
- Automation and robotics
- Networking control
- Process manufacturing control
- Building security and control
- Healthcare monitoring equipment
- Enterprise systems
- Traffic control
- Transaction terminals
- Gaming
- Fire alarm and safety systems
- Defense and aerospace
- Power and energy
- Network communications

## ▶ Target applications using

### deterministic protocols:

- Drives, I/O modules or encoders
- Patient monitoring to CRT/MRI systems
- Programmable logic controllers

### single board computing:

- Data acquisition
- Point-of-sale terminals
- Telecommunications
- Global positioning satellite (GPS) devices
- Motion control

