

56800/E Hybrid Controllers in Connectivity Applications

Embedded Connectivity Summit 2004
October 4,5,6

Slide 1

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Introduction

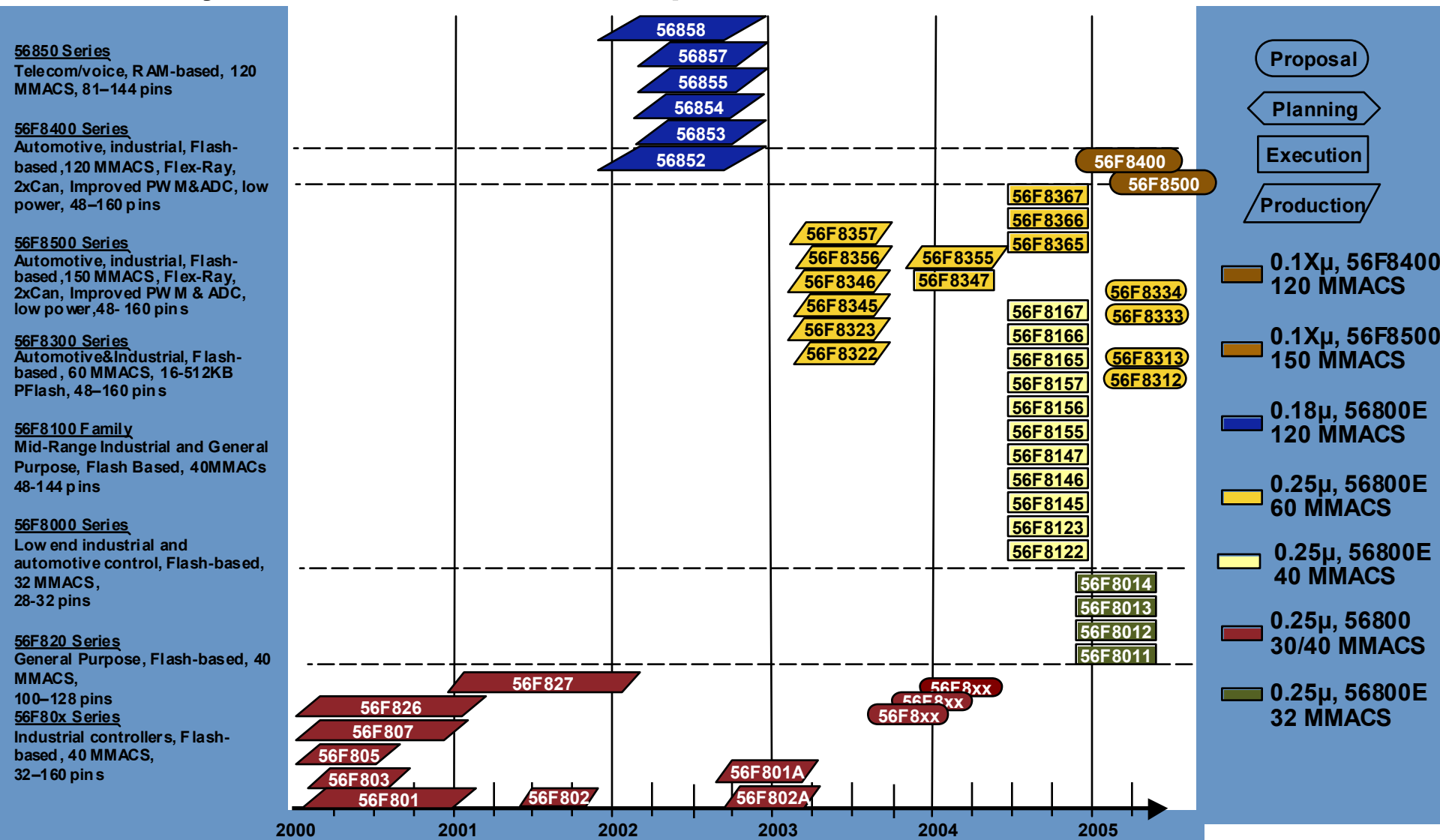
- ❖ **Covers connectivity peripherals available in the 56800E Hybrid Controller portfolio (SCI, SPI, CAN, SSI, Host Interface, I²C).**
- ❖ **Application Reference Designs**
- ❖ **Provides a general overview of the hardware and software support available for the 56800E Hybrid Controller product line.**
- ❖ **Hands-on exercises demonstrate application development using CodeWarrior™ tools with Processor Expert™ technology.**

Connectivity Peripherals

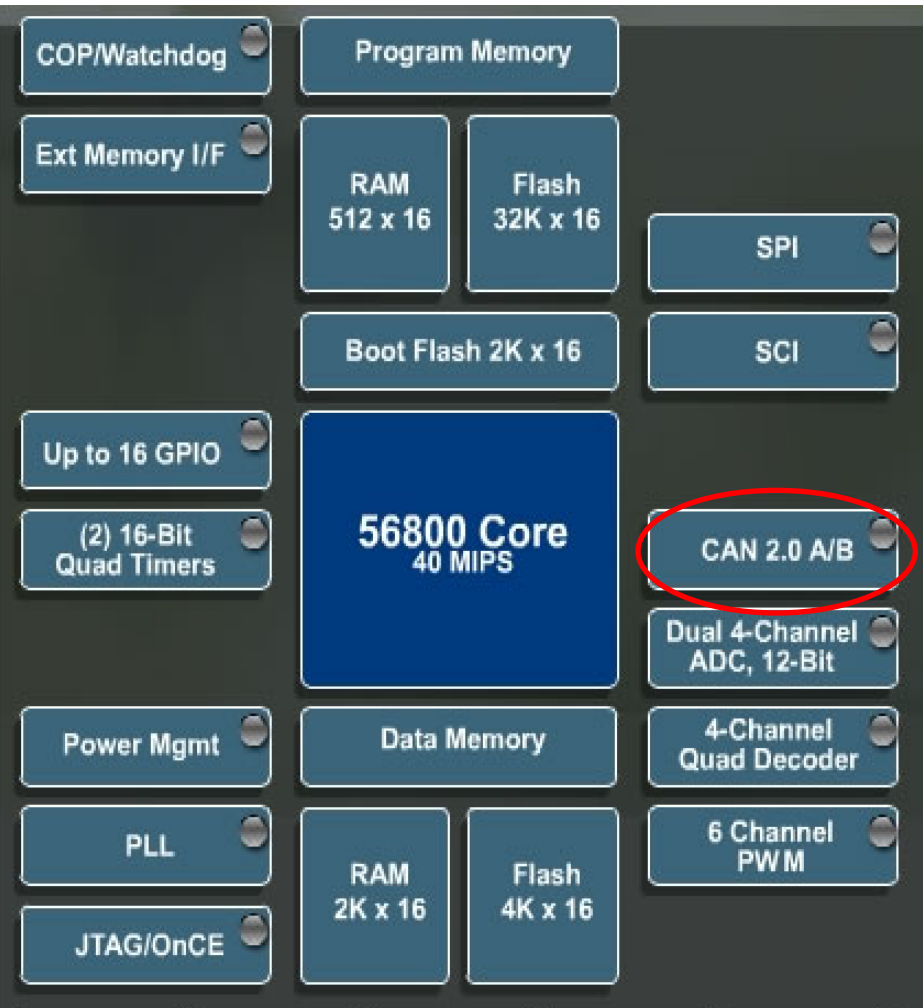
Slide 3

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NXP Added Connectivity Summit 2004 Hybrid Controller Roadmap

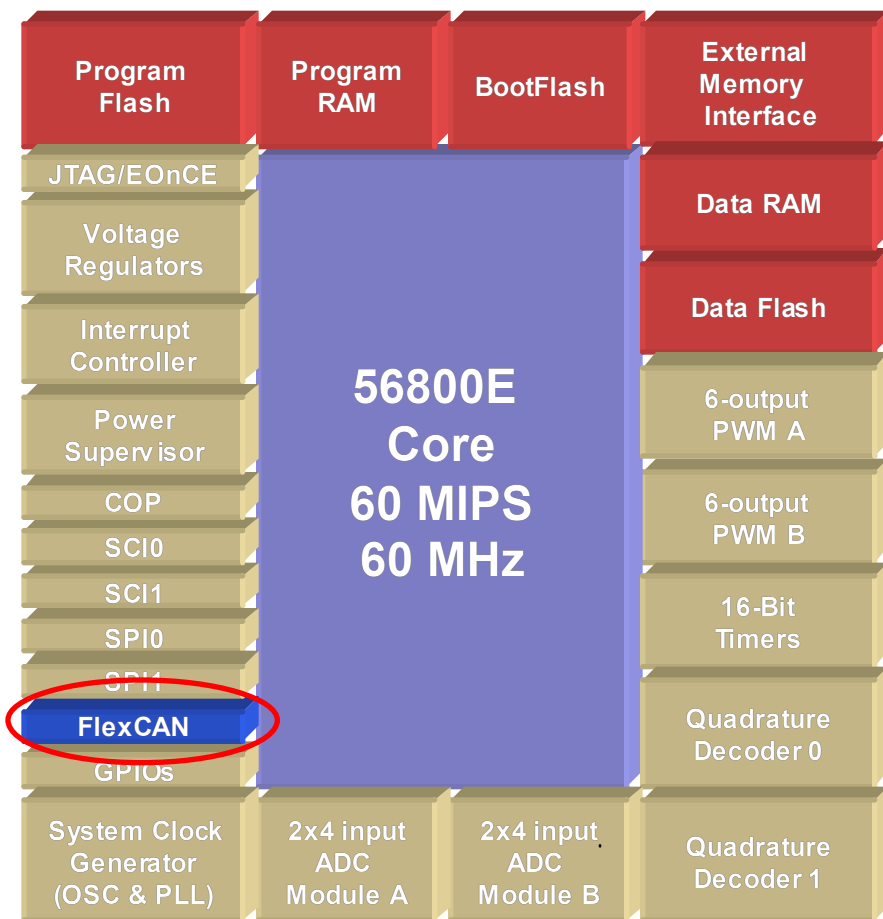


56F80x MSCAN Features



- ✓ **Version 2.0B compliant**
 - ✓ Standard and extended data frames
 - ✓ 0-8 bytes data length
 - ✓ Programmable bit rate up to 1 Mbps
 - ✓ Support for remote frames
- ✓ **Double-buffered receive storage scheme**
- ✓ **Triple-buffered transmit storage scheme**
- ✓ **Flexible maskable identifier filter**
- ✓ **Programmable wake-up functionality with integrated low-pass filter**
- ✓ **Separate signaling and interrupt capabilities for all CAN Rx/Tx error states**
- ✓ **Three low power modes**
- ✓ **Based on the Motorola Scalable Controller Area Network (MSCAN12) definition as implemented on the MC68HC12**

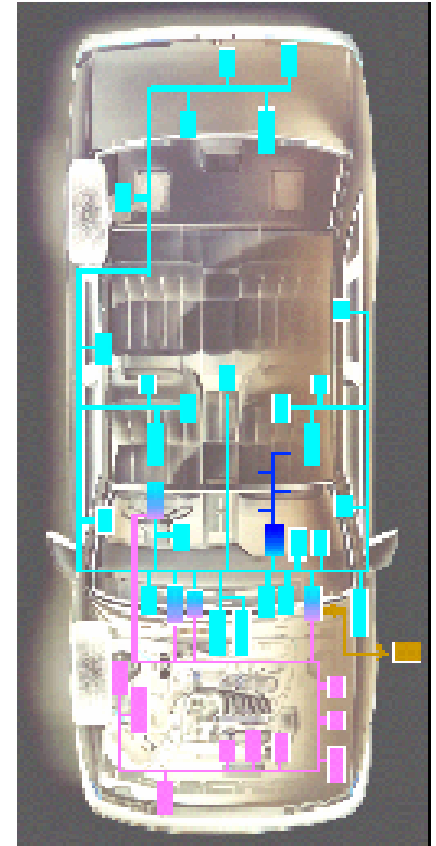
56F83xx FlexCAN Features



- ✓ Version 2.0B compliant
 - ✓ Standard and extended data frames
 - ✓ 0-8 bytes data length
 - ✓ Programmable bit rate up to 1Mbps
 - ✓ Support for remote frames
- ✓ Double-buffered receive storage scheme
- ✓ Flexible maskable identifier filter
- ✓ Programmable wake-up functionality
- ✓ Separate signaling and interrupt capabilities for all CAN Rx/Tx error states
- ✓ Three low power modes
- ✓ **Programmable first transmit scheme: Lowest ID or Lowest Message Buffer**
- ✓ **“Time Stamp”, based on 16-bit free-running timer with Global Network Synchronization**
- ✓ **Sixteen Flexible Message Buffers of 0-8 bytes Data Length, each configurable as Rx or Tx, all support Standard and Extended Messages**

CAN Applications: Vehicles and Transportation

- ❖ 80% of an annual 100-million-unit market with perhaps 20 distinct applications.
- ❖ CAN is the in-vehicle network (IVN)
 - ❖ engine management
 - ❖ body electronics (e.g. door and roof control)
 - ❖ air conditioning
 - ❖ lighting
 - ❖ entertainment control
- ❖ Majority of the European carmakers use CAN-based IVNs. American and Far East manufacturers started implementing CAN-based IVNs.



CAN Applications: Other Segments

The 20% of the market shared by all the other segments combined, however, represents thousands of applications most of which do not reach high volume

Factory automation: Control of assembly line manufacturing machinery enables automation. Typical applications include conveyors, production data recording, and other end-user configurable systems.

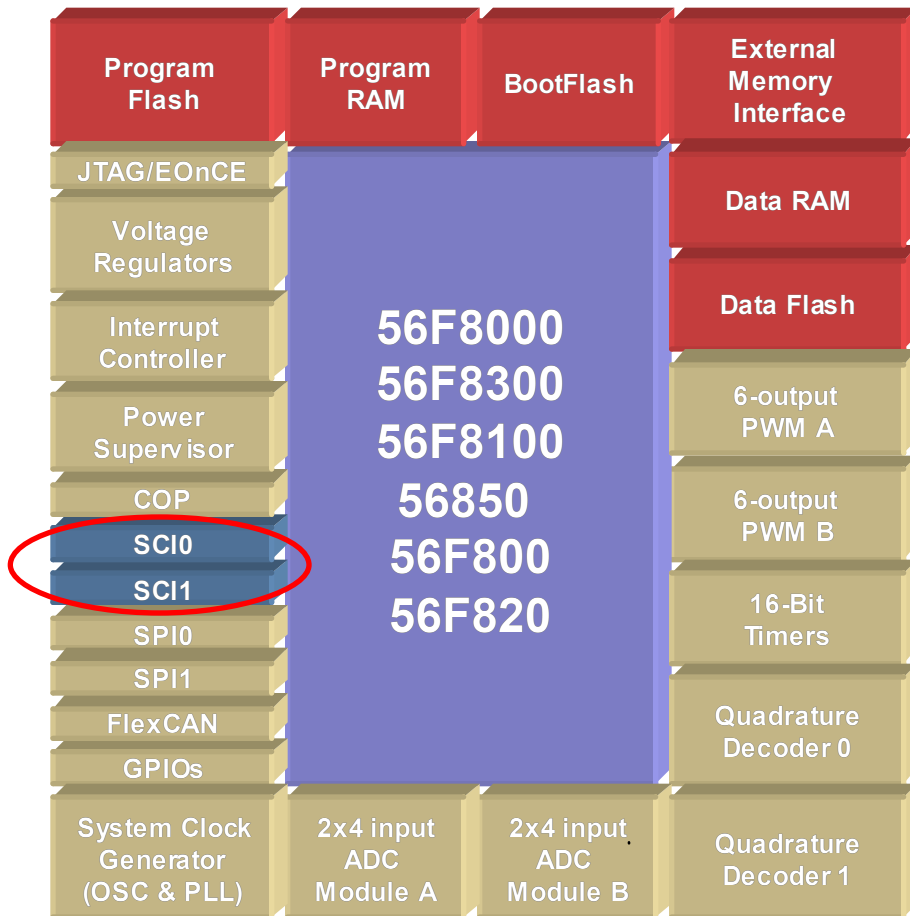


Medical: Hospitals control vital operating room components such as OR lights and tables, endoscope lights and cameras, insufflators, X-ray and ultrasound machines, video recorders, and video printers

Aviation: CAN is used as a backbone network in aircrafts for flight state sensors, navigation systems and research PCs driving displays installed in the cockpit.



SCI Features



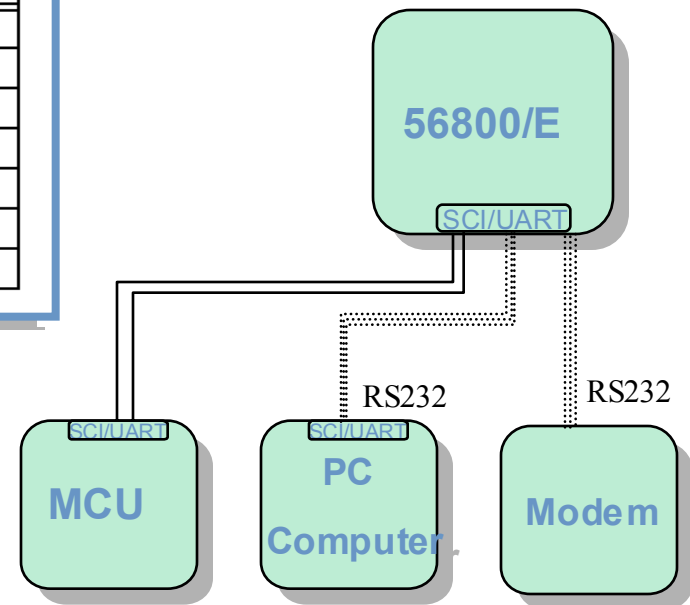
- ✓ Full duplex operation provides simultaneous data transmit and receive
- ✓ Half duplex operation allows data transmit and receive via single wire.
- ✓ Separately enabled transmitter and receiver
- ✓ 13-bit baud rate selection
- ✓ Standard mark/space non-return-to-zero (NRZ) format:
 - Programmable 8-bit or 9-bit data format
- ✓ Separate receiver & transmitter CPU interrupts
- ✓ Programmable polarity for transmitter and receiver
- ✓ Two receiver wakeup methods:
 - Idle Line
 - Address Mark
- ✓ Interrupt-driven operation with eight flags
- ✓ Receiver framing error detection
- ✓ Hardware parity checking
- ✓ 1/16 bit-time noise detection

SCI Applications

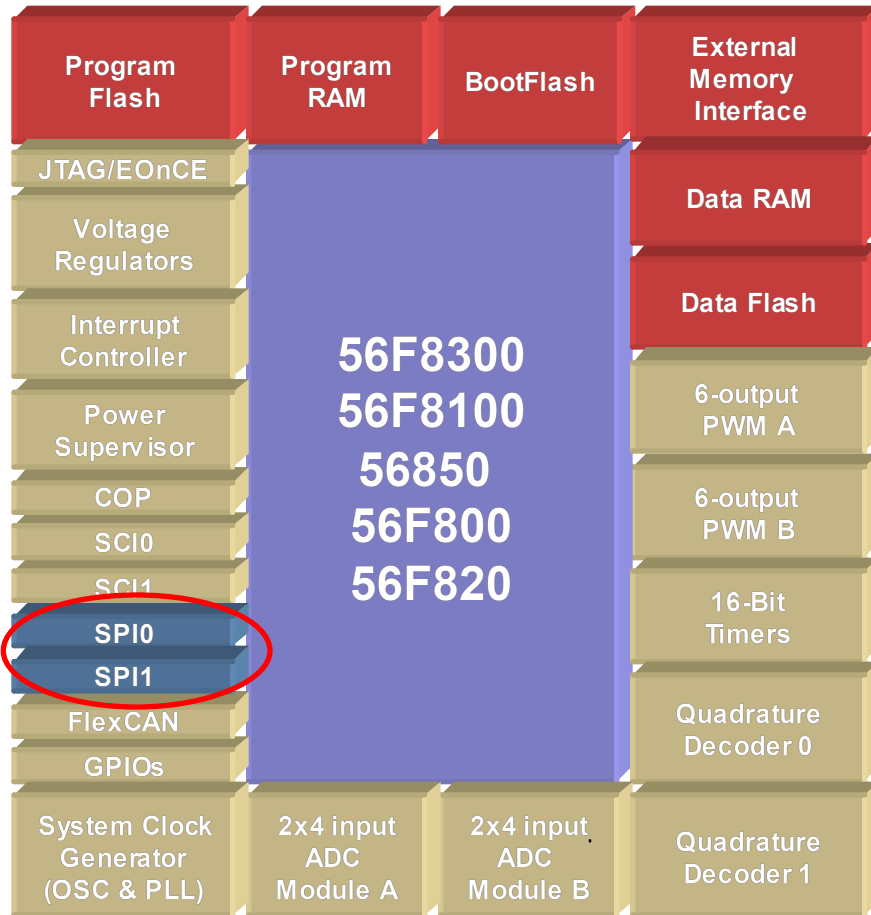
- ❖ Inter-Processor Communication, PC serial port communications, Modems
- ❖ Operates as a Universal Asynchronous Receiver/Transmitter (UART)
- ❖ Highly accurate baud rates provide reliable communication

Table 13-3. Example Baud Rates (Module Clock = 60MHz)

SBR Bits	Receiver Clock (Hz)	Transmitter Clock (Hz)	Target Baud Rate	Error (%)
98	612,245	38,265	38,400	-0.35
195	307,692	19,231	19,200	0.16
391	153,453	9,591	9,600	-0.10
781	76,825	4,802	4,800	0.03
1563	38,388	2,399	2,400	-0.03
3125	19,200	1,200	1,200	0.00
6250	9,600	600	600	0.00



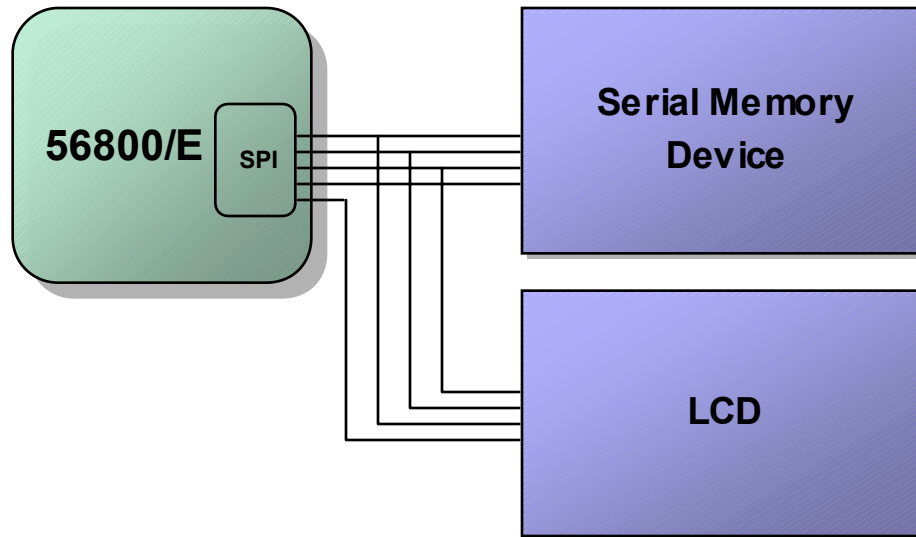
SPI Features



- ✓ Supports demand-driven master or slave devices with high data rates
- ✓ Full-Duplex Operation
- ✓ Double-buffered Operation with separate transmit and receive registers
- ✓ Programmable length transmissions, 2 to 16 bits
- ✓ Programmable transmit and receive shift order, MSB or last bit transmitted
- ✓ Eight master mode frequencies (maximum = bus frequency/2)
- ✓ Maximum slave mode frequency = bus frequency
- ✓ Serial clock with programmable polarity and phase
- ✓ Two separately enabled interrupts
- ✓ Receiver Full
- ✓ Transmitter Empty
- ✓ Mode Fault and overflow error flag with interrupt capability

SPI Applications

- ❖ Invented by Motorola
- ❖ Easy interface to Freescale MCUs, Analog, and Sensor Products
- ❖ Supports LCD drivers, A/D subsystems, Serial Data Flash



IIC Features

- ❖ **Compatible with I²C Bus standard**
- ❖ **Multi-master operation**
- ❖ **Software programmable for one of 256 different serial clock frequencies**
- ❖ **Arbitration lost interrupt with automatic mode switching from master to slave**
- ❖ **Calling address identification interrupt**
- ❖ **Start and stop signal generation/detection**
- ❖ **Repeated start signal generation**
- ❖ **Bus busy detection**

Host Interface Features

- ❖ Byte-wide, full-duplex, double buffered, parallel port
- ❖ Operate asynchronously to the DSP core clock
- ❖ Data transfers are manageable
 - ✓ The host side registers are accessible to the external host processor
 - ✓ The DSP side registers are accessible to the DSP core

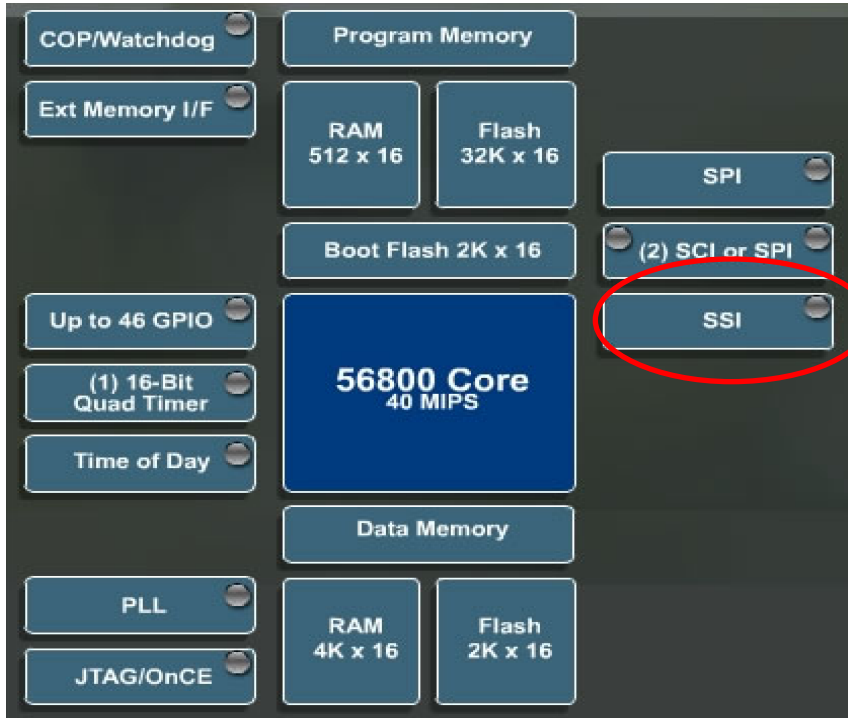
DSP Side.

- Registers are directly mapped into four X data memory locations.
- 16-bit data wide
- Transfer mode
 - ✓ DSP to host
 - ✓ Host to DSP
 - ✓ Host Command
- Handshaking protocol
 - ✓ Software Polled
 - ✓ Interrupt driven
- DMA accesses
- Instructions
 - ✓ Memory-mapped registers allow the standard MOVE instruction to be used
 - ✓ Bit manipulation instructions simplify I/O service routines

Host Side.

- 16 signal pins are provided to support non-multiplexed data bus
- 8-bit data wide
- Transfer mode
 - ✓ DSP to Host: 8-bit or 16-bit
 - ✓ Host to DSP: 8-bit or 16-bit
 - ✓ Host Command
- Handshaking protocols
 - ✓ Software Polled
 - ✓ Interrupt driven
- DMA accesses
- Separate interrupt lines for each interrupt source
- Special host commands force the host command associated DSP core interrupts under host processor control, which are useful for:
 - ✓ Real-time production diagnostics
 - ✓ Debugging window for program development

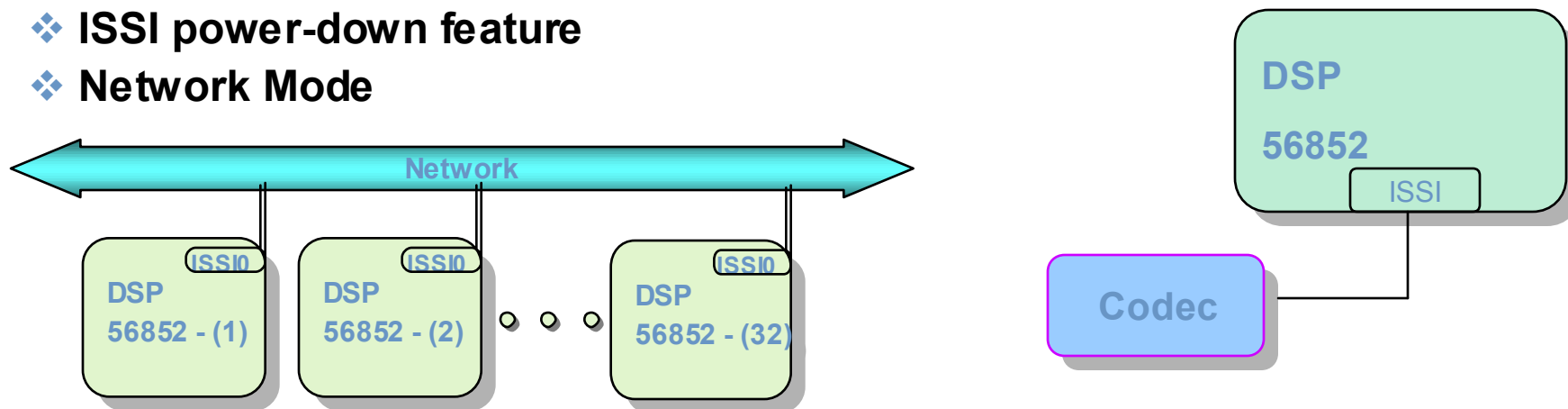
Asynchronous Serial Interface (56F826/827)



- ❖ Sophisticated programmable clocking
 - ✓ Completely separate clock and frame sync selections for receive and transmit sections
 - ✓ Independent or shared transmit and receive
 - ✓ Normal mode operation using frame sync
 - ✓ Gated Clock mode operation requiring no frame sync
 - ✓ Programmable internal clock divider
 - ✓ Program options for frame sync and clock generation
- ❖ Programmable word length (8,10,12, or 16 bits)
- ❖ SSI power-down feature
- ❖ Network Mode

Improved Synchronous Interface (56852)

- ❖ **Sophisticated programmable clocking**
 - **Completely separate clock and frame sync selections for receive and transmit sections**
 - **Independent or shared transmit and receive**
 - **Normal mode operation using frame sync**
 - **Gated Clock mode operation requiring no frame sync**
 - **Programmable internal clock divider**
 - **Program options for frame sync and clock generation**
- ❖ **Programmable word length (8,10,12, or 16 bits)**
- ❖ **ISSI power-down feature**
- ❖ **Network Mode**



Enhanced Synchronous Serial Interface (56853/4/5/7/8)

- ❖ Independent (asynchronous) or shared (synchronous) transmit and receive sections with separate or shared internal/external clocks and frame syncs
- ❖ Normal mode operation using frame sync
- ❖ Network mode operation allowing multiple devices to share the port with as many as thirty-two time slots
- ❖ Network mode enhancements
 - Time slot mask registers (receive and transmit)
 - End of Frame Interrupt
- ❖ Gated Clock mode operation requiring no frame sync
- ❖ Programmable internal clock divider
- ❖ Programmable word length (8,10,12, or 16 bits)
- ❖ Program options for frame sync and clock generation
- ❖ ESSI power down feature
- ❖ Completely separate clock and frame sync selections for receive and transmit sections
- ❖ Audio enhancements
- ❖ Three transmitters per ESSI (allowing 6 channel surround sound)

Application Reference Designs

Slide 18

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Sur 800 Design Opportunities by Market



General

- Medical Scanners
- Remote Monitoring
- Cable Test Equipment
- Noise Cancellation
- ID Tag Readers
- Traffic Light Control
- Underwater Acoustics

Appliance

- Compressors
- Smart Appliances
- General Purpose Drives

Industrial

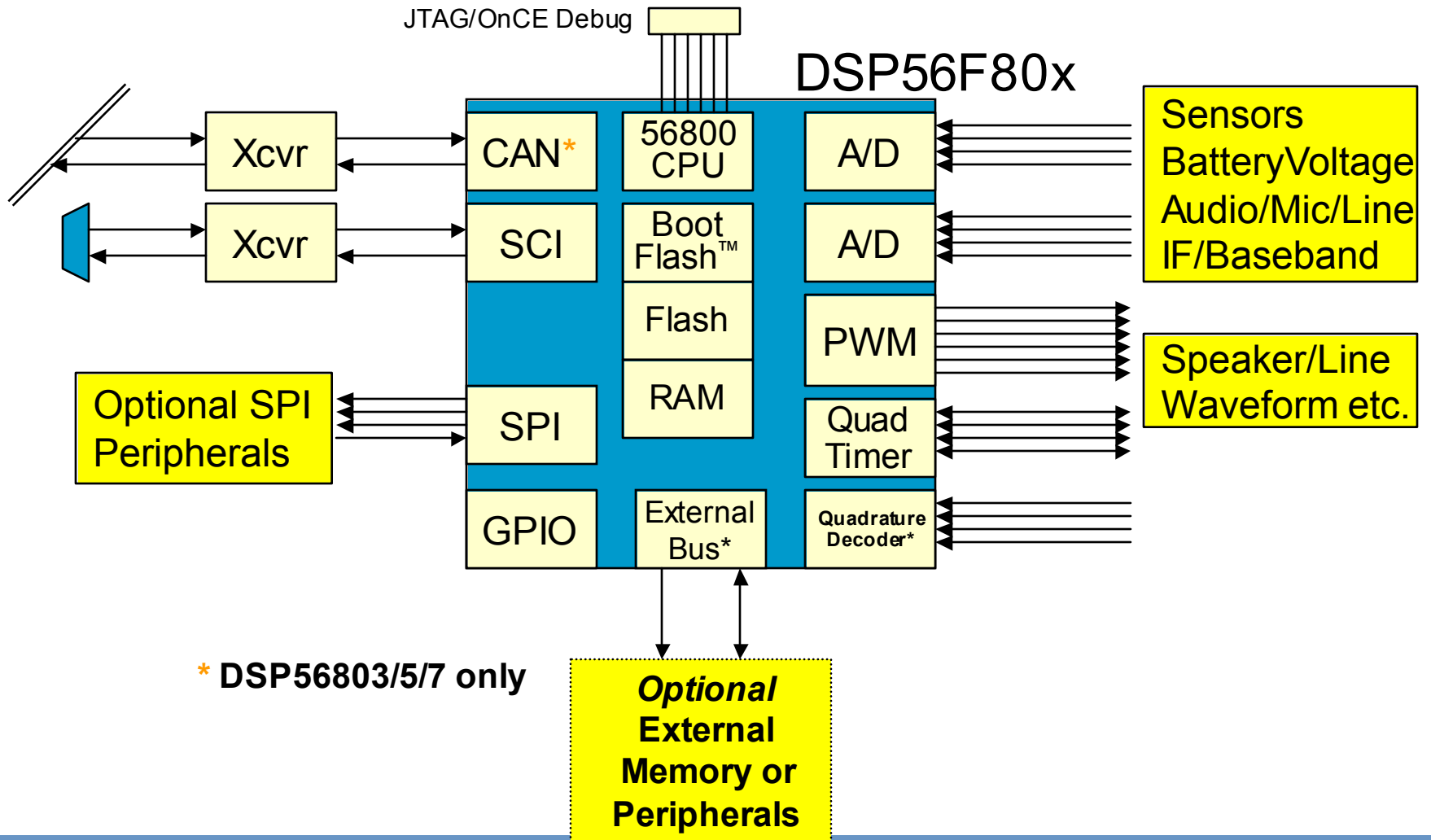
- HVAC Blowers & Fans
- Lifts / Elevators / Cranes
- Frequency Inverters
- Variable Speeds Pumps
- Uninterruptible Power Supplies

Office / Home

- Printers / Fax / Scanners
- Exercise Equipment
- Electric Lawn Equipment
- Temperature Control

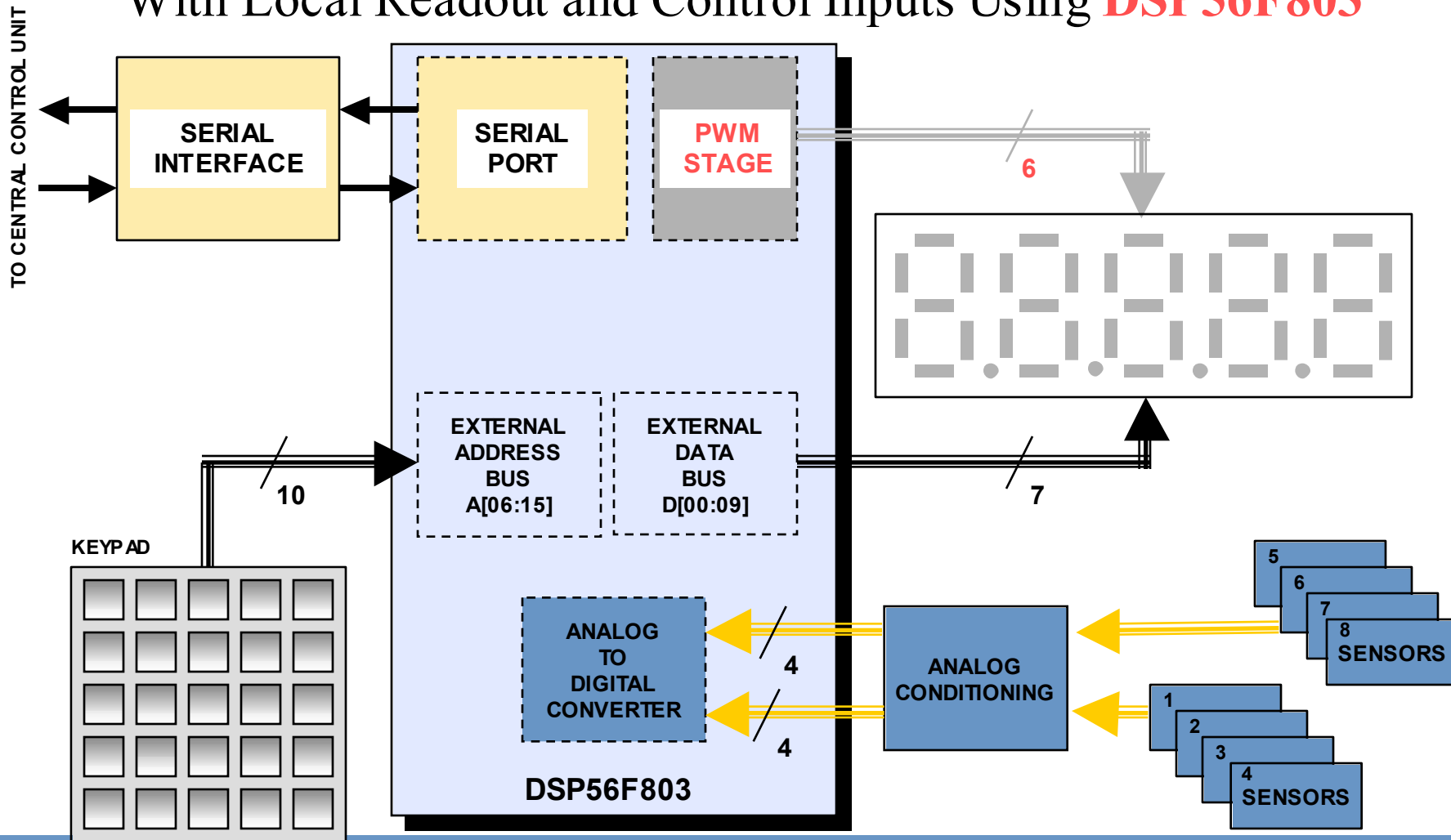


General Embedded Application



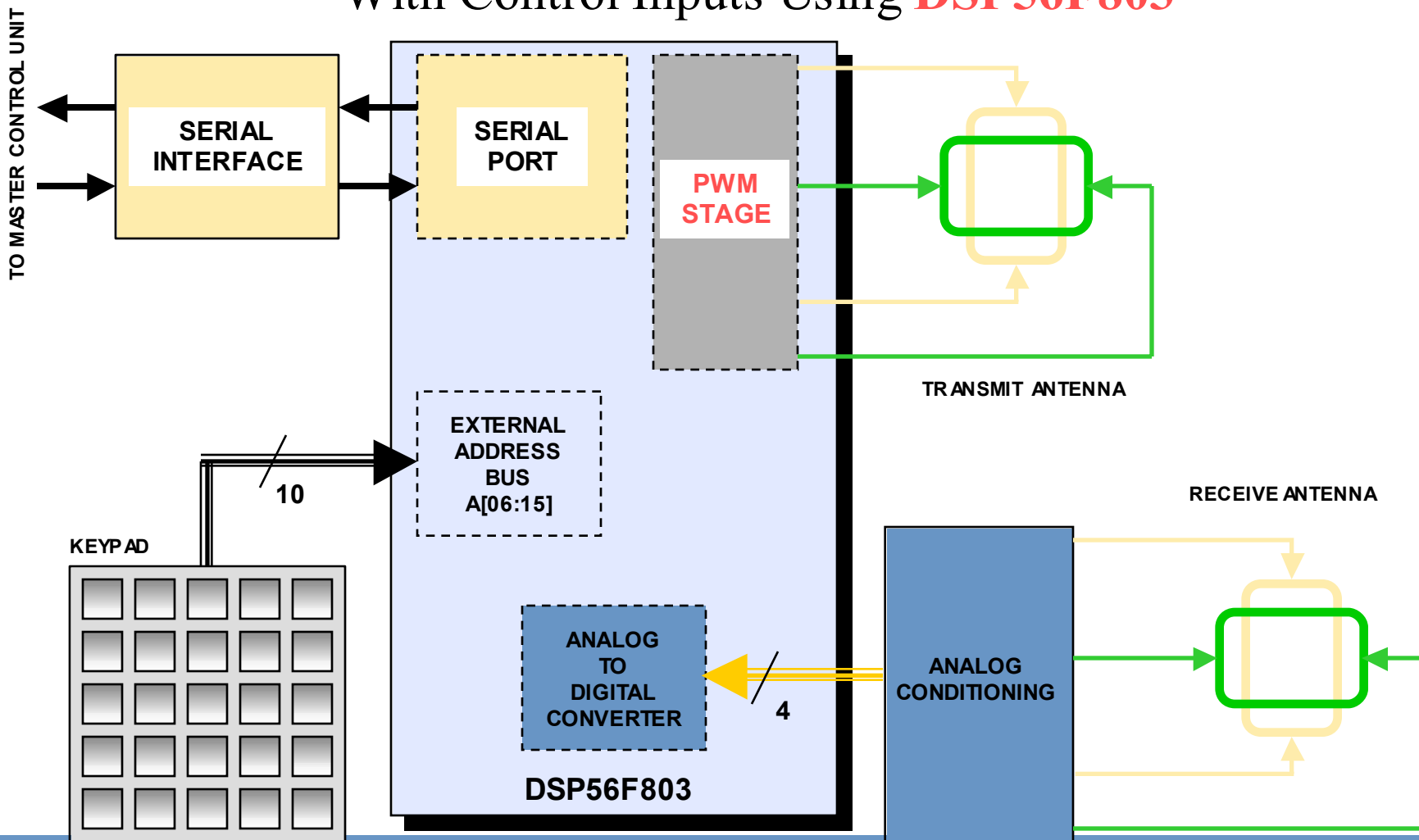
Remote Monitoring System

With Local Readout and Control Inputs Using **DSP56F803**



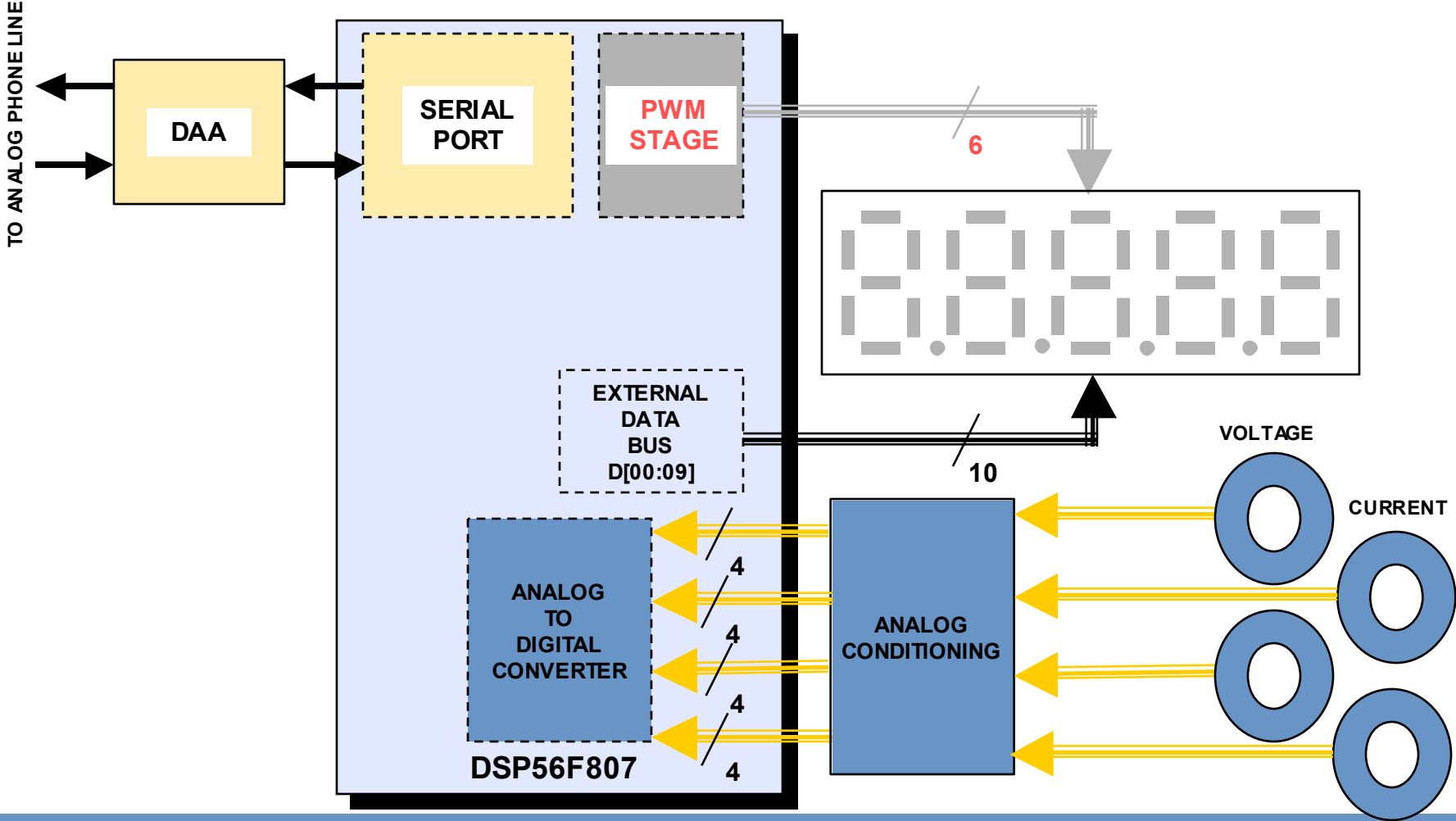
Tag Reader System

With Control Inputs Using **DSP56F803**



Automatic Meter Reader (AMR) System

3-Phase Unit With Local Readout Using **DSP56F807**



Identifying 56F80x opportunities/Key Peripherals

❖ All types of Industrial 3 phase Motor Control

- ✓ High speed sophisticated PWMs can replace what had previously been performed in external PWM generation chip
- ✓ High speed/performance 1.2 μ s/12-bit ADC
- ✓ Quadrature decoders for direct interface to Hall Effect sensors or Optical encoders
- ✓ High 30/40 MIPS MCU/DSP performance required for advanced Motor Control Algorithms
- ✓ Integration of support and communication peripherals

❖ Metering and Industrial Control

- ✓ High speed/performance 1.2 μ s/12-bit ADC
- ✓ High 30/40 MIPS MCU/DSP performance required for advanced Control Algorithms
- ✓ Use of PWMs to generate output waveforms
- ✓ Integration of support and communication peripherals

Identifying 56F80x opportunities/Key Peripherals

Medical

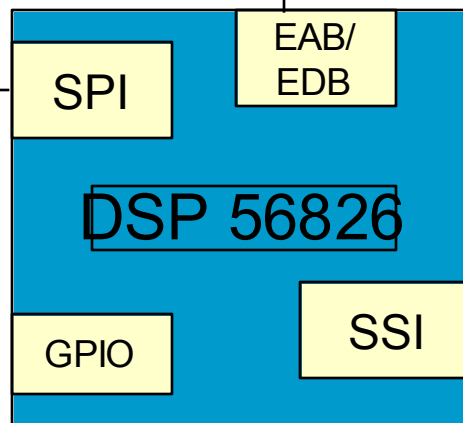
- High speed sophisticated PWMs can replace what had previously been performed in external PWM generation chip
- High speed/ performance 1.2 μ s/12-bit ADC
- High 30/40 MIPS MCU/DSP performance required for advanced Control Algorithms
- Integration of support and communication peripherals

Power Supplies/Inverters

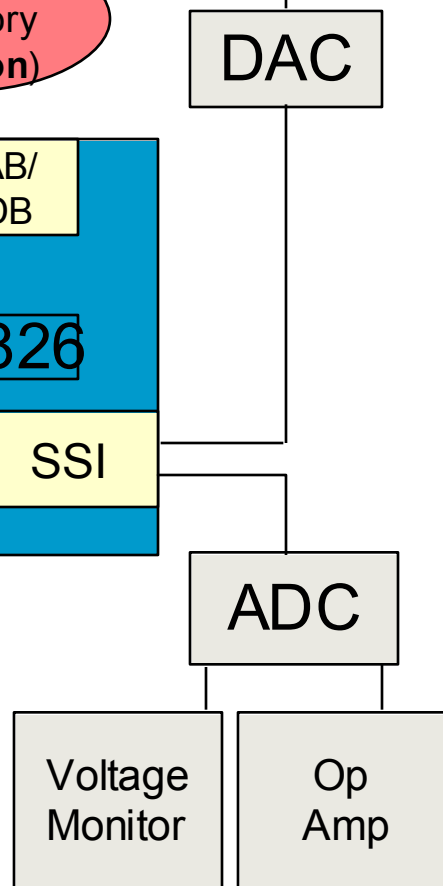
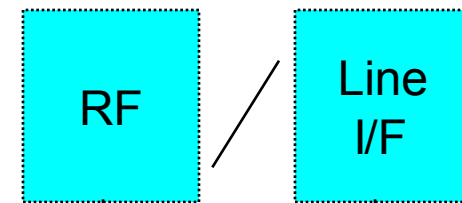
- High speed sophisticated PWMs can replace what had previously been performed in external PWM generation chip
- High speed/ performance 1.2 μ s/12-bit ADC
- High 30/40 MIPS MCU/DSP performance required for advanced Control Algorithms
- Integration of support and communication peripherals

Single Programmable DSP Remote Metering

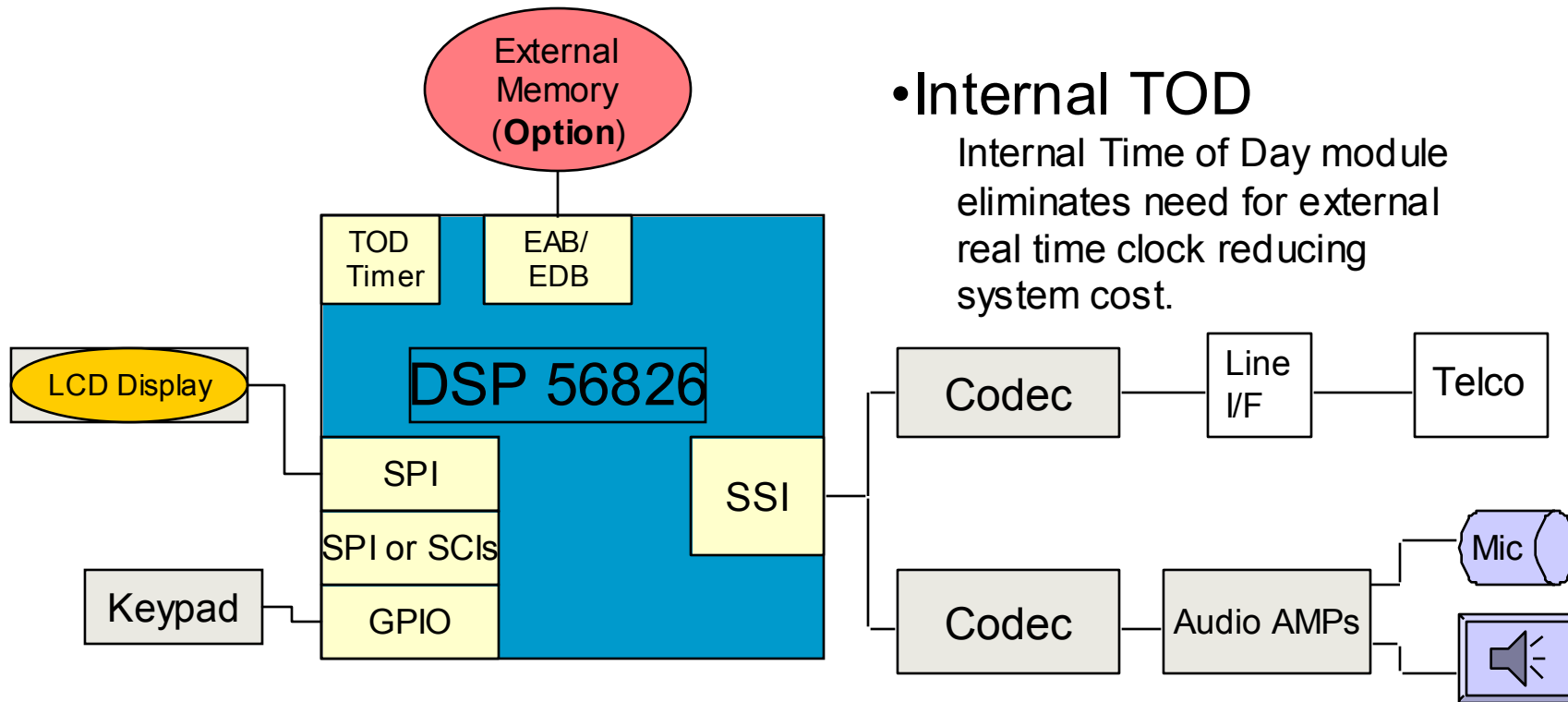
- Flexible PLL w/TOD
Solutions provide for various crystals and/or oscillators, reducing system cost.



- Programmable DSP
Programmability of flash based DSP56826 allows DSP to act as an MCU as well, reducing system cost



Digital Answering Device



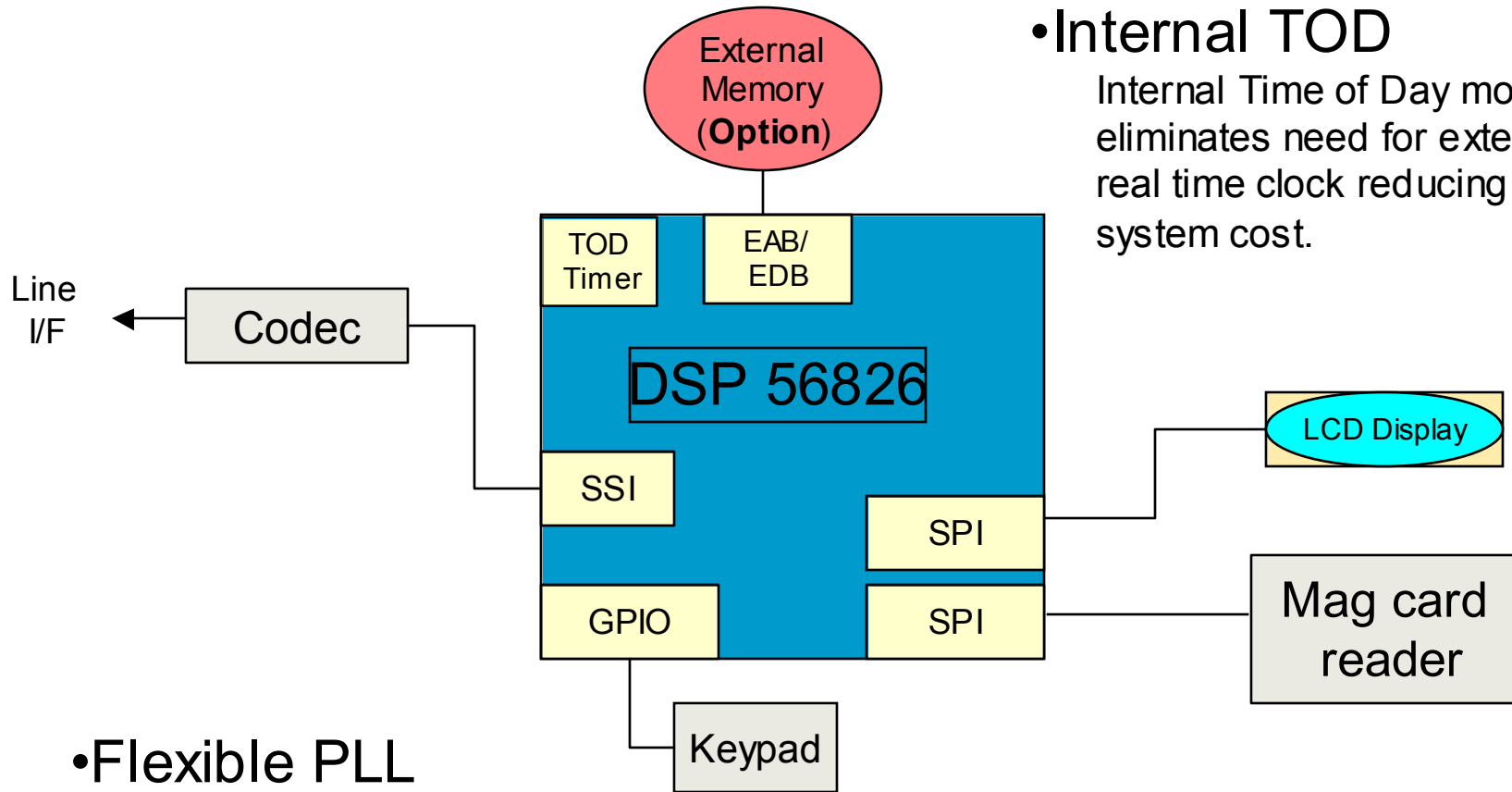
•Internal TOD

Internal Time of Day module eliminates need for external real time clock reducing system cost.

•Flexible PLL

Solutions provide for various crystals and/or oscillators, reducing system cost.

POS Terminal



•Internal TOD

Internal Time of Day module eliminates need for external real time clock reducing system cost.

•Flexible PLL

Solutions provide for various crystals and/or oscillators, reducing system cost.

Identifying 56F82x Opportunities/Key Peripherals

❖ Telephony

- ✓ SSI enables connection to external High performance Codecs
- ✓ Time-of-Day peripheral enables time aware applications requiring time stamps
- ✓ High 40 MIPS MCU/DSP performance required for telephony Algorithms
- ✓ Internal Flash memory enables lower system cost
- ✓ Integration of support and communication peripherals

❖ Voice Applications

- ✓ SSI enables connection to external high performance Codecs
- ✓ Time-of-Day peripheral enables time aware applications requiring time stamps
- ✓ Internal Flash memory enables lower system cost
- ✓ High 40 MIPS MCU/DSP performance required for telephony Algorithms
- ✓ Internal ADC and timer peripheral can be used to create low cost Codec
- ✓ Integration of support and communication peripherals

Identifying 56F82x opportunities/Key Peripherals

❖ General Purpose

- ✓ Low noise linear High performance 2.4 μ s/12-bit ADC
- ✓ High 40 MIPS MCU/DSP performance
- ✓ Integration of support and communication peripherals
- ✓ Lower power consumption than 56F80x devices

50 Design Opportunities by Market



Telecommunications

- VoIP
- Low end Networking

Consumer

- Feature Phones
- IP Phones
- Karaoke
- Toys

Automotive

- Hands-free
- Embedded Video

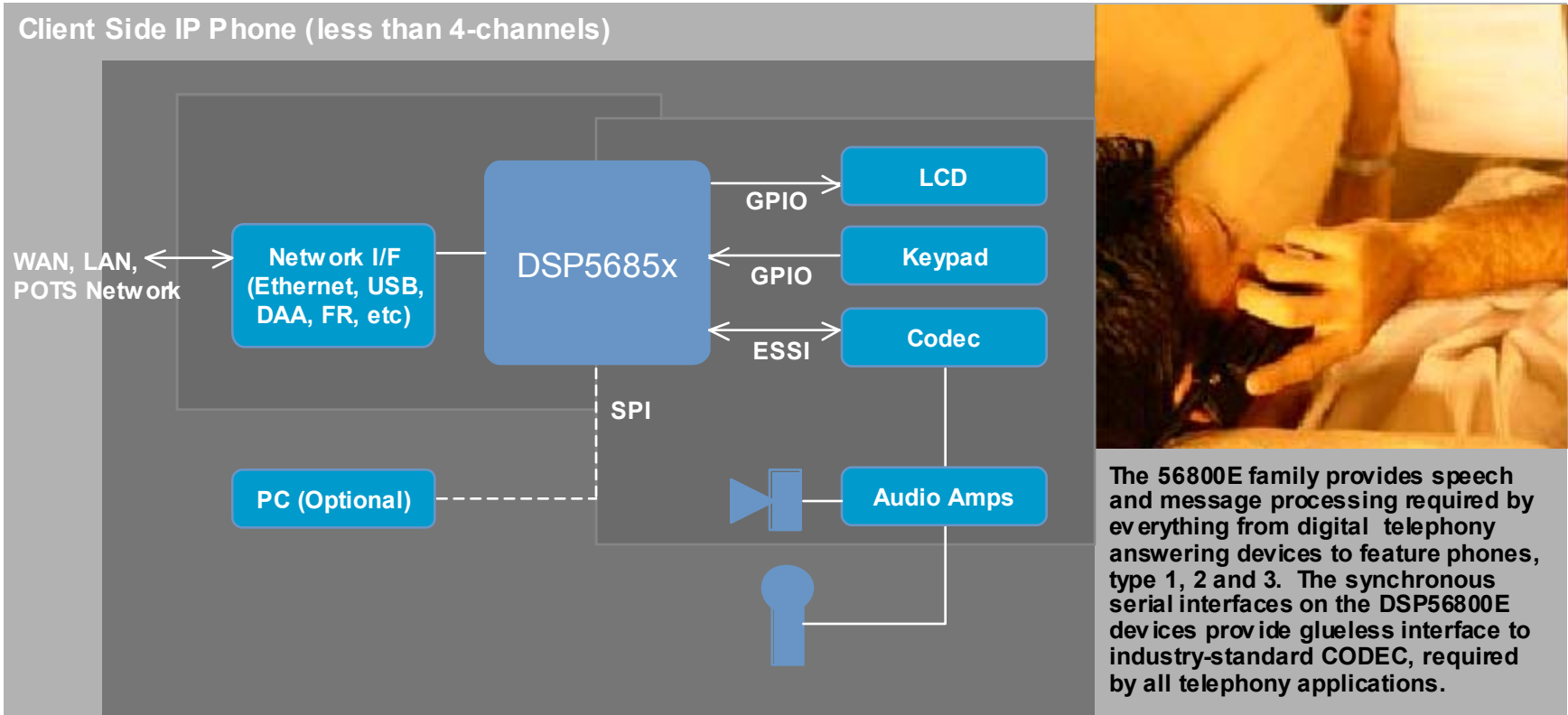
General

- Medical applications
- Security
- Voice recognition systems



Client Side IP Phone

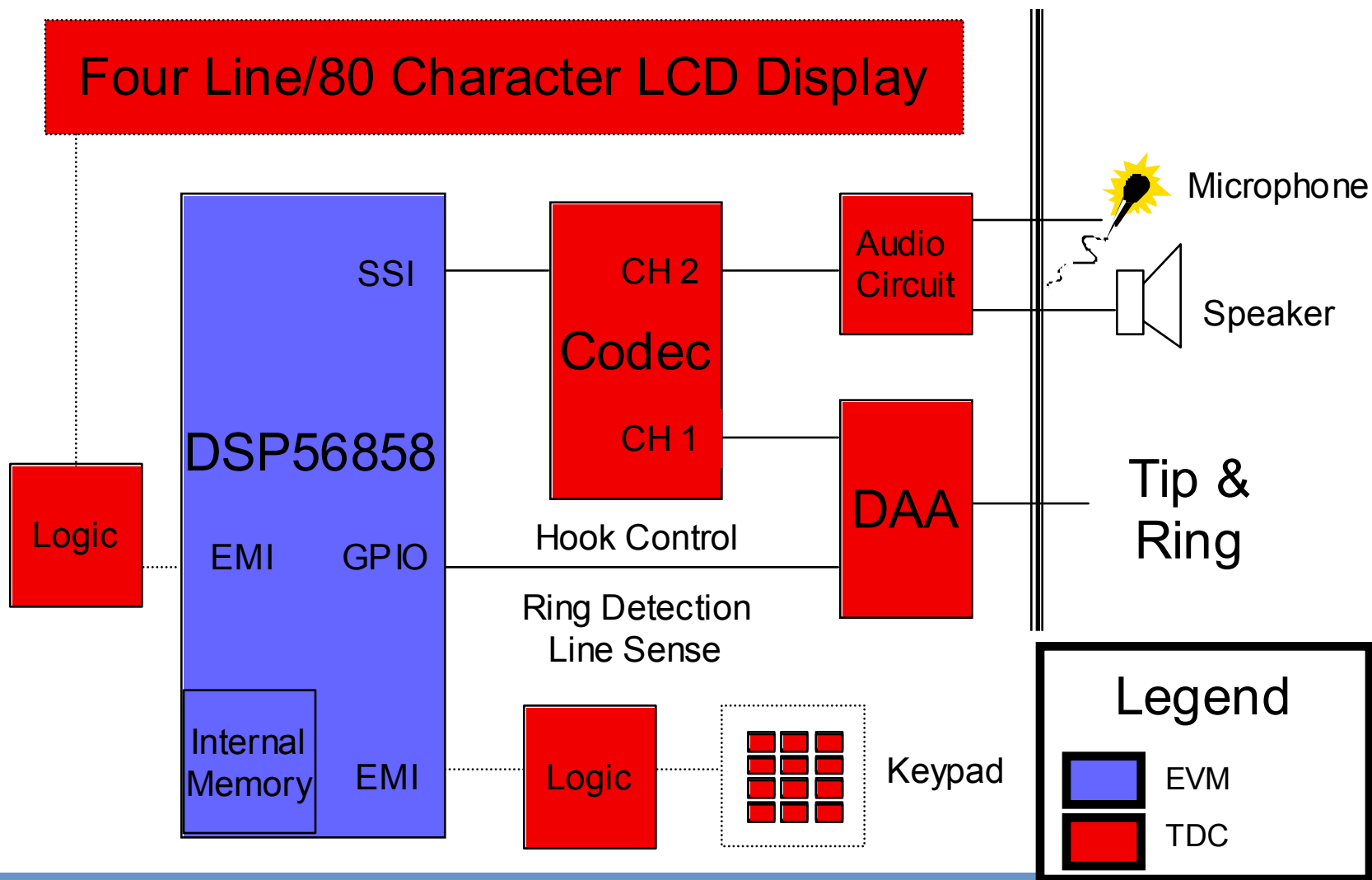
With MCU functionality and DSP processing power combined with a large number of peripherals and I/O, the enhanced 5685x chips offer a single-chip solution for Client-Side IP Phones. The 5685x devices can support all the necessary system components required for an IP phone, including voice-band codec, keypad, and optional LCD. The device can connect via Ethernet or USB transceiver chips to LAN, DAA to Telco, or RF to wireless LAN.



The 56800E family provides speech and message processing required by everything from digital telephony answering devices to feature phones, type 1, 2 and 3. The synchronous serial interfaces on the DSP56800E devices provide glueless interface to industry-standard CODEC, required by all telephony applications.

DSP56858 Feature Phone

Four Line/80 Character LCD Display



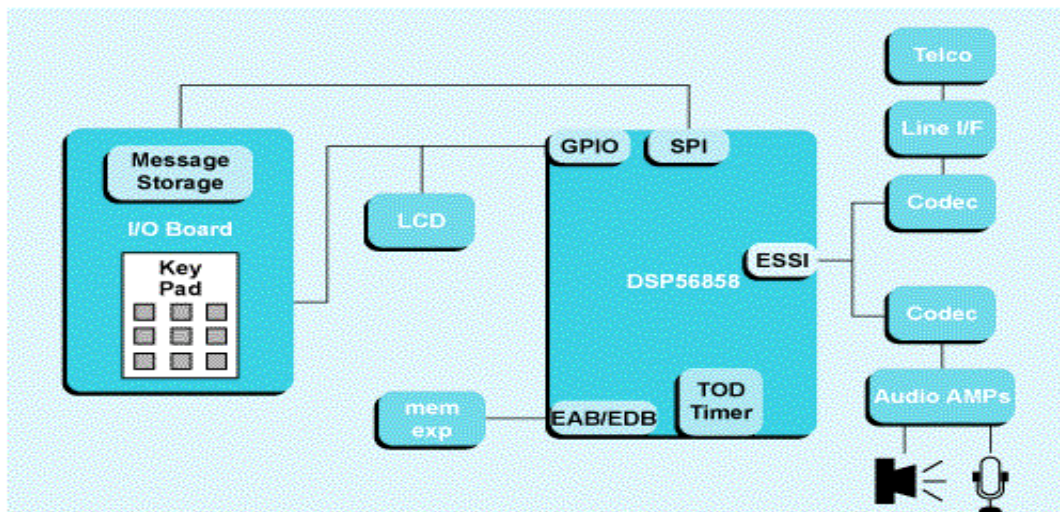
Feature Phone – Our Solution



- Includes the DSP5685x silicon and implements the following features for a single or multi-line application in compliance with the caller ID telecommunications standard **SR-3004**:
 - Type 1 Caller ID and Visual Message Waiting Indicator
 - Type 2 Call Waiting ID
 - Type 2.5 Call Waiting Deluxe Options
 - Full Duplex Speakerphone with System Optimization Diagnostic Tools
 - Multi-line/VoIP Conference Bridge
 - Adaptive Line and Acoustic Echo Cancellers
 - Extension in Use Detection
 - DTMF Detection/Generation
 - EIA-470B DTMF Dialer
 - Voice Activity Detection -- Call Progress Signal Detection
 - Volume/Gain Control
 - Tonal Ringing Generator
 - AT Command/Keypad/LCD Control Interface

- All Drivers for DSP5685x peripherals, Codec and DAA

Voice-Controlled Digital Answering Machine



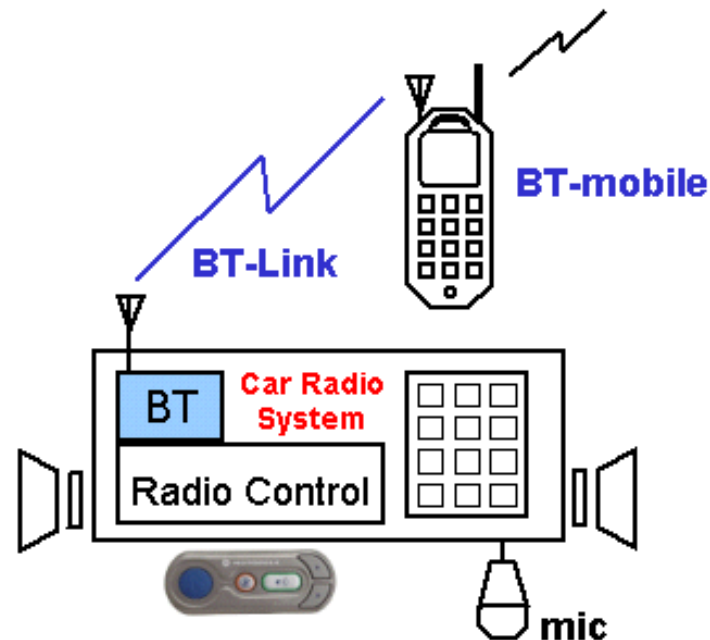
Several of Motorola's DSP56800E devices are appropriate for a DTAD application. For example, as shown in Figure 1, the DSP56858 provides the following interfaces:

- Flexible PLL dock source provides various crystals and/or oscillators that help to reduce system cost
- SSI or ESSI peripherals for seamless connection to Codecs (for user interface and telco interface)
- An SPI for connection to a Flash card device
- An integrated time-of-day peripheral providing real-time dock
- Additional general purpose input/output (GPIO) ports for LCD and keypad support

Included in Processor Expert are:

- VRLite-1 for memory-optimized, isolated-word, speaker-dependent speech recognition system
- A wide variety of vocoder algorithms for voice compression
- A comprehensive set of drivers and framework code, enabling quick completion of the software application
- The out-of-the-box software components for all on-chip peripherals, in combination with software libraries for motor control, communication, and signal processing, make it easier to develop the most demanding real-time embedded applications

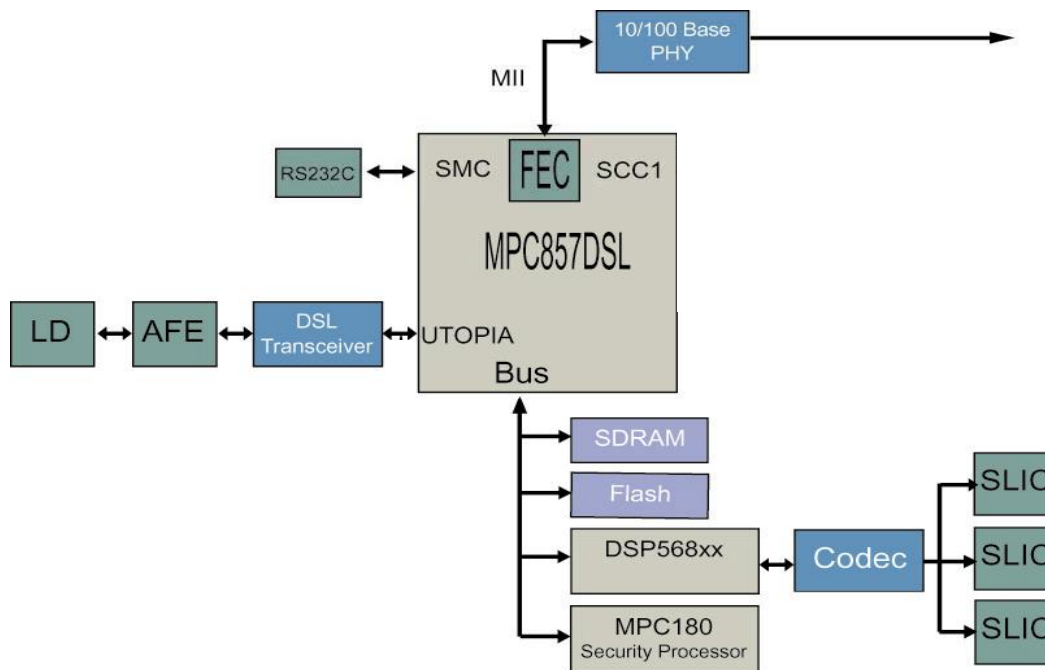
Hands Free Cell Phone Operation



Features:

- Bluetooth connection replaces ear phone cable
- Platform into Car Radio System
- Headset & Handsfree profile
 - Noise suppression
 - Echo cancellation
- Full-Duplex communication quality

Voice Enabled Router/IAD



In the above example the DSP is running the voice processing, echo cancellation, jitter buffer, and other signal processing type tasks. The RISC or CISC processor, the MPC857DSL in this case, is running the protocol stacks and other tasks required to perform the entire VoIP function.

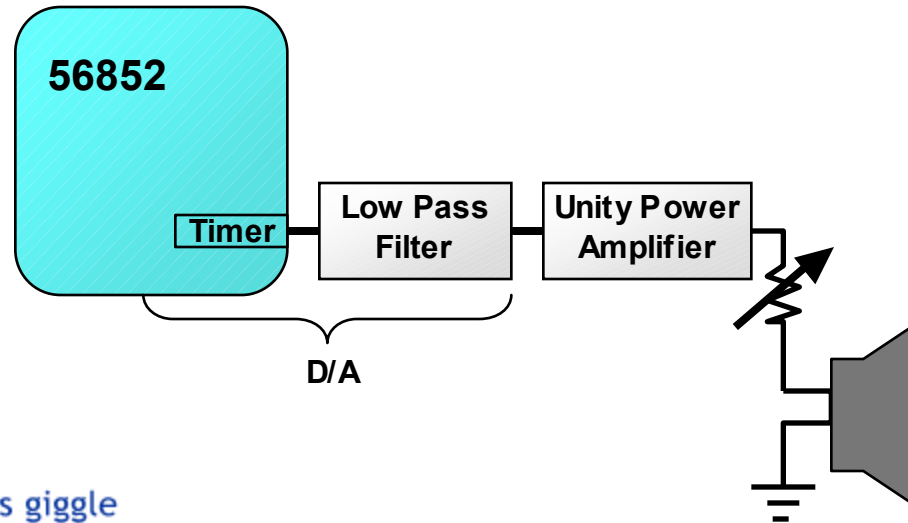


High Tech Toys



Wabi shares the home phone line.

Wabi periodically dials out to a toll-free number to check for new messages. Wabi then communicates wirelessly with the base station. The bear itself has no wires (other than when he is recharging).



Listen for Wabi's giggle

When Wabi receives a new message he giggles and lights up an LED to let the child know there is a new message. If Wabi hasn't been played with for a while only the light illuminates to avoid waking sleeping children.



Children can play messages over and over again.

Pressing the buttons on Wabi's chest will loop through all the stored messages.

Messages are stored until newer ones replace the oldest ones.

Identifying 5685x opportunities/Key Peripherals

❖ Telephony & Voice Applications

- ✓ ESSI enables connection to external high performance Codecs
- ✓ Time Of Day peripheral enables time aware applications requiring time stamps
- ✓ High 120 MIPs MCU/DSP performance required for telephony Algorithms
- ✓ Internal timer peripheral can be used to create low cost DAC
- ✓ Integration of support and communication peripherals
- ✓ Full complement of Telephony software
- ✓ Very Cost Effective

Identifying 5685x opportunities/Key Peripherals

❖ Voice over IP (VoIP)

- ✓ ESSI enables connection to external High performance Codecs
- ✓ High 120 MIPS MCU/DSP performance supports multiple channel operation
- ✓ Integration of support and communication peripherals
- ✓ VoIP software components
- ✓ Networking software available from third party for single chip implementations
- ✓ High performance Host Port Interface for simple connection to Power PC or ColdFire network processors for multi-chip systems
- ✓ Very Cost Effective

8300 Target Markets



Industrial

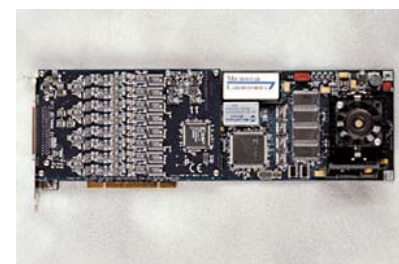
- UPS
- Power supplies
- Frequency inverters
- Protection relay
- Sensorless control
- Valve actuators

General

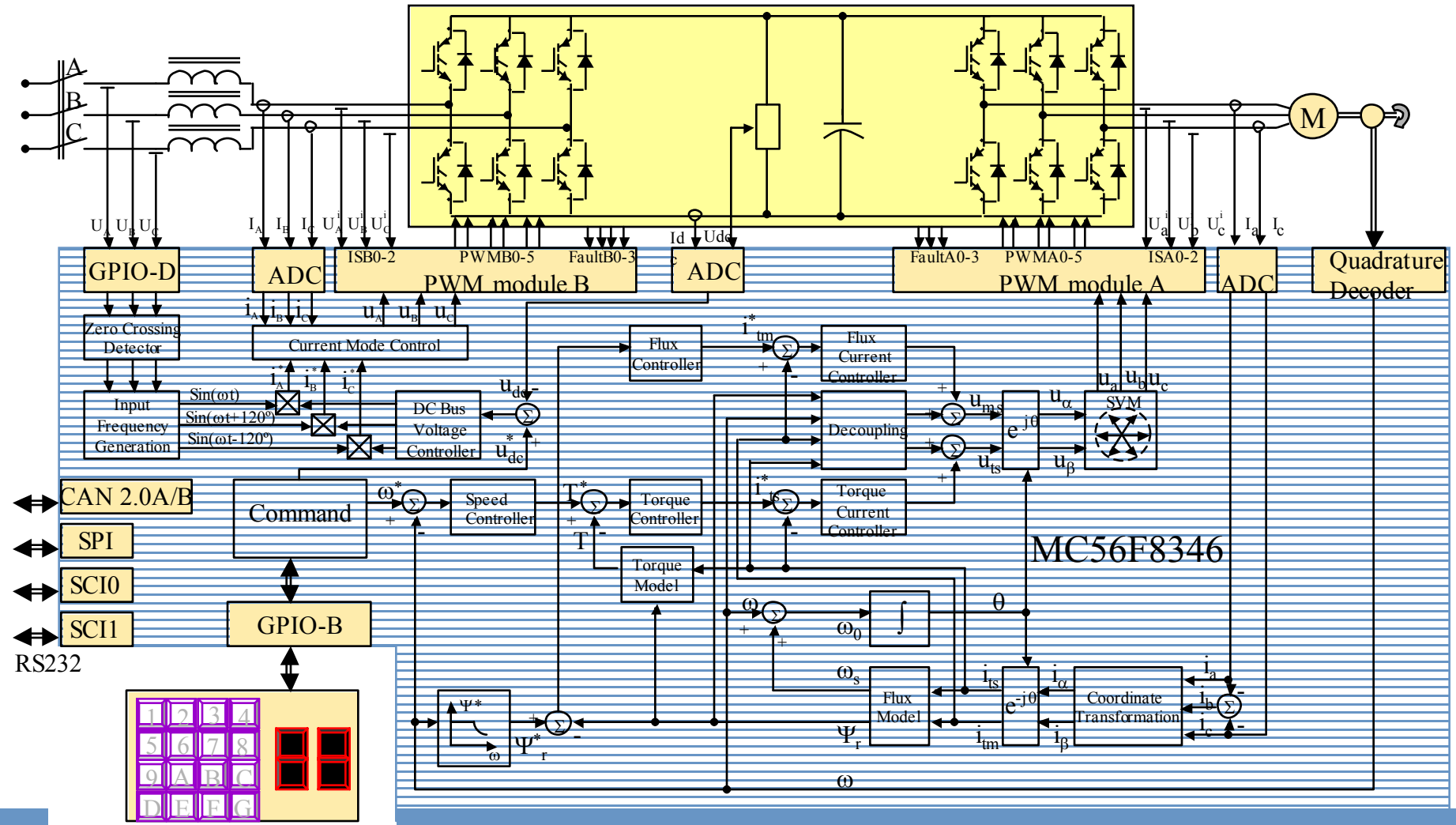
- Bill validators
- Medical instrumentation
- Intelligent toys
- Metering
- Retail scanners

Automotive

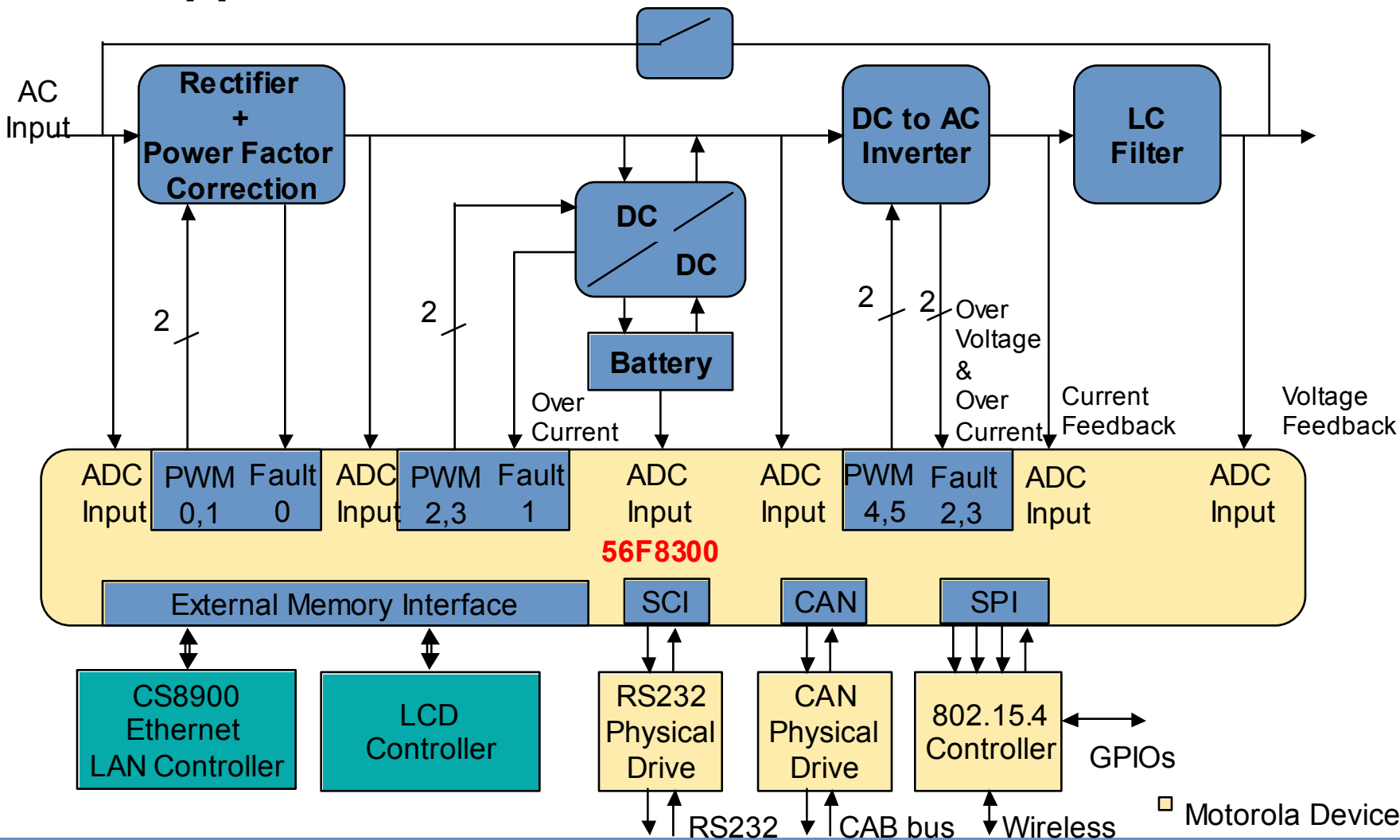
- EPAS
- Braking
- Transmission
- Active suspension
- Valve actuators
- Engine performance modules
- Exercise equipment
- Security and safety systems
- Vending machines
- Home automation



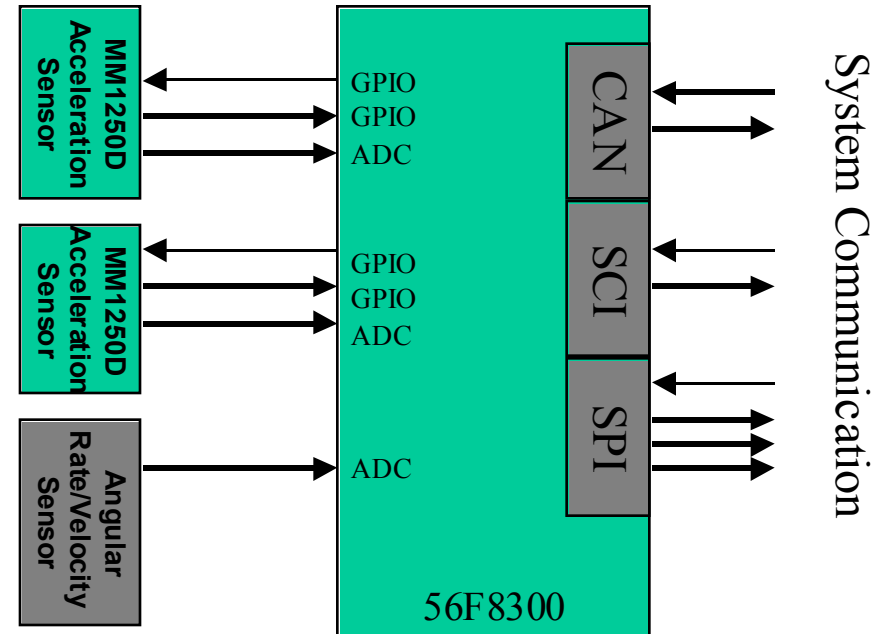
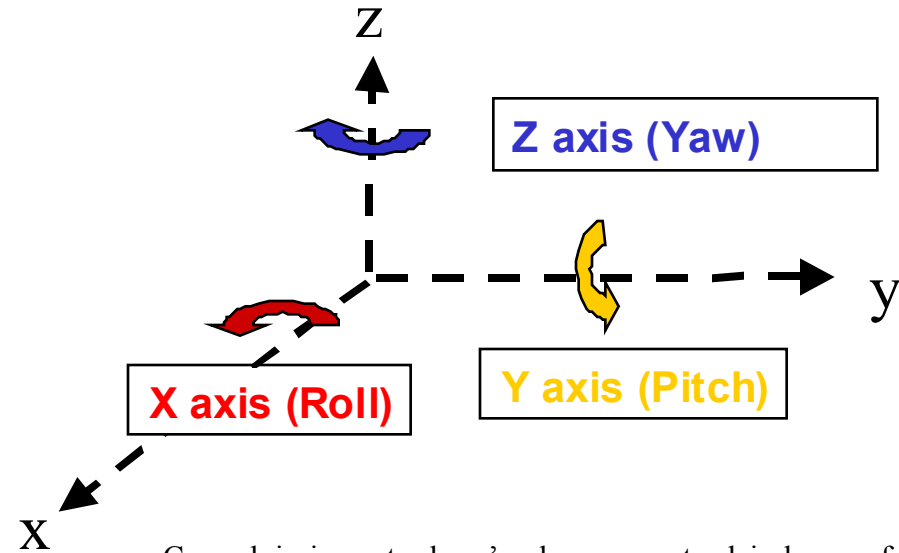
Field Oriented Motor Control Application



UPS Application



Intelligent Sensor Applications

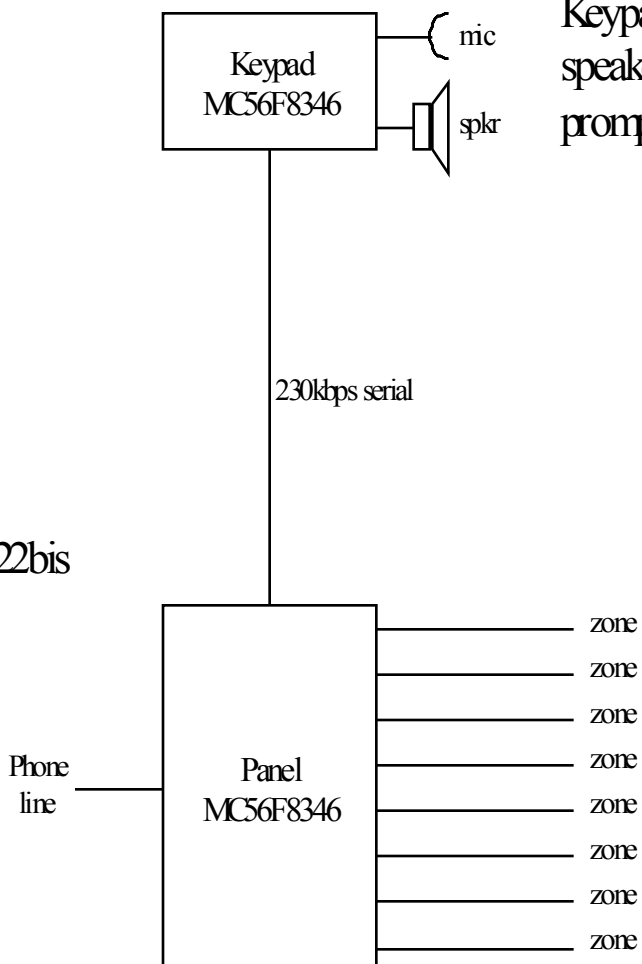


Combining today's low-cost, high-performance sensor technology with the processing capability of the 56F8300 makes traditionally high-cost intelligent sensor systems much more affordable. With the greatly reduced cost and increased performance these systems can be applied to many new markets.

One such system is the Inertial Sensor, which can be used to determine the angular and linear motion of an object. Traditionally, the inertial sensors have been used for active stabilization and navigation applications. But in the past, the intelligent inertial sensor systems were quite expensive because of the cost of mechanical accelerometers and gyros, and the cost of the high-performance processors required in the system. This made their use practical only for expensive and complex systems, such as military submarines and commercial aircraft. Now, with the introduction of low-cost MEMS sensor technology and the low-cost 56F8300 hybrid processors, much more economical inertial sensors can now be produced.

Connected Alarm Systems

Panel Unit performing: Caller ID, v.22bis soft modem, speaker phone, voice compression and security control.



Keypad Unit performing: Human Interface, speaker phone, voice compression, and voice prompt message replay.

Analog inputs from various zone sensors.

Identifying 56F8300 Opportunities/Key Peripherals

- ❖ **All types of Industrial 3 phase Motor Control**
 - ✓ High speed sophisticated (60 MHz) PWMs can replace what had previously been performed in external PWM generation chip
 - ✓ High speed/performance 1.2 μ s/12-bit ADC
 - ✓ Quadrature decoders for direct interface to Hall Effect sensors or Optical encoders
 - ✓ High 60 MIPs MCU/DSP performance required for advanced Motor Control Algorithms
 - ✓ Integration of support and communication peripherals
 - ✓ Flash Security

- ❖ **Metering and Industrial Control**
 - ✓ High speed/performance 1.2 μ s/12-bit ADC
 - ✓ High 60 MIPs MCU/DSP performance required for advanced Control Algorithms
 - ✓ Use of (60 MHz) PWMs to generate output waveforms
 - ✓ Integration of support and communication peripherals
 - ✓ Flash Security

Identifying 56F8300 opportunities/Key Peripherals

❖ **Medical**

- ✓ High speed sophisticated (60 MHz) PWMs can replace what had previously been performed in external PWM generation chip
- ✓ High speed/ performance 1.2 μ s/12-bit ADC
- ✓ High 60 MIPs MCU/DSP performance required for advanced Control Algorithms
- ✓ Integration of support and communication peripherals
- ✓ Flash Security

❖ **Power Supplies/Inverters**

- ✓ High speed sophisticated (60 MHz) PWMs can replace what had previous been performed in external PWM generation chip
- ✓ High speed/ performance 1.2 μ s/12-bit ADC
- ✓ High 60 MIPs MCU/DSP performance required for advanced Control Algorithms
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- ✓ Flash Security

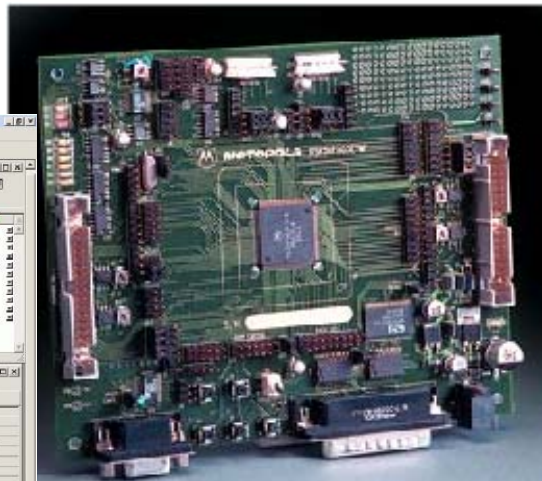
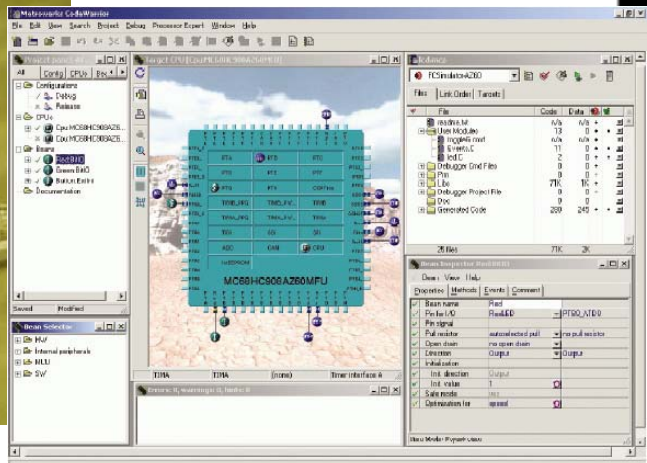
Identifying 56F8300 opportunities/Key Peripherals

❖ Automotive

- ✓ High speed sophisticated (60 MHz) PWMs can replace what had previously been performed in external PWM generation chip
- ✓ High speed/performance 1.2 μ s/12-bit ADC
- ✓ Quadrature decoders for direct interface to Hall Effect sensors or Optical encoders
- ✓ High 60 MIPS MCU/DSP performance required for advanced Control Algorithms
- ✓ Integration of support and communication peripherals
- ✓ Flash Security
- ✓ Integrated safety features
- ✓ Full Auto temp range and test coverage

Hardware & Software Development Tools

The Complete Development Environment



CodeWarrior™ for 56800/E

CodeWarrior for Freescale 56800/E is a windows based visual IDE that includes an optimizing C compiler, assembler and linker, project management system, editor and code navigation system, debugger, simulator, scripting, source control, and third party plug in interface.

Processor Expert™

Processor Expert (PE) provides a Rapid Application Design (RAD) tool that combines easy-to-use component-based software application creation with an expert knowledge system. PE is fully integrated with the CodeWarrior for 56800/E.

Hardware Tools

The 56800/E solutions are supported with a complete set of evaluation modules which supply all required items for rapid evaluation and software and hardware development. In addition several command converter options exist for customer target system debugger connection.

56800/E Evaluation Board (EVB)

Evaluation Board (EVB) Kit

The EVB kit includes everything required to start developing code immediately. It includes the evaluation board, all documentation, required cabling, power supply, CodeWarrior IDE, Processor Expert, and the training CD.

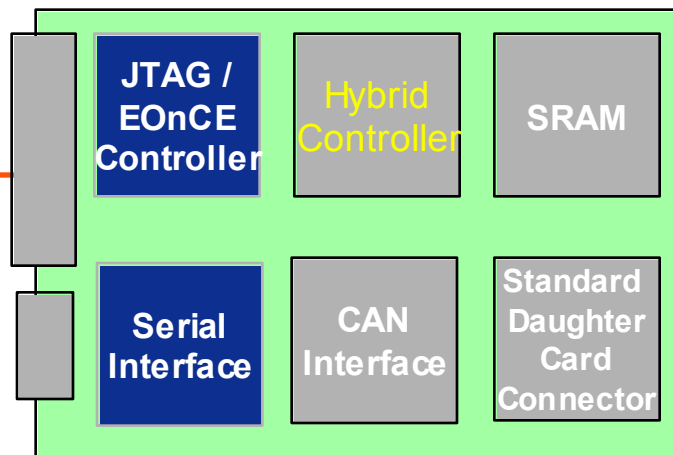
Standard Features:

- ✓ Parallel port Connection to Host PC
- ✓ Non intrusive debug via OnCE/EOnCE port
- ✓ JTAG Connector
- ✓ RS232 Serial connector
- ✓ Expansion Memory
- ✓ Standard daughter card connection
- ✓ CAN PHY layer
- ✓ Universal Power Supply
- ✓ Code Warrior CD w/30 day evaluation license
- ✓ Processor Expert
- ✓ Hands on training CD



Windows Host System

Parallel cable



EVB

56F800 Demonstration Kit

- Demo Board
- Complimentary CodeWarrior™ License
 - 16K bytes Program Memory Limit
- Parallel Cable
- Directions for Kit
- Training CD
- Ordering Part Number and Price:
 - **DSP56F800DEMO**
 - --\$49.95 (US power supply) suggested resale
 - **DSP56F800DEMO-E**
 - --\$64.95 (International power supply) suggested resale



56F8300 Developer's Starter Kit

- Everything required to start developing code immediately
- All documentation, required cabling, power supply and more
- Parallel port connection to host PC
- JTAG connector
- CAN PHY layer
- Non-intrusive debug via EOnCE port
- On-board MC33794 E-Field sensor
- Universal power supply
- CodeWarrior CD with Processor Expert



56800/E Demos and Reference Designs

Vehicle

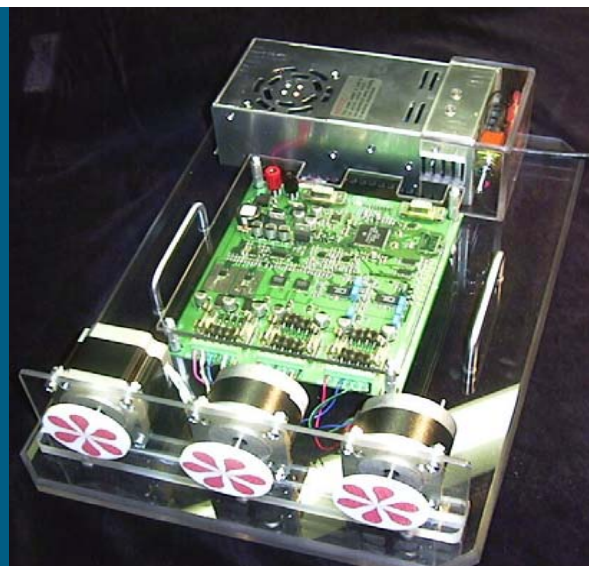
- Electronic Power Assisted Steering (EPAS) Demo
 - 56F805 Version and 56F8345 Version
- Hybrid Braking Demo in Definition

Industrial

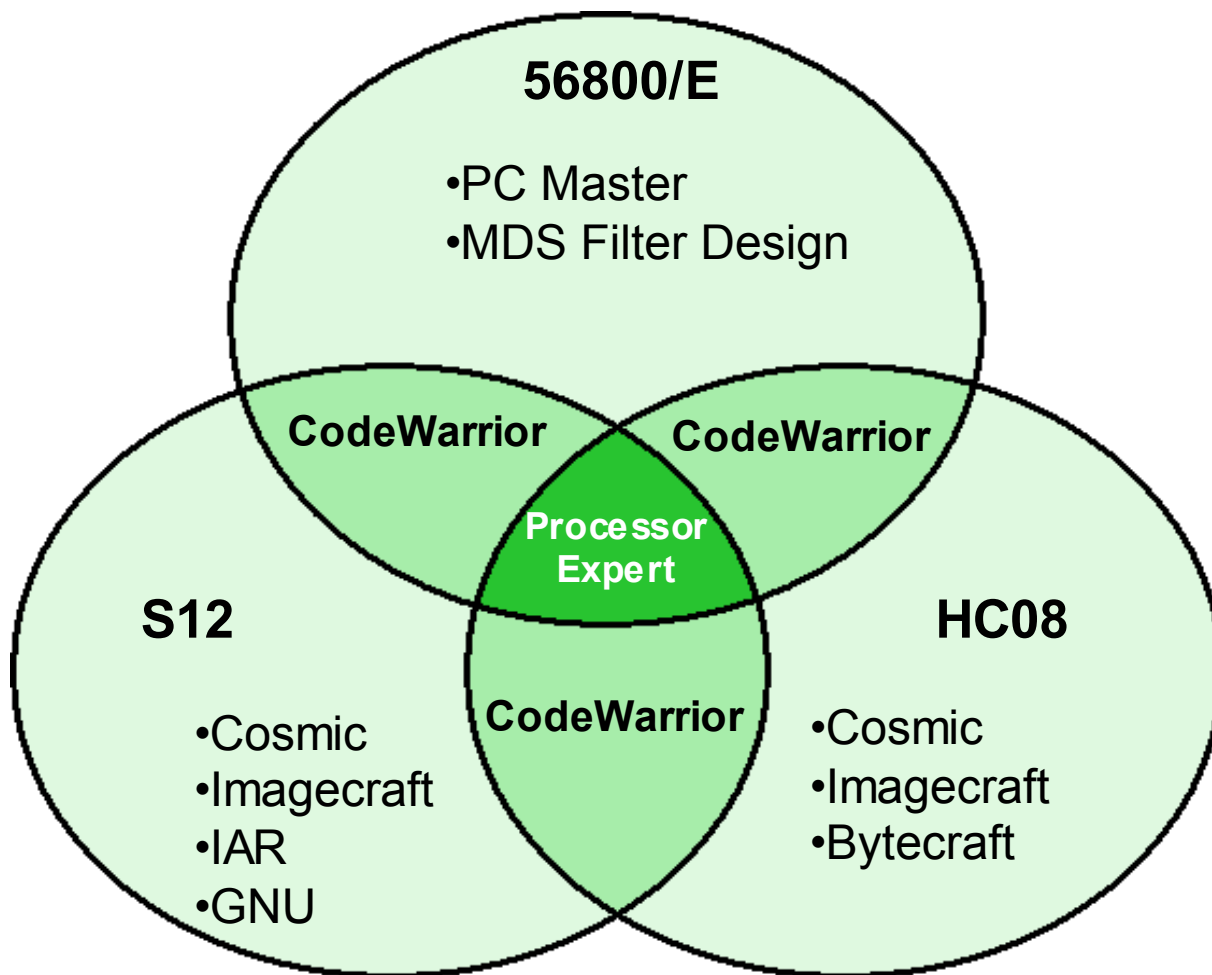
- UPS Reference Design in Development
- Powerline Modem
 - Switch Mode Power Supply in Definition
 - Low Cost 56F800
- Motor Control Demos
 - BLDC
 - Switch Reluctance
 - Sensorless ACIM
 - Stepper Motors

Voice

- Speaker Feature Phone
- Hands-free (AEC/NS)
- Voice Recognition



8 and 16-Bit Products Division Software Development Tools



8/16-Products Compiler Offerings

	FREE	\$495	\$995	Unlimited
HC(S)08	4K bytes	32K bytes	64K bytes	\$1995
HCS12	12K bytes	32K bytes	64K bytes	\$2495
56800/E	16K bytes	64K bytes	128K bytes	\$1495

Third Party Hybrid Controller Support

- **Domain Technologies: www.domaintec.com**
 - Development systems: [Emulators](#), [debuggers](#), [interfaces](#) and [libraries](#).
- **Lauterbach: www.lauterbach.com**
 - Modular development tools ranging from [In-Circuit Emulators](#) and [Logic Analyzers](#) to [Pattern and Stimulus Generators](#)
- **Macraigor: www.macraigor.com**
 - Host to target connections including [parallel port](#), [ISA bus](#), [PCI bus](#), [Serial](#) and [Ethernet](#).
- **P & E Micro:**
 - [In-Circuit Debugger \(ICD\) Software](#), [Parallel-Port Interface](#), [Cable \(DSP Cable\)](#), [Flash Programmer \(PROG\) Software](#) and [Register File Viewer/Editor](#)
- **System General: www.sg.com.tw**
 - Manual and Automated Device [Flash Programmings](#)

Third Party Hybrid Controller Support

Motor Boards & Development Systems

- **Micromint: www.micromint.com**
 - Motorman GUI Configured Embedded [Motion Control Module](#)
- **New Micros: www.newmicros.com**
 - NMIN-0803 & IsoPod Single Board [Motion Controllers](#)

RTOS/Network Stacks

- **Unicoi (DSP OS): www.unicoi.com**
 - [DSPOS RTOS](#); [Ethernet Daughtercards](#); [Softworks Fusion Internet \(TCP/IP stack\)](#), [LAN](#), [network management](#), [Web software](#)
- **Micrium: www.micrium.com**
 - [uCOS RTOS](#)
- **Quadros: www.quadros.com**
 - [RTXC Quadros RTOS](#)

Voice Solutions

- **Clarity: www.clarityco.com**
 - [CVC ClearVoice Capture Noise Suppression Solutions](#)

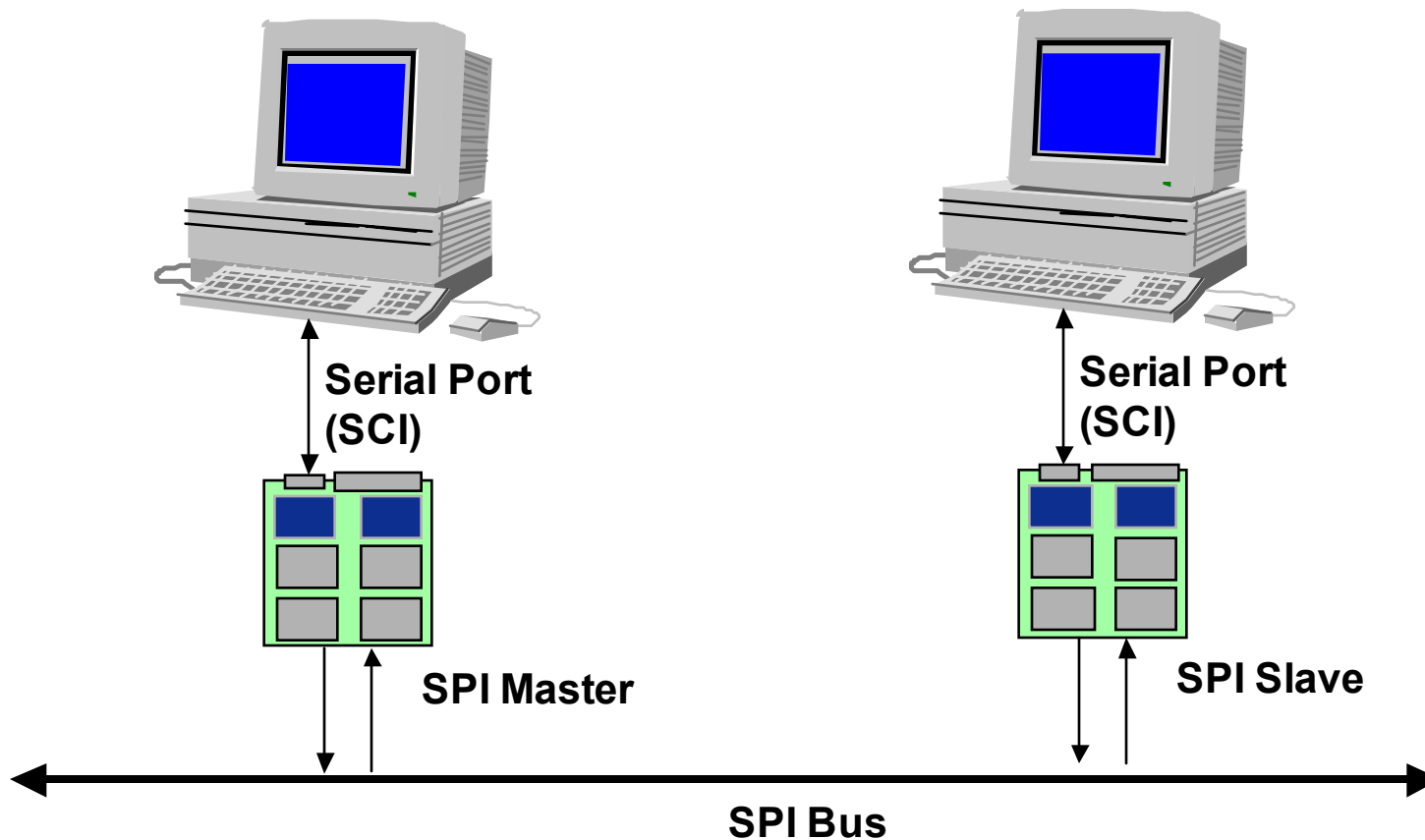
Hands-On Exercise

Slide 59

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Task Description

Develop a “Chat Room” application that uses the Serial Peripheral Interface (SPI) as the interprocessor communication channel.



Approach

- ❖ Design a communication system that exchanges key-press data from the PC between two EVMs connected by the SPI.

- ❖ Use Processor Expert Beans to implement application
 - ✓ SynchroMaster
 - ✓ SynchroSlave
 - ✓ Term

- ❖ Download and Execute on 56F8357 EVM

Summary

Slide 62

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Summary

- ❖ **Understand the available connectivity peripherals in the 56800E Hybrid Controller portfolio (SCI, SPI, CAN, SSI, Host Interface, I²C).**
- ❖ **Exposed to the target markets and available Application Reference Designs**
- ❖ **Understand the hardware and software support available for the 56800E Hybrid Controller product line.**
- ❖ **Demonstrated the ease of developing applications using CodeWarrior™ development tools with Processor Expert™ technology.**

56800E



Thank You!!!