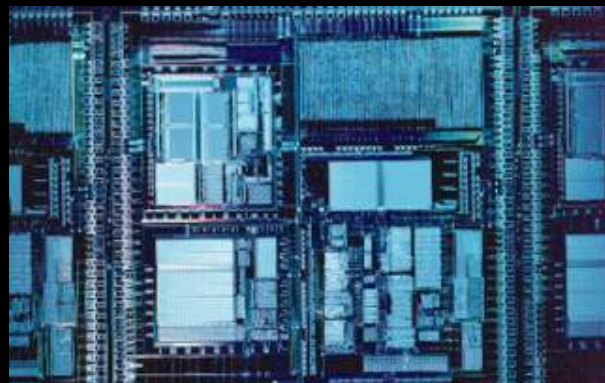
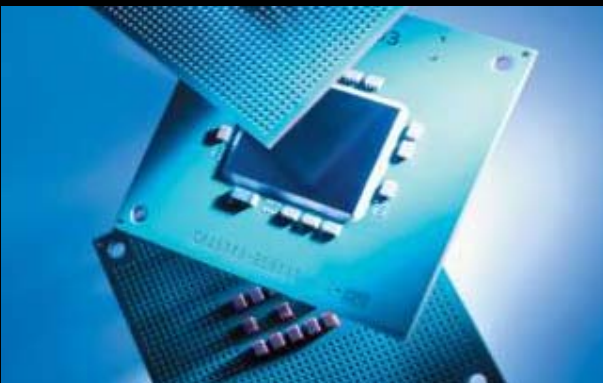


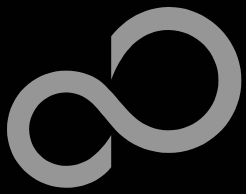
Fujitsu FlexRay Solutions

FUJITSU

From System Support to Silicon

2nd FlexRay Product Day, Böblingen Dec 1st, 2005





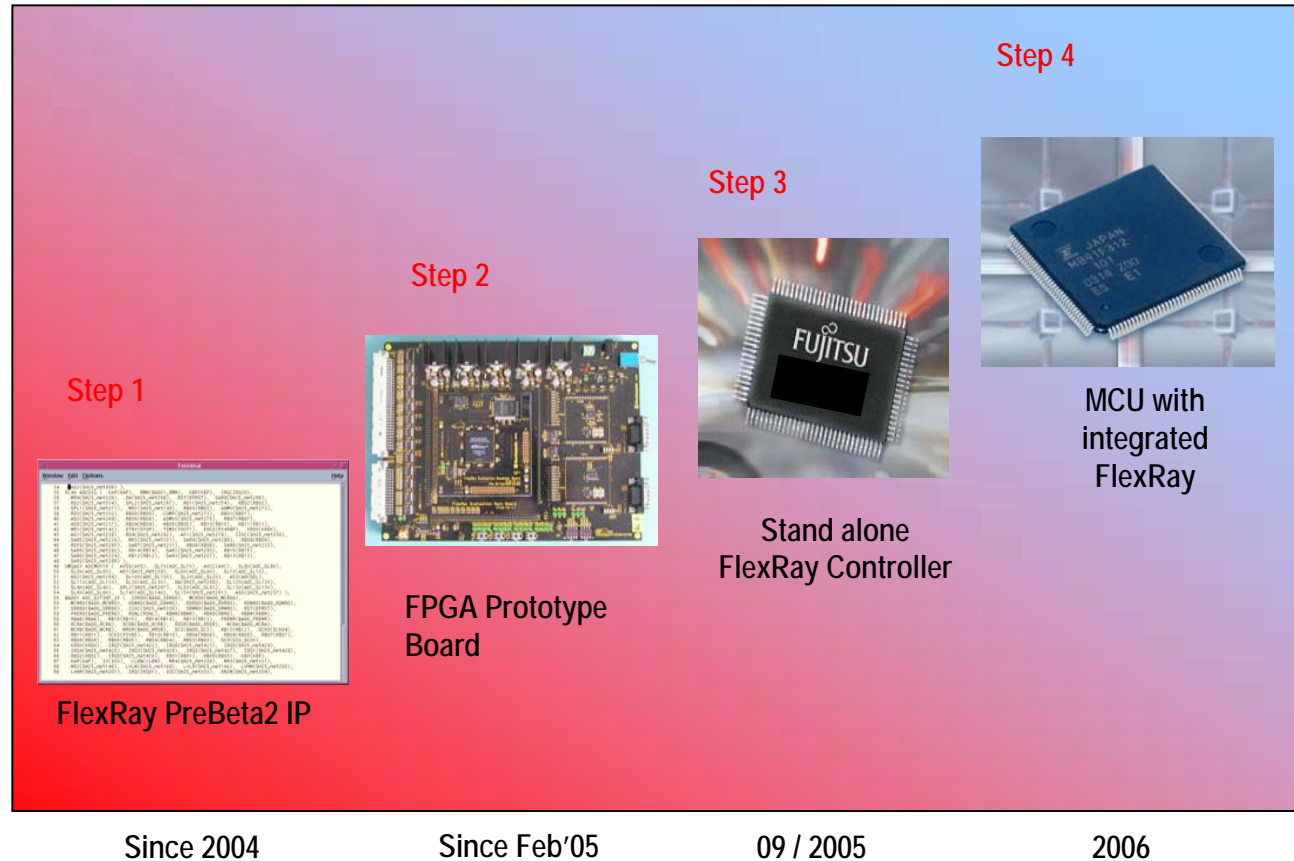
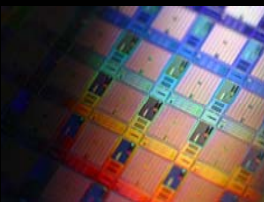
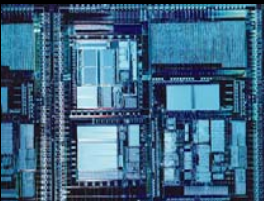
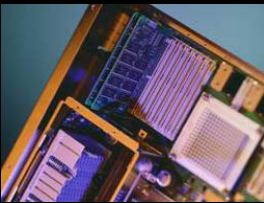
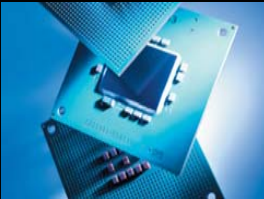
Content



- **Fujitsu FlexRay Roadmap**
- **FlexRay Development Platforms**
- **FlexRay ASSP Solution**
- **FlexRay MCU**
- **Software, Tools, Cooperation**



Fujitsu FlexRay Roadmap



FPGA & First Silicon provide Protocol Version 2.1!



Development Platforms



■ FlexRay Evaluation Kit

- FPGA-based Solution
- Presented at Embedded World 2005 in February
- For first steps; getting familiar with FlexRay Protocol
- For quick project startup

available

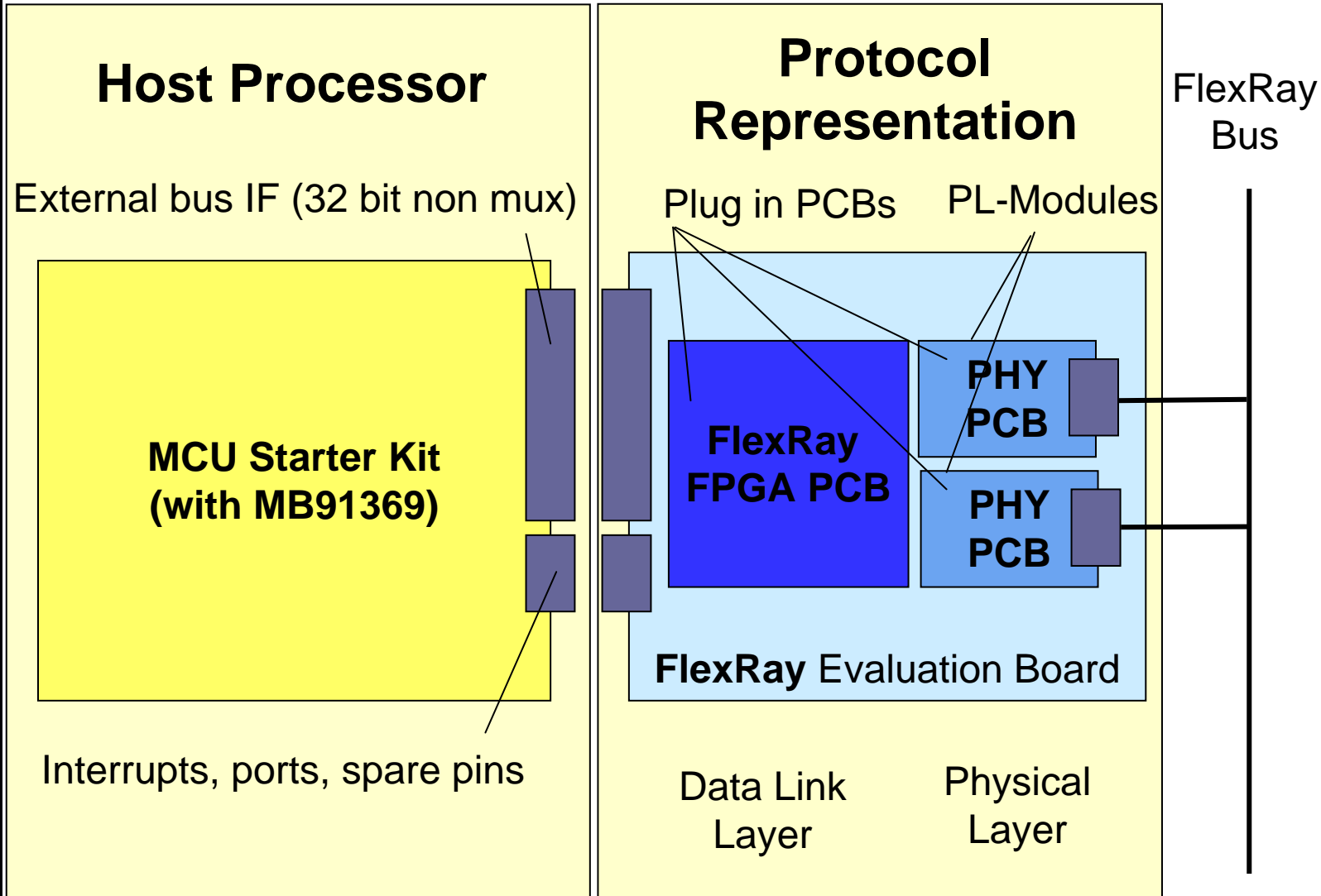
■ FlexRay Starter Kit

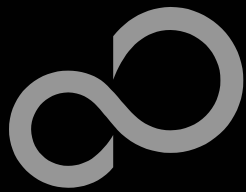
- Based on first Silicon for ERAY
- Features new 32-bit family MB91F460

available



FPGA-based FlexRay - Concept -





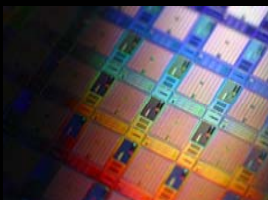
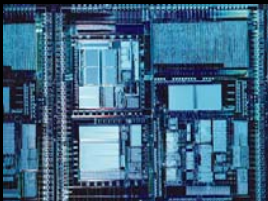
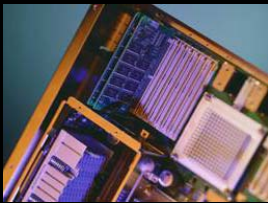
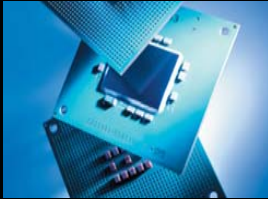
FLEXRAY-FPGA-EVA-KIT-369

■ FPGA-based *FlexRay Evaluation Kit* available on stock @FME

- Order Code: ***FLEXRAY-FPGA-EVA-KIT-369***

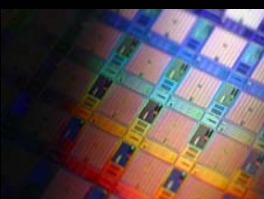
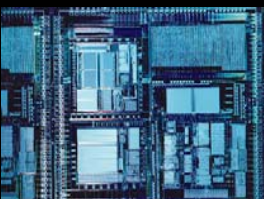
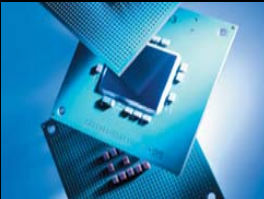
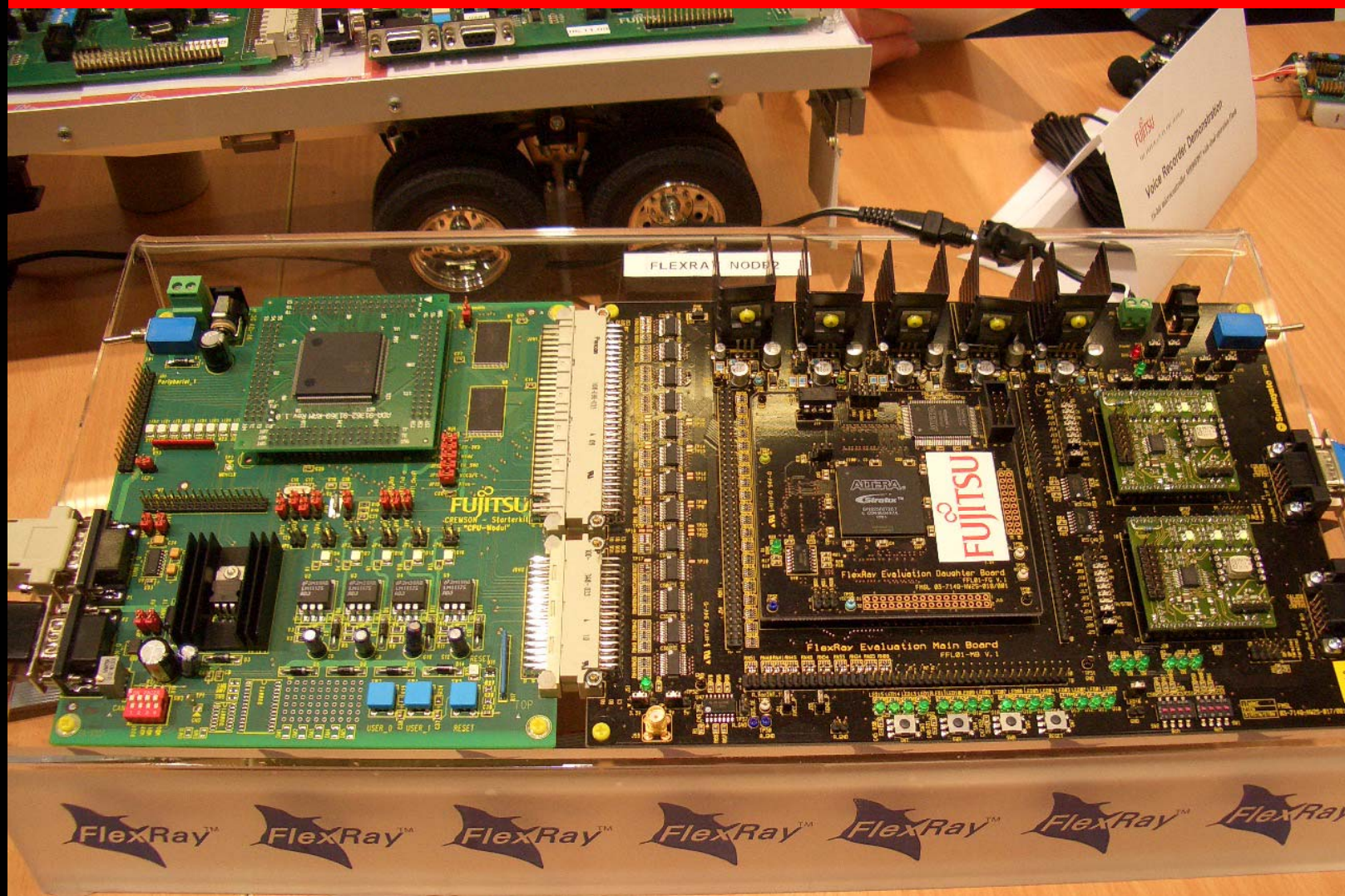
■ Contents

- Host Processor Board
 - 32-bit MCU MB91F369
 - Onboard Monitor Debugger
- FlexRay Main & Daughter Board
 - FPGA-based ERAY IP core featuring protocol Version 2.1
 - Plug in sockets for physical layer modules
- Software
 - Driver for FlexRay interface as library
 - Example software
- Tools
 - DECOMSYS::DESIGNER trial version (30 days free usage)
 - FlexConfig from TZM ('light' version)
 - Softune Workbench on Micros CD 3.6





FLEXRAY-FPGA-EVA-KIT-369





Application Examples



■ Basic FlexRay Communication

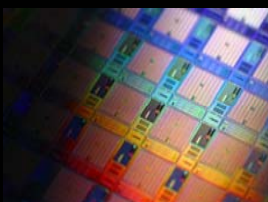
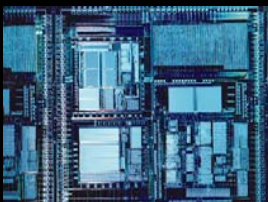
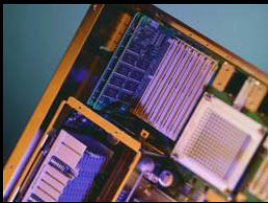
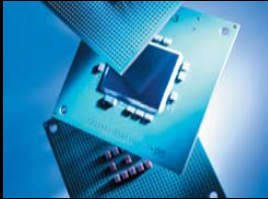
- 2 FlexRay nodes configured to send frames on each channel
- 16-bit counter embedded to each frame send in static slot

■ CAN FlexRay Gateway

- Each nodes acts as a gateway that collects CAN messages and sends these as frames in static slots on the FlexRay bus; - or vice a versa

■ Keyboard/LCD Demo

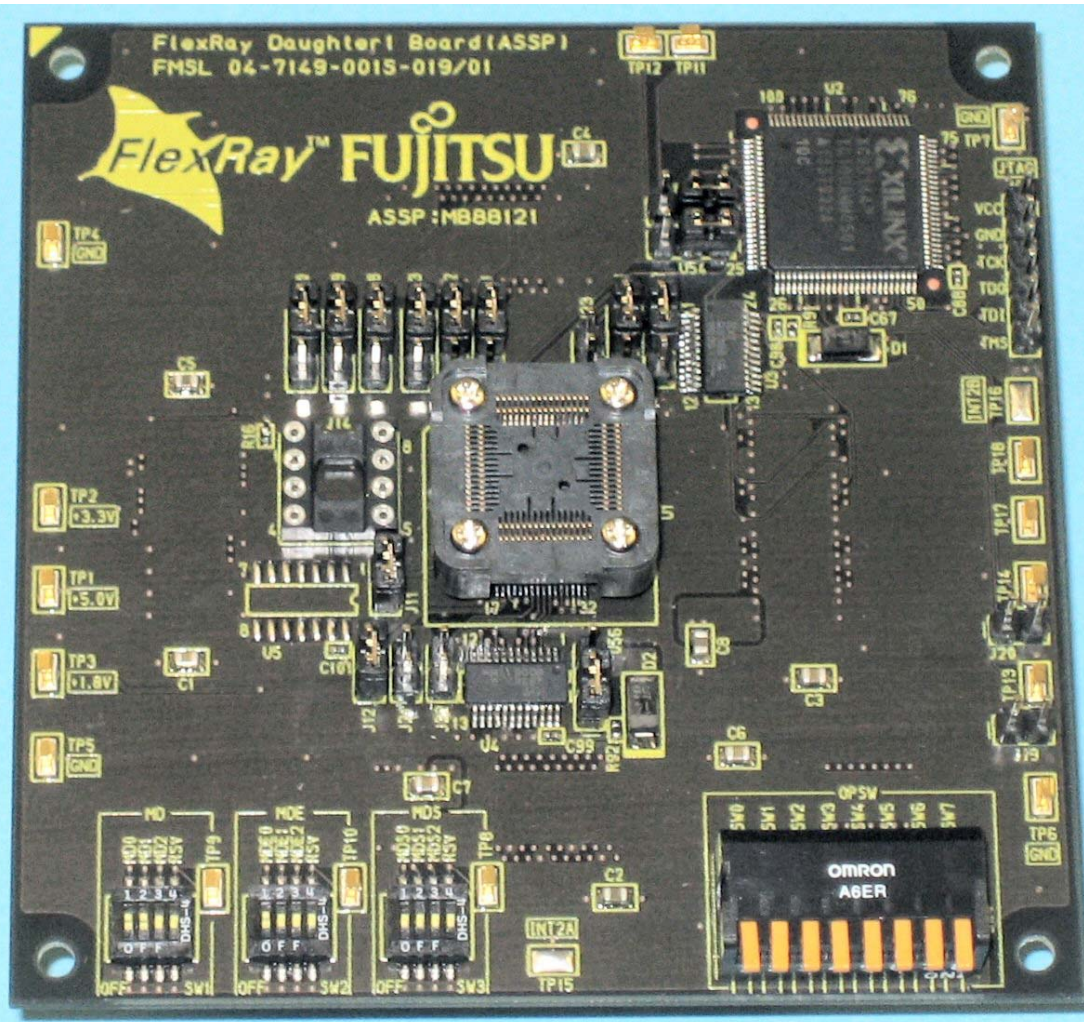
- User enters data from the keyboard which is transmitted as frame in static slot
- Data is displayed on LCD



MB88121 Daughter Board



Migration Support FPGA -> ASSP



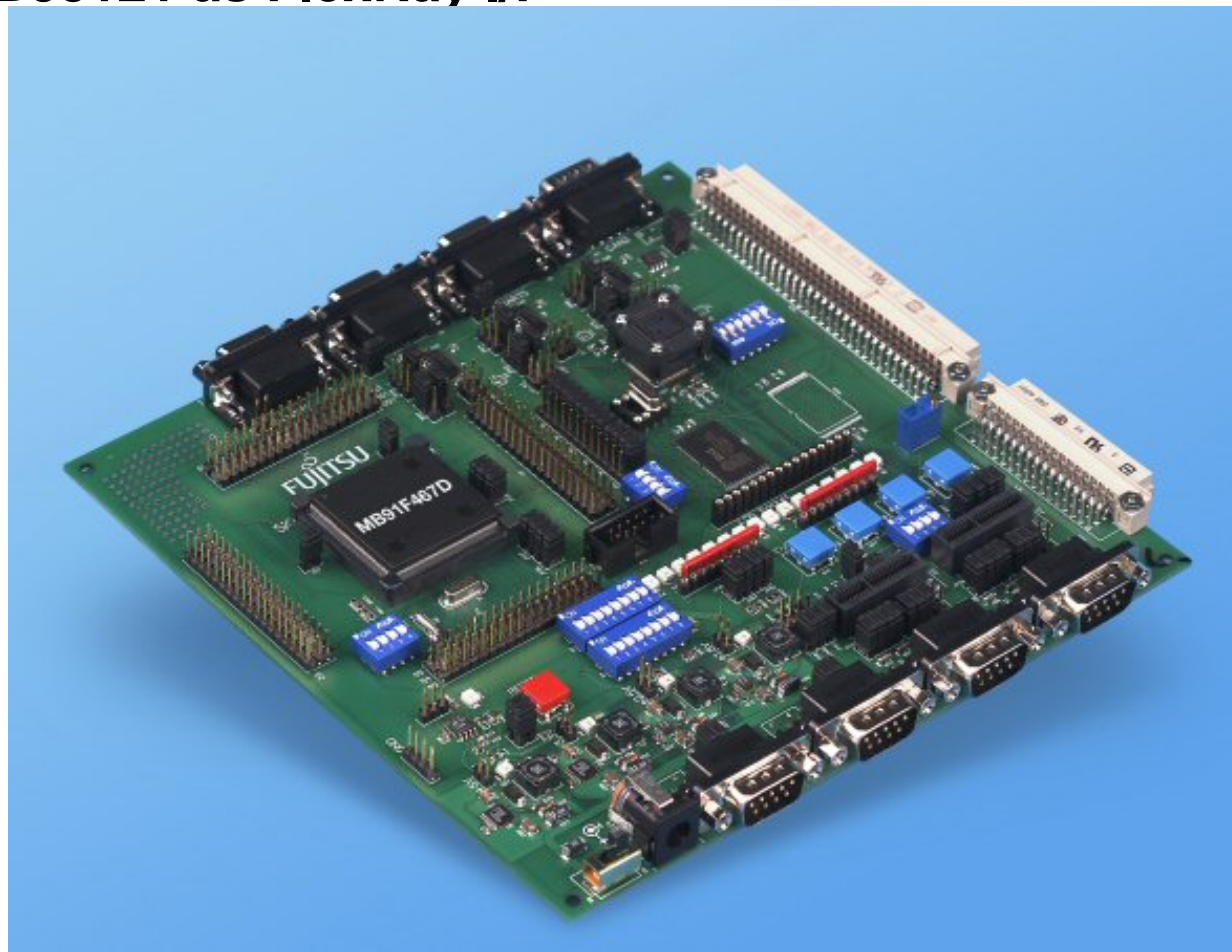
- Plugs into Evaluation kit
- Mode selection for host I/F
- Level shift for Physical Layer
- Supports 16-bit non-mux host interface



SK-91F467-FLEXRAY



- Starter Kit to support new MB91F460 series
- MB88121 as FlexRay I/F



3 x CAN I/F, 3 x LINUART, Ext. Bus I/F



First ERAY Silicon



MB88121

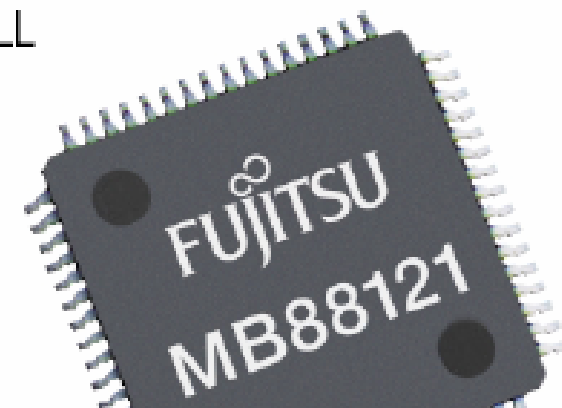


THE POSSIBILITIES ARE INFINITE

Fujitsu first to present Silicon
for FlexRay™ based on ERAY core

Available since
Sept. 2005

- Supports FlexRay Protocol V2.1
- Parallel host interface
- DMA support
- 64 pin LQFP with 0.5 pin pitch
- Internal PLL



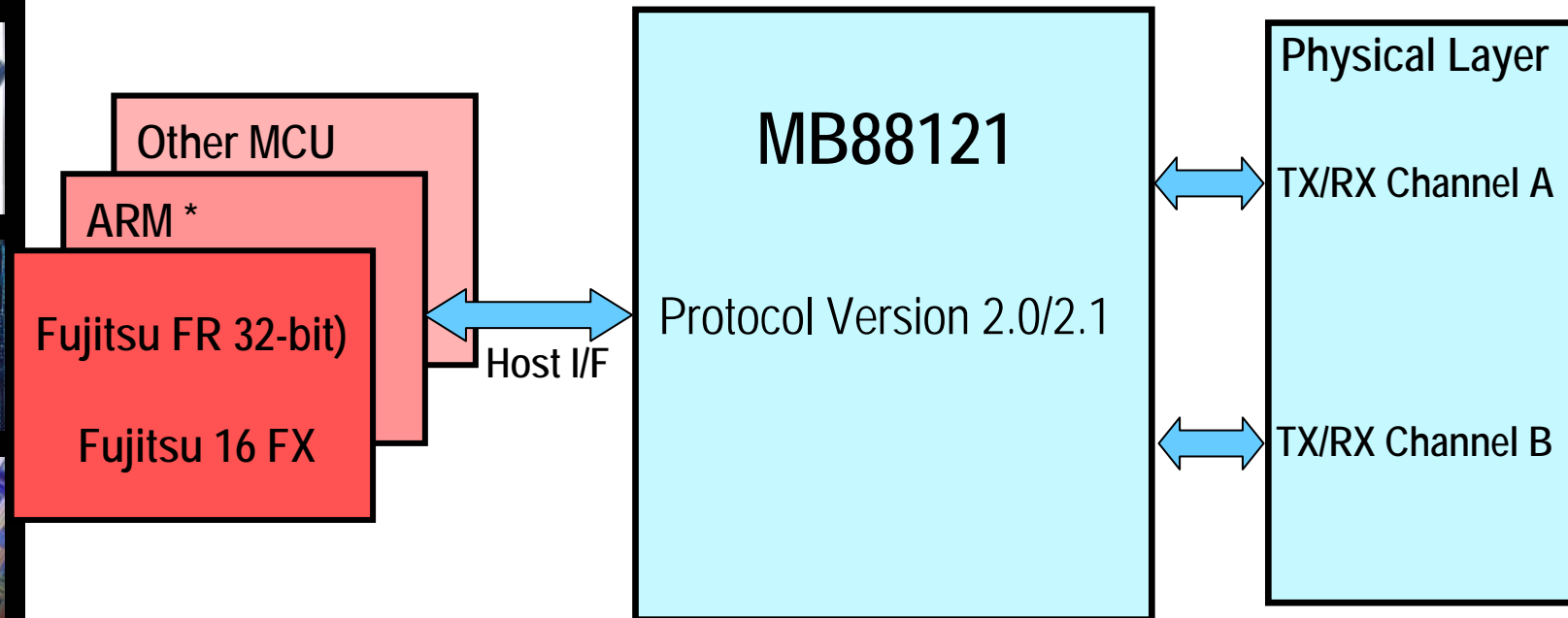


MB88121 Concept



■ Stand alone FlexRay Protocol device

- Emulates the data link layer
- For existing applications that need to communicate via FlexRay
- Substitute for lack of suitable embedded solutions in short time frame
 - For 16- and 32-bit processors



* Under consideration



MB88121 Features



■ First Silicon features Protocol Version 2.0 & 2.1

- PreBeta2 release of IP core as basis for design
- Update with final IP release in early 2006 foreseen

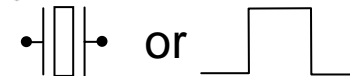
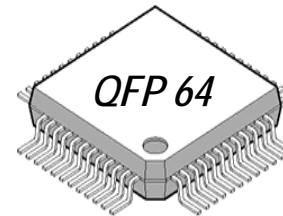
■ Package QFP64

- 0.5 pin pitch / 10 x 10 mm (M0)

■ Single Supply Voltage

■ Clock

- 4/5/8/10 MHz quartz
- Square wave input 40 MHz or 80 MHz (for test purposes)



First samples available since 9/2005

■ Parallel Host Interfaces

- 32-bit multiplexed Mode
- 16-bit multiplexed & non-multiplexed Mode
- 8-bit multiplexed & non-multiplexed Mode

■ Serial Host Interface

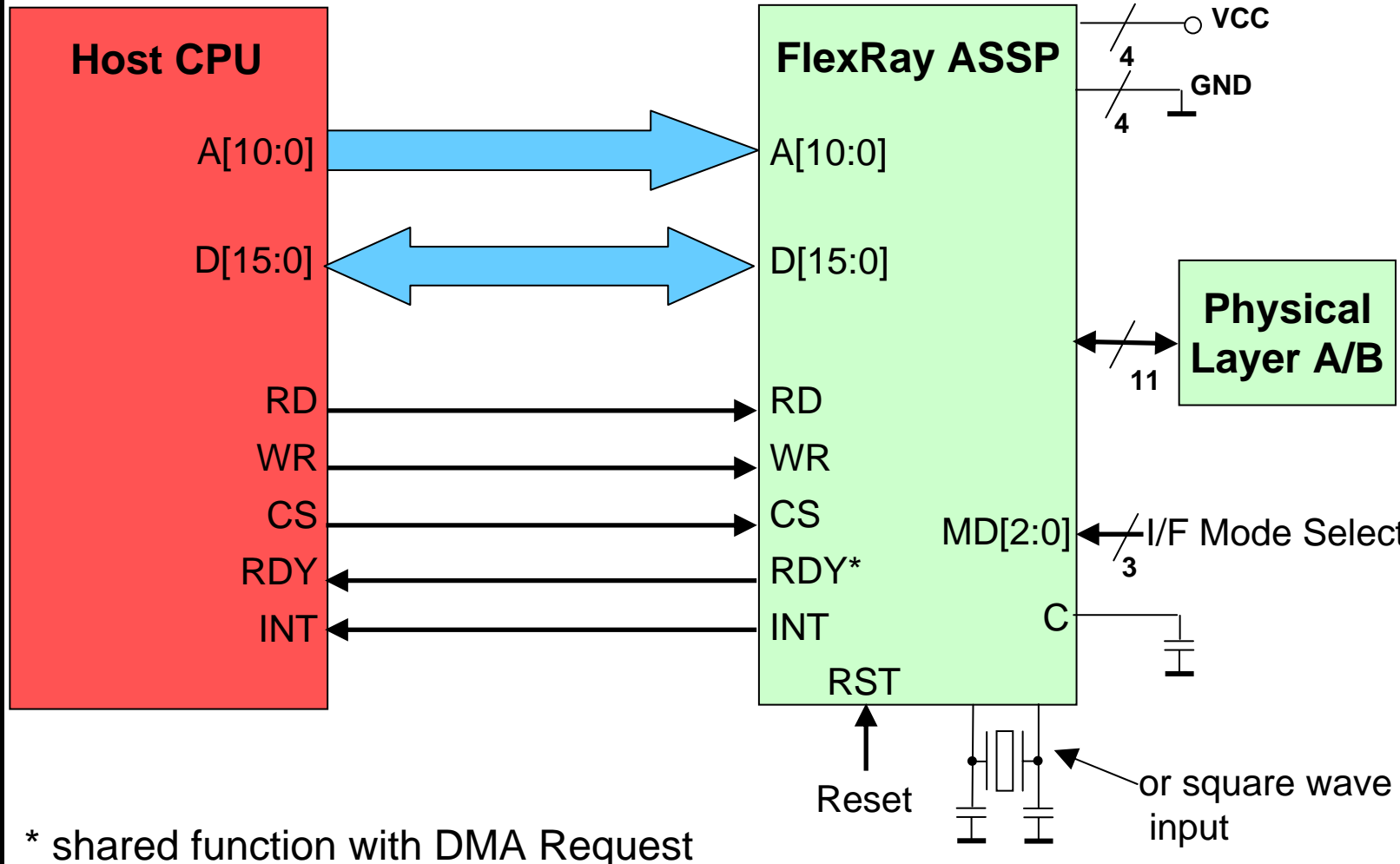
- SPI

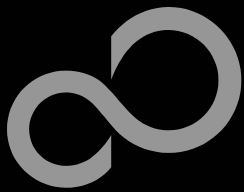


Parallel Host Interface



16-bit non-multiplexed Mode





MB88121 Schedules



■ **MB88121**

- First Silicon with ERAY core in the market
- Features protocol Specification 2.0
 - PreBeta2update release

Sept 2005

■ **MB88121A**

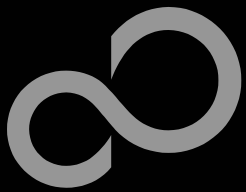
- Protocol Specification 2.1
 - Beta release
- DMA support for host interface

Nov 2005

■ **MB88121B**

- Certified IP with Protocol Specification 2.1
 - Beta2 update
- Enhanced host interface options i.e SPI (tbd)

1Q/2Q 2006



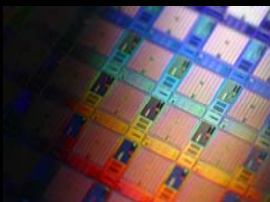
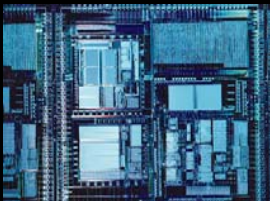
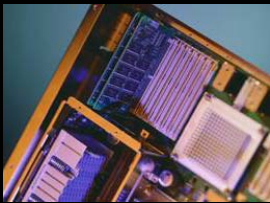
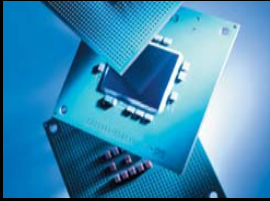
FlexRay MCU



Single Chip Solution

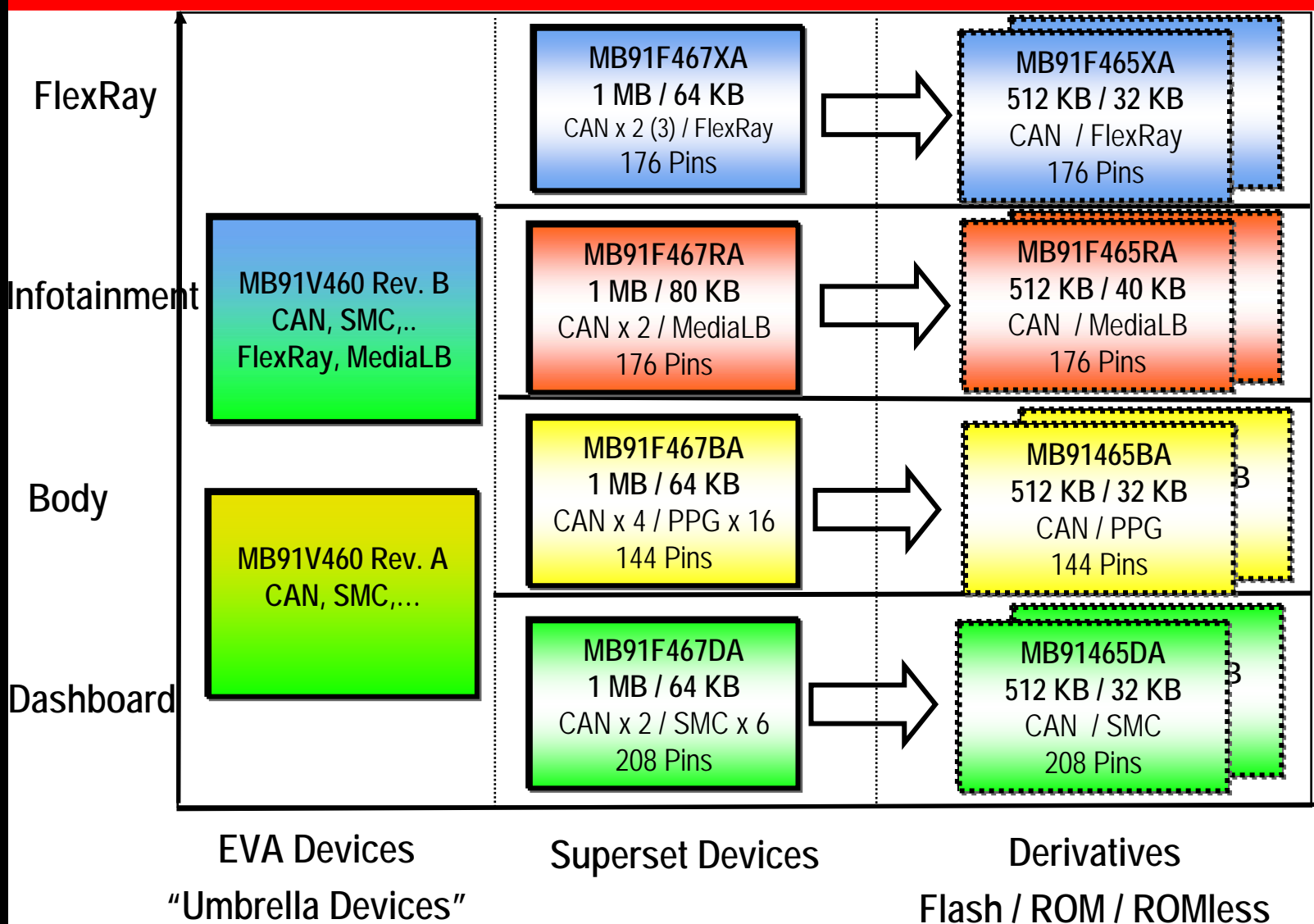
with

Embedded FlexRay Controller



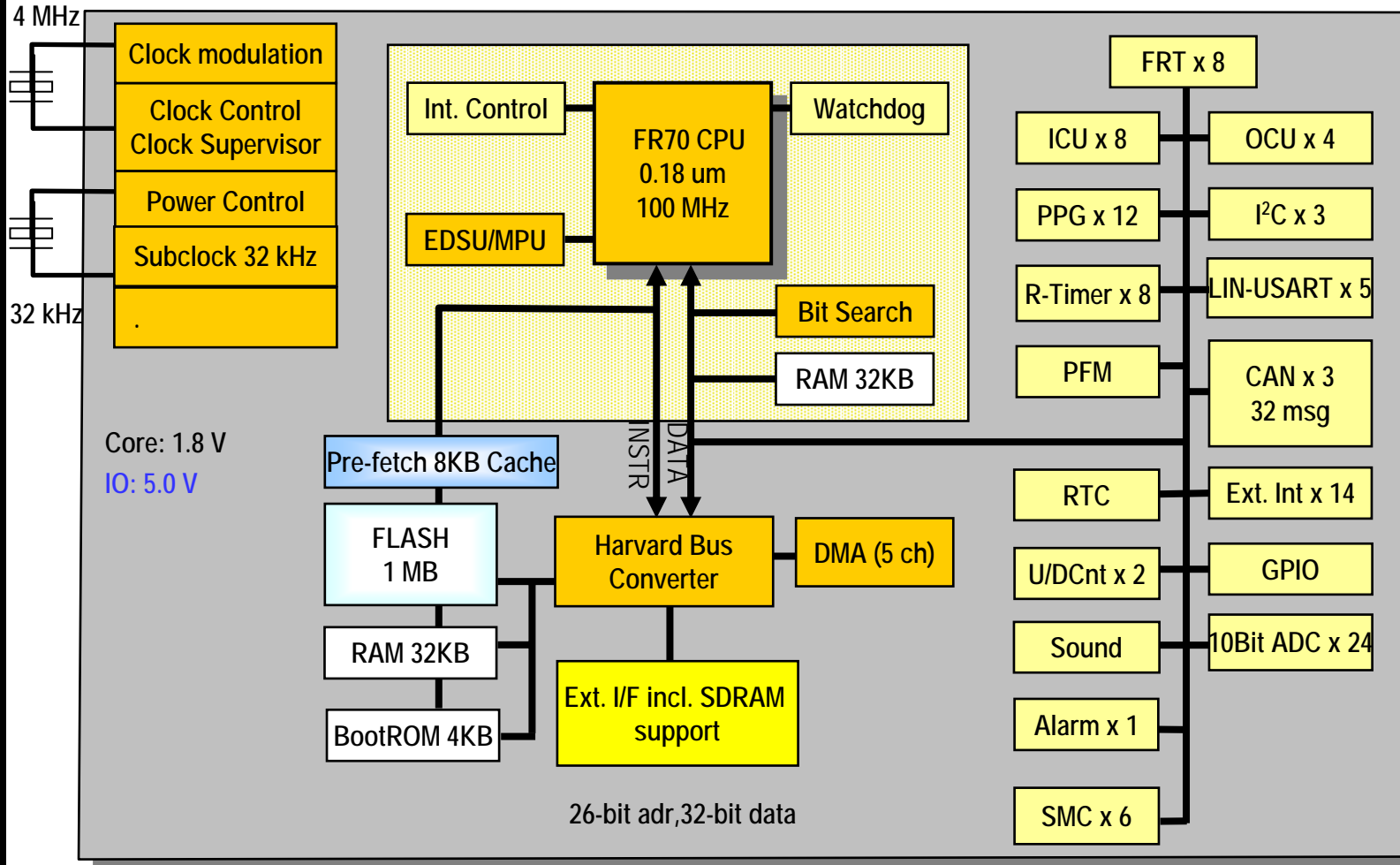


MB91460 Line-up





MB91F467DA - Dashboard

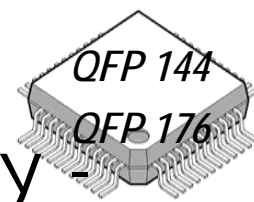


Available since 11/2005

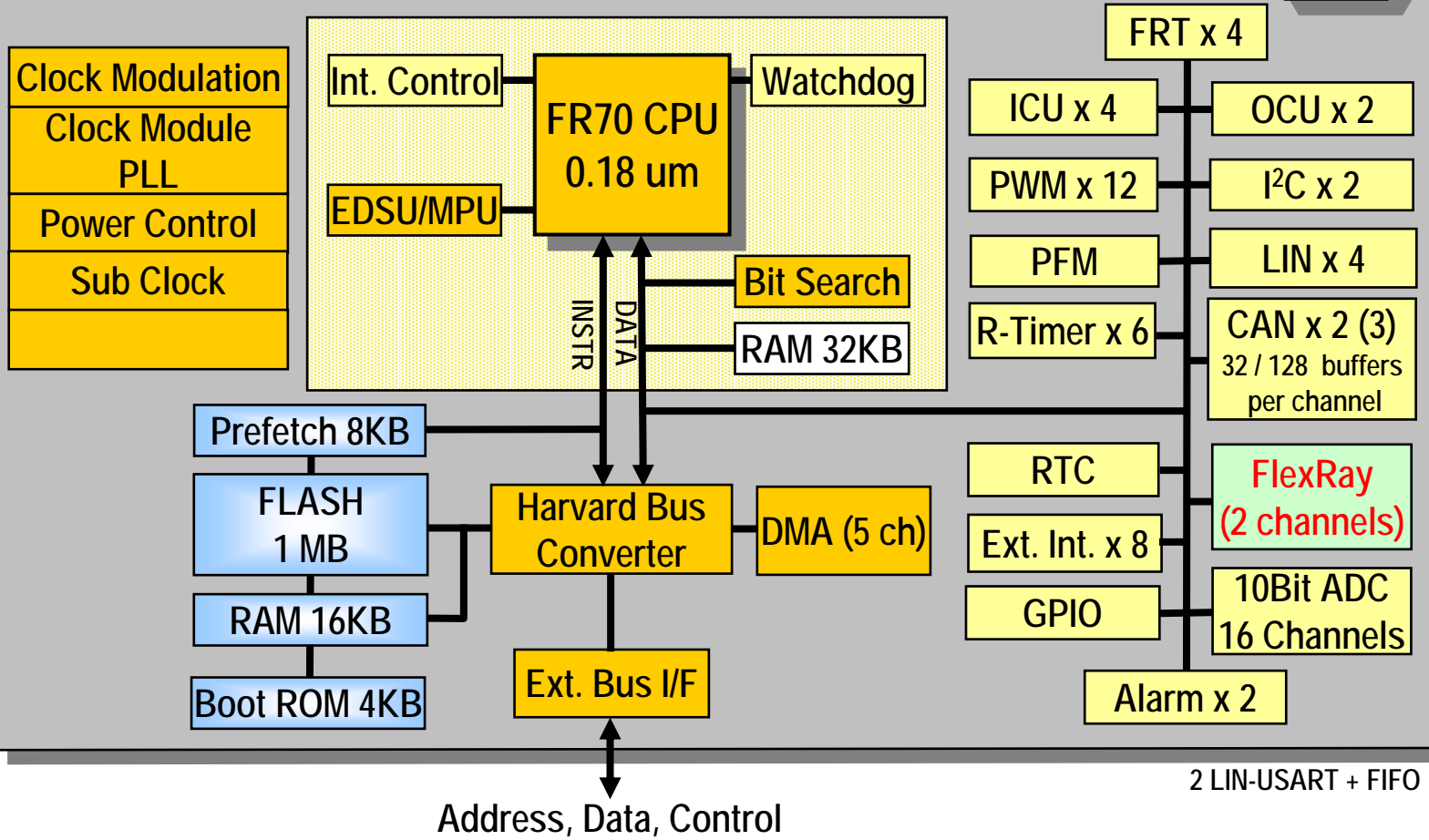


MB91F467XA

- Superset Device FlexRay



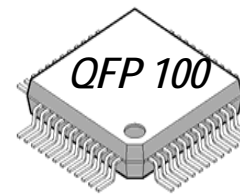
5V single supply



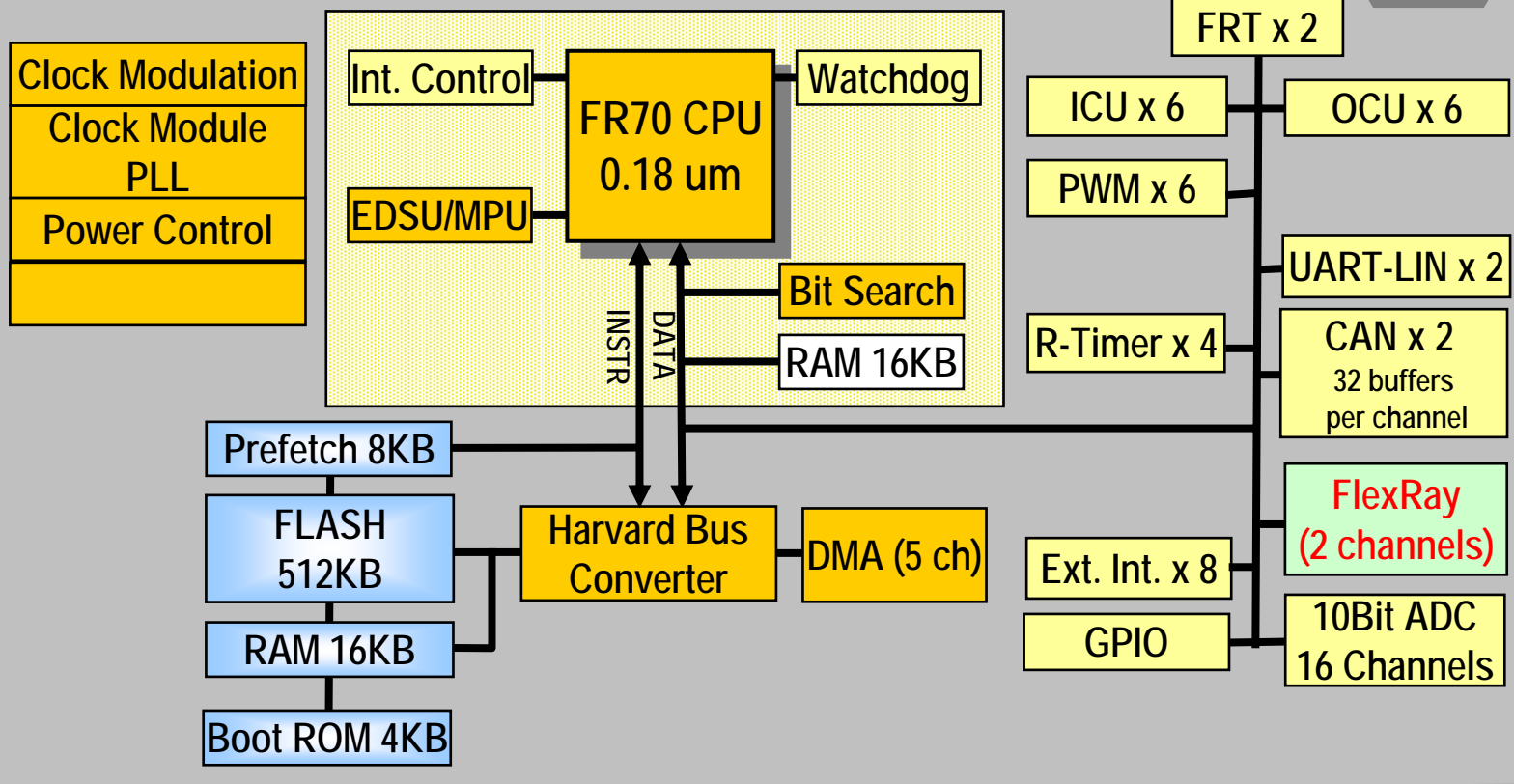
2 LIN-USART + FIFO



MB91F465XA



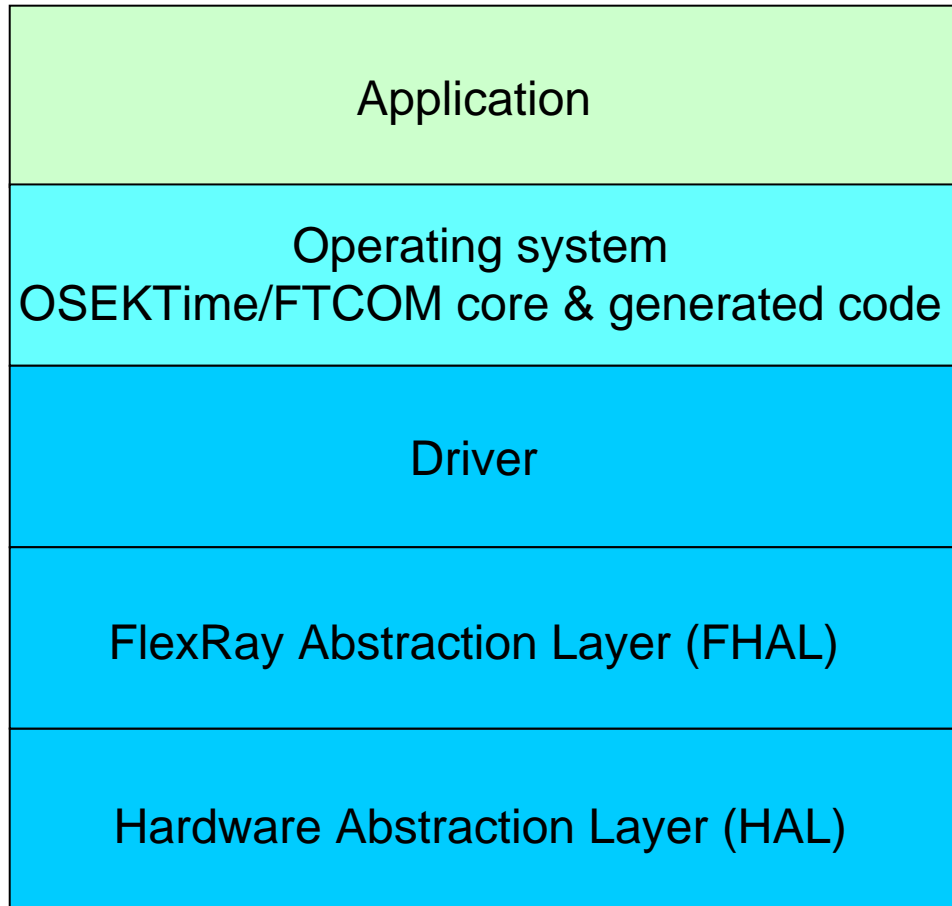
5V single supply



Target application i.e. Driver Assistant Systems available in 2H'06



Communication Software



FlexRay COMMSTACK

Provides the services for application, access via FTCOM

Provides access to registers and memory

Abstraction of CPU
i.e. endianness, data structures

Available with any Fujitsu Development Platform



Fujitsu's Cooperation - FlexRay Partnerships -



- Collaboration with leading Tools and Software suppliers provides the best solution for your FlexRay application

Physical Layer

austriamicrosystems AS8221



TZM FlexPL-Moduls



FlexRay Silicon

FUJITSU

MB88121
MB91F465XA

Tools

FUJITSU
FlexRay-FPGA-Eva-Kit-369
SK-91F467-FLEXRAY

Software

3SOFT

TimeCore

DECOMSYS 
Your FlexRay Development Partner

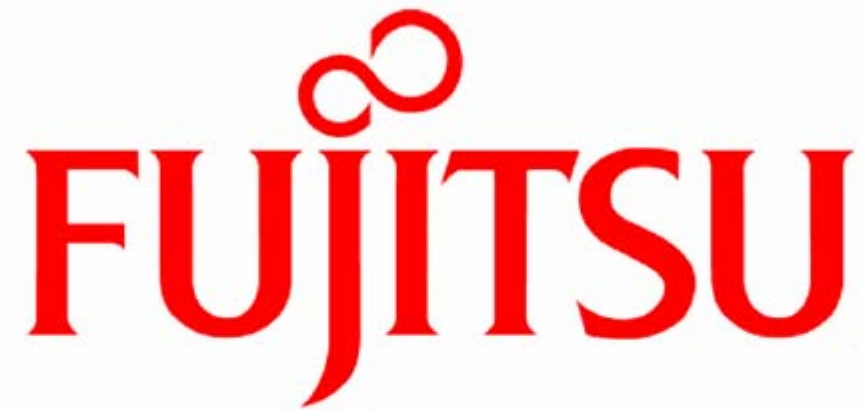
COMMSTACK

DECOMSYS 
Your FlexRay Development Partner
BUSDOCTOR
DESIGNER

TZM FlexConfig



vector  **DENoe/FlexRay**



FUJITSU

THE POSSIBILITIES ARE INFINITE