

# Motorola

## 8 / 16-Bit Flash MCU

<http://www.motorola.com/mcu/>

A graphic featuring the word "Experience." in a large, bold, black sans-serif font. Below it, the phrase "How to Win with Motorola" is written in a smaller, black sans-serif font. The text is set against a white background with a faint, light gray grid pattern. To the left of the text is a red square with a white grid pattern, partially overlapping the white background.

**Experience.**  
How to Win with Motorola

[y.k.wong@motorola.com](mailto:y.k.wong@motorola.com)

# Focus Segments

- ✓ Home Appliance (white goods, AV, small appliance)
- ✓ USB PC Peripherals
- ✓ CRT/LCD Monitor (MCU+TMDS)
- ✓ Cellular and NB Chargers, Smart Battery Pack
- ✓ Instrument, Health Monitor, Temp Control, FRS (LCD MCU series)
- ✓ Power Meter
- ✓ Automotive Body Electronics
- ✓ OTP/Flash Mass Market

# Motorola's Leading Flash Technology

## *Motorola Flash Technology..*

## *Means for you..*



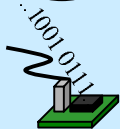
**High speed programming**  
- 32k bytes in 1 second

**Minimal programming cost for volume production**



**No external high voltage required for reprogramming**

**Saves cost of additional power supply components**



**In-Application Reprogrammable through user defined interface**

**No special circuitry required - can use RS232, CAN, IrDA..**

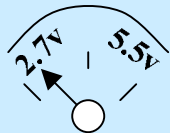


**Up to 100,000 write/erase cycles and 100 years data retention**

**Eliminate external EEPROM for system cost savings**

**Small flash block/page size down to 64 bytes**

**Use for calibration or NV data storage requirements**



**Erase and reprogram over whole voltage operating range**

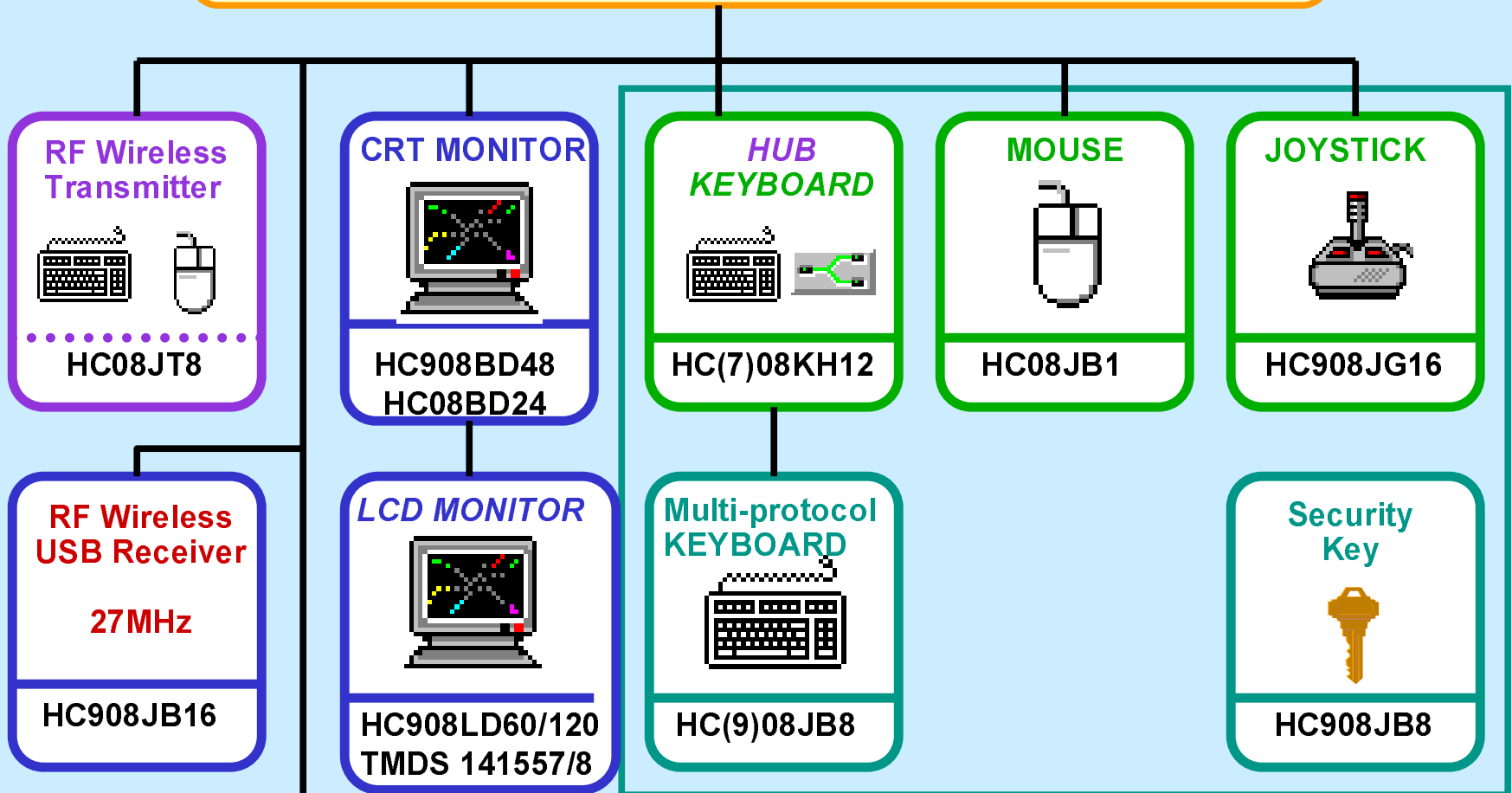
**Reprogram Flash in either 5v or 3v systems**



**Erase and reprogram over entire temperature operating range**

**-40°C to +125°C, not just at room temperature**

# Family of Application Specific MCU's for USB Peripherals



*USB 2.0 high speed*

*HID Peripherals*

# 9JB8 Smart Key - Application

## 微星845主機

新一代的Pentium® 4 845主機板終於在千呼萬喚中，正式登場。微星科技推出845 Pro2及845 Pro主機板，支援Intel® Pentium® 4 845晶片，超強功能、絕佳效能，讓你輕鬆坐享數位世界，是新一代主機板的最佳選擇。

新超ㄉ一尤、功能：

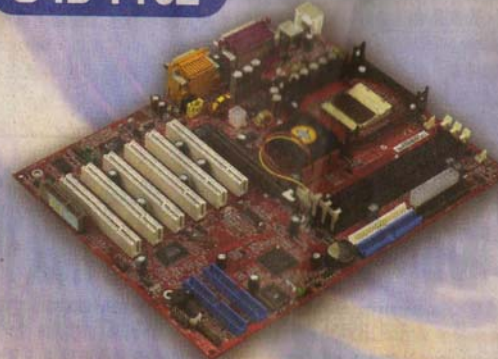


**Smart Key**：為你的電腦多加一把鑰匙，提高你電腦的安全等級；USB介面讓你輕鬆使用。(市價約1500元左右)



**D-Bracket**：透過燈號的顯示，輕鬆知道您的電腦發生什麼樣的問題，讓你超頻沒問題！

845 Pro2



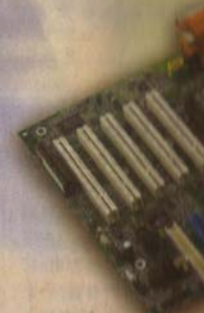
Intel 845 Chipset / Socket 478

支援Intel® Pentium® 4處理器至2.0GHz及以上時脈

- 3組PC133 SDRAM DIMM插槽，可支援到3.0GB
- 內建6聲道立體音效
- 支援微星Smart Key™ 硬體電腦防護裝置，防止他人濫用使用
- 支援微星Live Update™ 線上自動更新BIOS/Driver
- 支援微星D-Bracket™ 硬體偵錯裝置，增加方便性
- 支援微星Fuzzy Logic™ 3人工智慧超頻功能



845 Pro



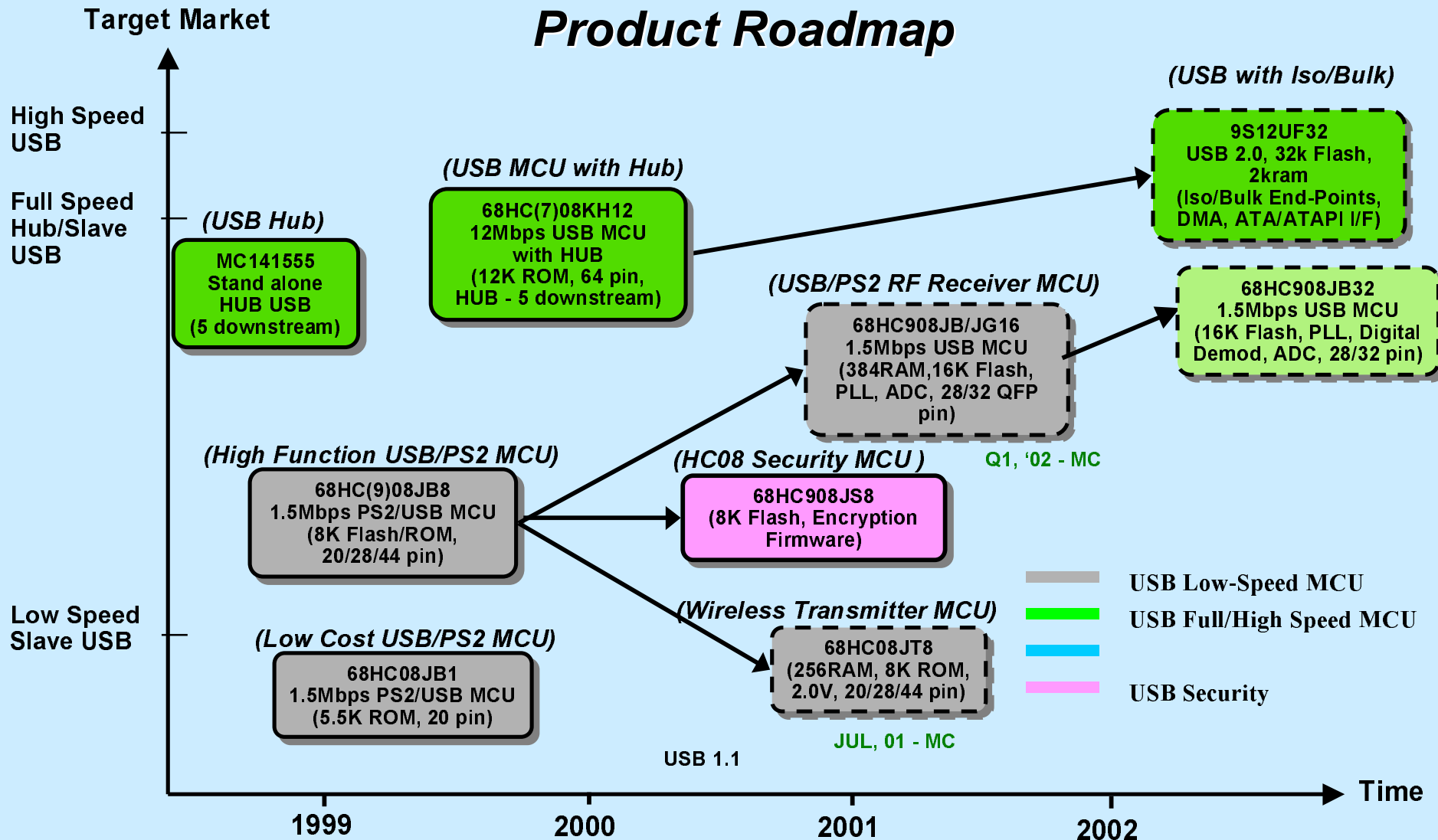
Intel 845 Chipset

支援Intel® Pentium®

- 3組PC133 SDRAM
- 支援微星Live Update™
- 支援微星D-LED™
- 支援微星Fuzzy Logic™



# PC Peripherals Segment Product Roadmap



# 68HC908JB8, 08JB8, 08JT8, 08JB1

Upward HC05 Object Code Compatible

	ROM	RAM	Package
256 Bytes RAM	JB8	8K	20/28/44
8K Bytes Flash / ROM	JB1	5.5K	128

Single-Wire Development Interface

Address-Match Hardware Breakpoints

Reset / Interrupt Priority Control

External Interrupt

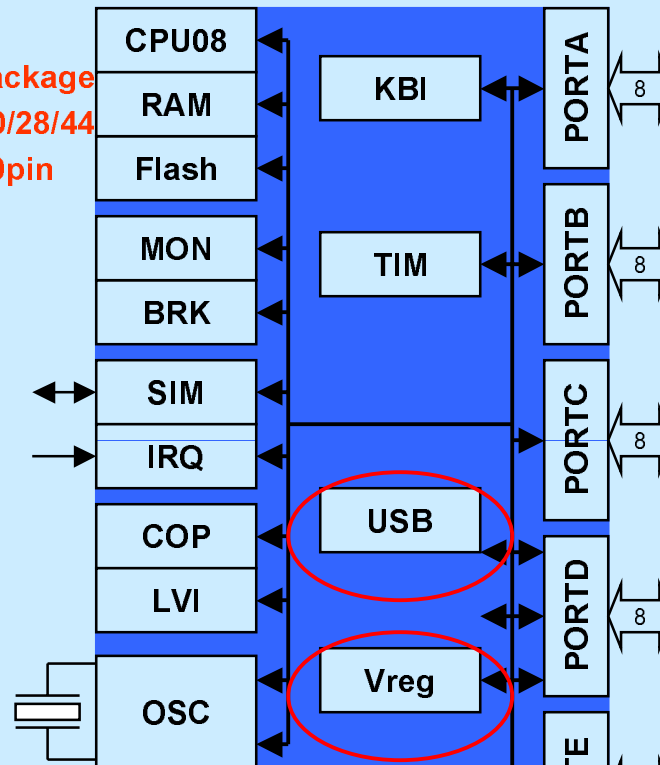
Watchdog

Low-Voltage Inhibit

Clock Oscillator

QFP 44, DIP 20, SOIC 28

3 ROMs - 08JB8/JT8 (8K) MC 'ed  
08JB1 (5.5K) MC'ed



8 Keyboard Interrupts

2 Channel 16-Bit Timer

- Input Capture
- Output Compare
- Pulse Width Modulation

Up to 37 Bi-directional I/O

28pin - 21 I/O

20pin - 13 I/O

- 10 mA on 8 pins
- 25 mA on 2 pins

USB

- 1.5 Mbps

3.3 V Regulator

- 5V VDD, 3MHz Bus
- RESET, IRQ 0-5V operation
- I/Os are 0-3.3V operation
- 08JT8 1.8-3V Operation, NO USB, NO Vreg, NO LVI

# 68HC908JB16<sub>(PLL)</sub>/JG16<sub>(ADC)</sub>

Upward HC05 Object Code Compatible

384 Bytes RAM

16K Bytes FLASH

Single-Wire Development Interface

Address-Match Hardware Breakpoints

Reset / Interrupt Priority Control

External Interrupt

Watchdog

Low-Voltage Inhibit

Crystal Oscillator

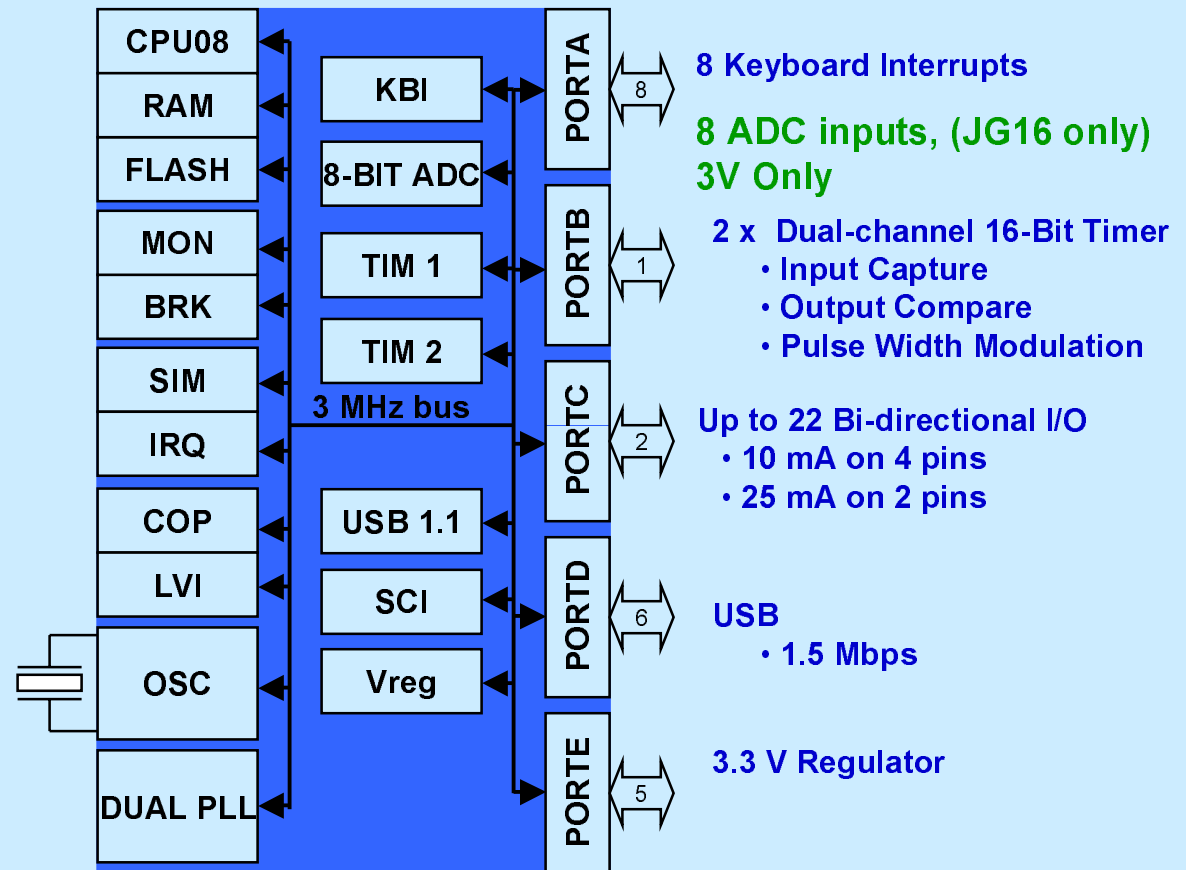
Dual Clock Generators

27MHz PLL (JB16 32LQFP only)

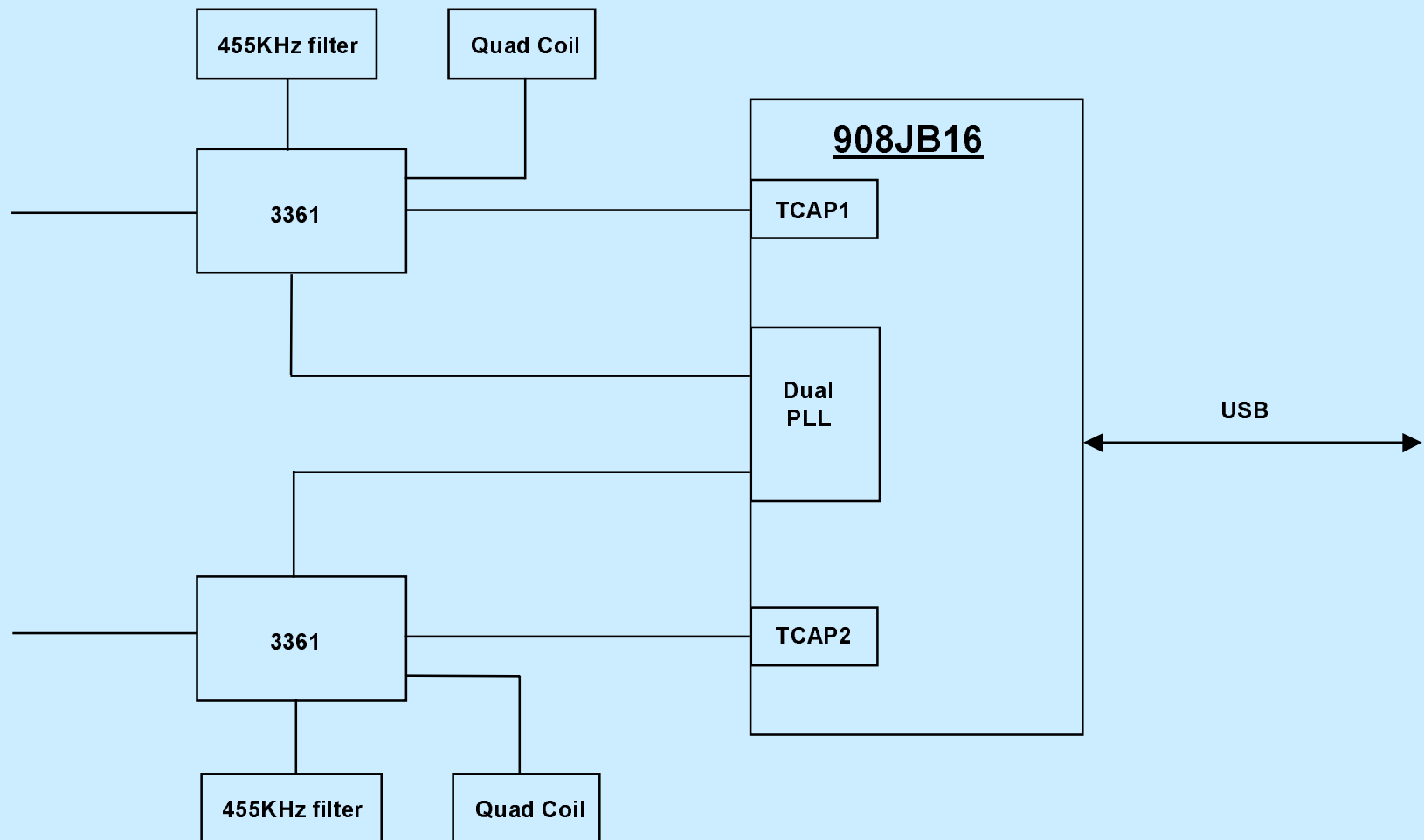
Sample NOW!

JB16 : 32-pin LQFP, 28-pin SOIC

JG16 : 32-pin LQFP

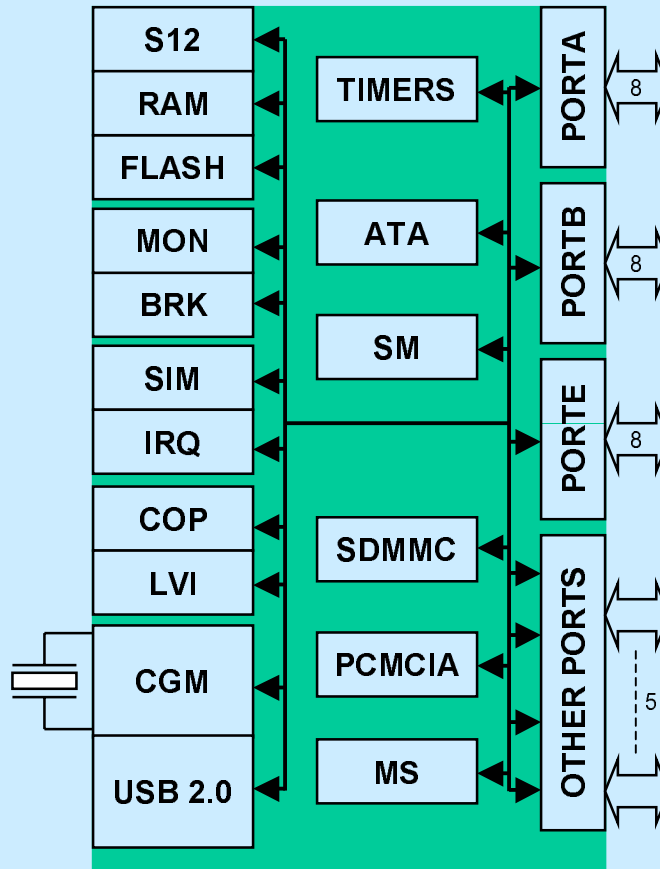


# 908JB16 in wireless receiver application 27MHz, 2 Channel



# 9S12UF32

- S12 16-Bit CPU Core
- 1K Bytes RAM
- 32K Bytes FLASH EEPROM
- Single-Wire Background Debug
- Address-Match Hardware Breakpoints
- Reset / Interrupt Priority Control
- External Interrupt
- Watchdog
- Low-Voltage Inhibit
- Clock Generation and Reset Module
- Universal Serial Bus 2.0
- 3.3V to 5V operating voltage
- 25MHz bus
- 100-QFP



81 Bi-directional I/O

## Timer

- 16-bit main counter
- 8-bit programmable with IC and OC channels
- 16-bit pulse accumulators

## ATA Interface

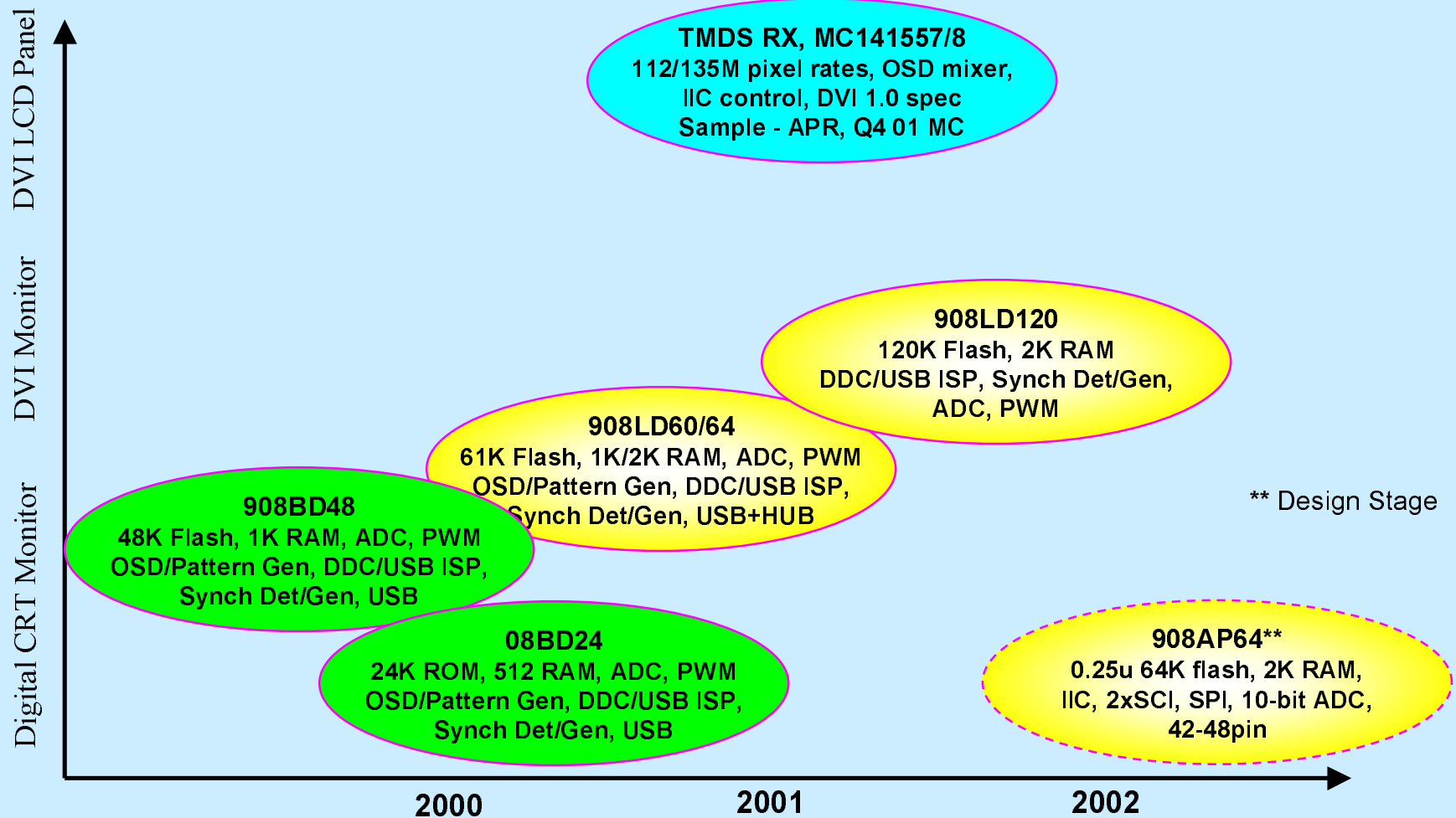
## Smart Media Interface

MMC System v2.1 and SD Memory Card v1.0 Interface, Compact Flash

## ATAPI Interface

MemoryStick/MagicGate Interface

# Monitor Segment Product Roadmap

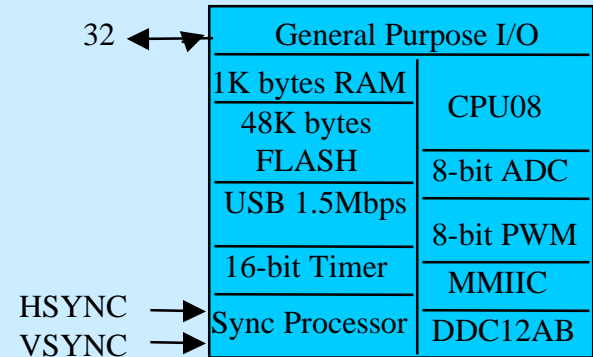


\*\* Design Stage

# CRT/LCD Monitor MCU HC908BD48 / 08BD24

## FEATURES :

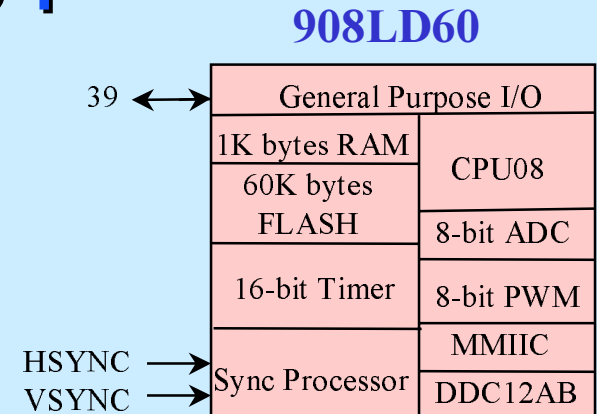
- 6MHz internal bus operation, 24MHz external crystal
- 48K Flash (ROM 08BD24 24K only)
- 1K RAM (ROM 08BD24 512byte only)
- 32 General purpose I/O
- 28-pin or 42-pin plastic SDIP or 44-pin QFP package
- 16-bit Timer
- Low Speed USB with 3 Endpoints (908BD48 Only)
- Sync Processor which contains H/V, Composite, or digital SOG SYNC signal frequency counters, H/V polarity detection, (auto) polarity controlled, selectable H/V Sync outputs, and the CLAMP pulse output, fast Horizontal frequency measurement, low vertical frequency detect
- DDC12AB module
- Second multi-master IIC ,module (908BD48 Only)
- COP, LVR
- 16ch 8-bits PWM/BRM
- 6ch 8-bit ADC



# CRT/LCD Monitor MCU HC908LD60/64

## FEATURES :

- 6MHz Bus, 24MHz external crystal
- 60K Flash
- 1K Ram (2K Ram - 9LD64)
- Sync Processor which contains H/V, Composite, or digital SOG SYNC signal frequency counters, H/V polarity detection, (auto) polarity controlled, selectable H/V Sync outputs, and the CLAMP pulse output, fast Horizontal frequency measurement, low vertical frequency detect
- 8-Ch 8-bits PWM
- 8-bit ADC
- 39 General purpose I/O
- 2-Ch 16-bit Timer
- DDC12AB module
- Additional Multi-Master IIC
- USB HUB and OSD, 908LD64 Only



## STATUS

Samples: Now  
Tools: Now  
ICP Tools: Now  
Production Now

# LCD Monitor TMDS Receiver

## MC141557/8

### FEATURES :

- DVI 1.0 Compliance
- Support Input Resolution up to 112/135 MHz
- Support all XGA / SXGA TFT Panels
- Support 24-Bit One Pixel/Clock or 48-Bit Two Pixels/Clock Output up to 16.7 Million Colors
- Frame Rate Preservation Locks Outgoing Frame Rate with Incoming Frame Rate
- OSD Interface
- Built-in High Speed Clock Recovery Circuit for Generating Clocks for Receiver and Panel
- Sync. Signal Detection
- Selectable Output Driver Strength
- M-Bus Interface
- 3.3V Supply

### STATUS

Samples:	Now
Demo Boards:	Now
Production	Q1, '02

# 68HC908AP64

Derive from 08BD64

Upward HC05 Object Code Compatible

2K Bytes RAM

64K Bytes FLASH

Single-Wire Development Interface

Address-Match Hardware Breakpoints

Reset / Interrupt Priority Control

External Interrupt

Watchdog (driven by internal OSC)

Low-Voltage Inhibit

32 kHz Clock with 32 MHz internal PLL

RC Clock Option

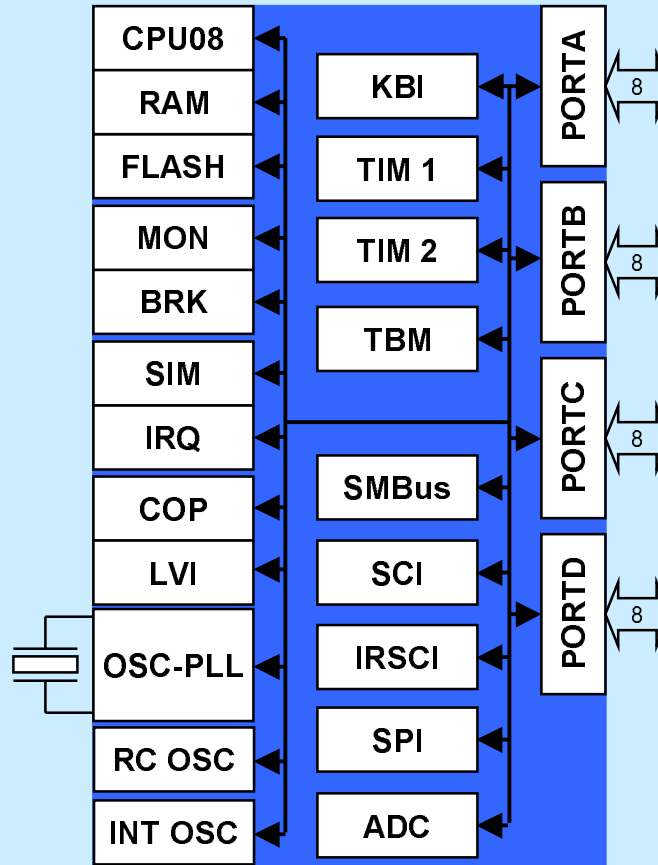
Internal Clock Oscillator

3V, 5V operating voltages

8MHz bus

48-LQFP, 42-SDIP

0.25µm technology



Up to 32 Bi-directional I/O

8 Keyboard Interrupts

Two 2-Channel 16-Bit Timer

- Input Capture
- Output Compare
- Pulse Width Modulation

Timebase Module

System Management Bus /  
IC Interconnect Bus (IIC)

Serial Communications Interface

Infrared Serial  
Communications Interface

Serial Peripheral Interface

8-Channel 10-Bit ADC

# Motorola Solutions for Home Appliance Motor Control



BOSCH-SIEMENS

*Motorola DSP & MCU are widely used by major Home Appliance manufacturers, such as Whirlpool, Electrolux, GE, Siemens, AKO, Matsushita... worldwide.*

## Hardware:

- Single Phase Motor MicroControllers:

- 8-16-pin: 68HC908QT/QY1/4, HC908KX2/8

- 20/28-pin: 68HC908JL3E/JK3E, HC908JL8, HC908GR8

- 40/44-pin: 68HC05SR3 , HC908SR12, HC908GP32/GT8/GT16

- 56/64-pin: 68HC05B6/B8/B16/B32, HC908AB32/08AB16, HC908LJ12

- 3-Phase Variable Frequency Motor MicroControllers:

- 56 up -pins: DSP568xx, 68HC908MR16/32

- 28/32pins: HC908MR8

## Software:

- Czech laboratory with over 10 engineers specializing in Motorola MCU/DSP motor control software design.
- Shanghai MCU Motor Control laboratory.

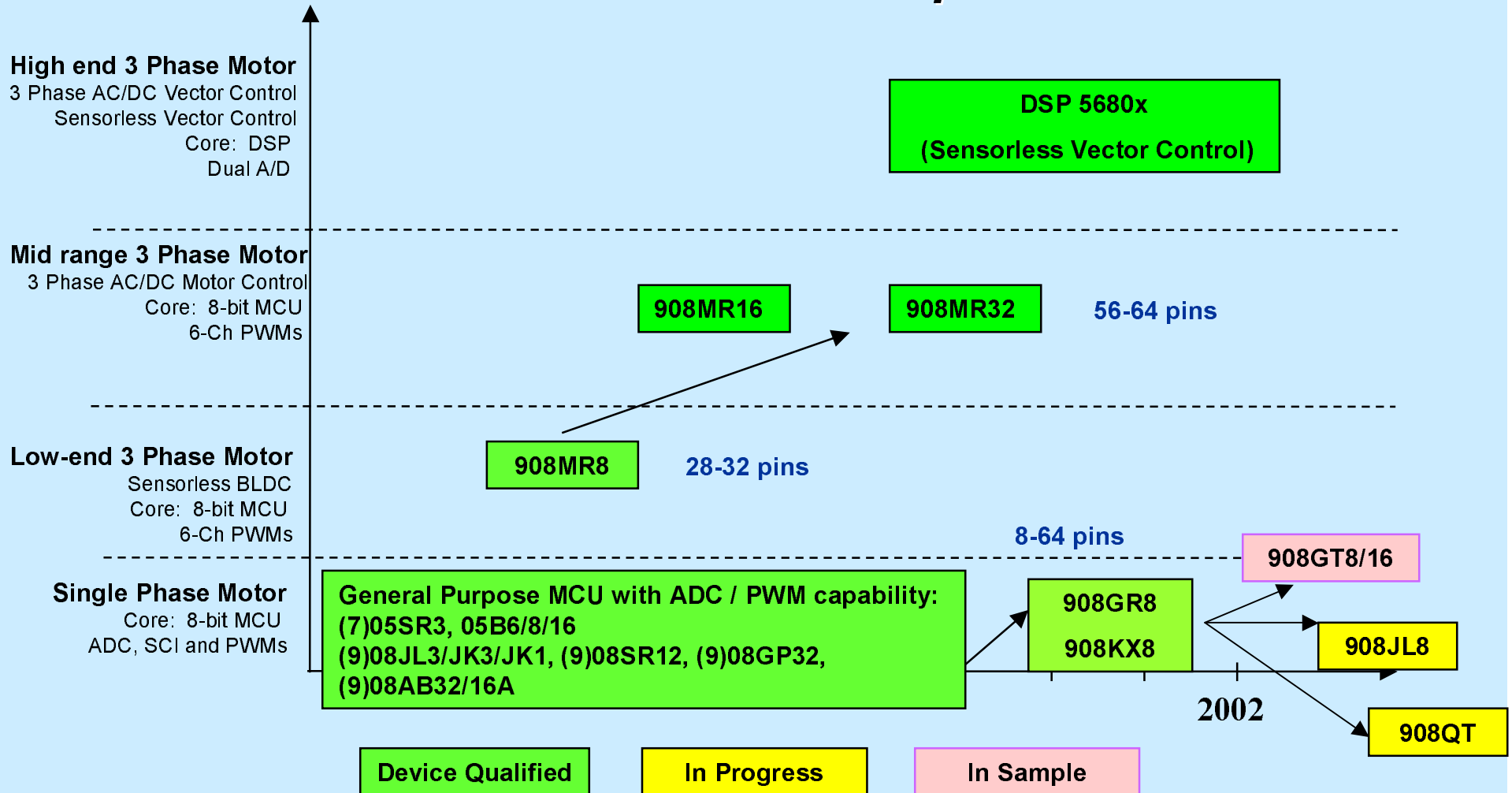


AKO



# Home Appliances

## Product Roadmap



# 68HC908QT1/4 - 8 pin

## 68HC908QY1/4 - 16 pin

CPU08  
 128 Bytes RAM

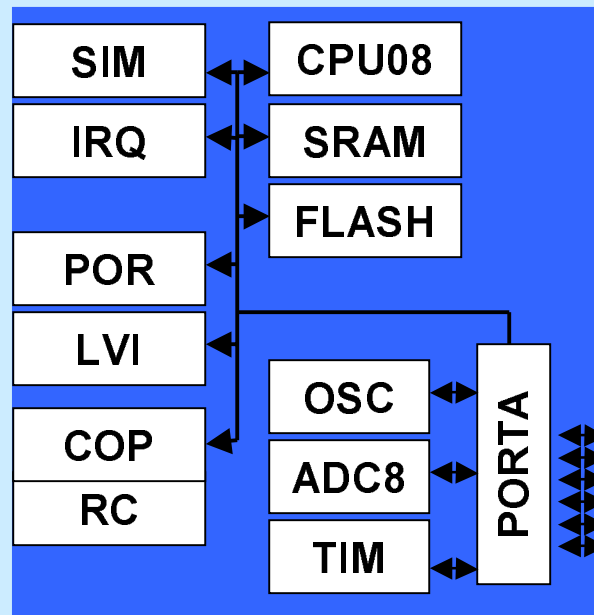
QT1/QY1 - 1.5k Flash  
 QT4/QY4 - 4k Flash

System Integration Module  
 External Interrupt

Power-On Reset  
 Low-Voltage Inhibit

COP with Auto Waitup  
 Internal OSC, 3.2MHz  
 RC  
 Xtal

QT - 8pin P dip, SO  
 QY - 16pin P dip, SO



QT - Up to 6 I/O  
 QY - Up to 12 I/O  
 All Ports Pins Rated for

- 15mA Sink
- 15mA Source

2 Channel 16-Bit Timer

- Input Capture
- Output Compare
- Pulse Width Modulation

QT4 and QY4 Only

- 4 Ch 8 bit ADC

Q3 Sample

# 68HC908KX8

Upward HC05 Object Code Compatible

192 Bytes RAM

7,680 Bytes Flash

Single-Wire Development Interface

Address-Match Hardware Breakpoints

Reset / Interrupt Priority Control

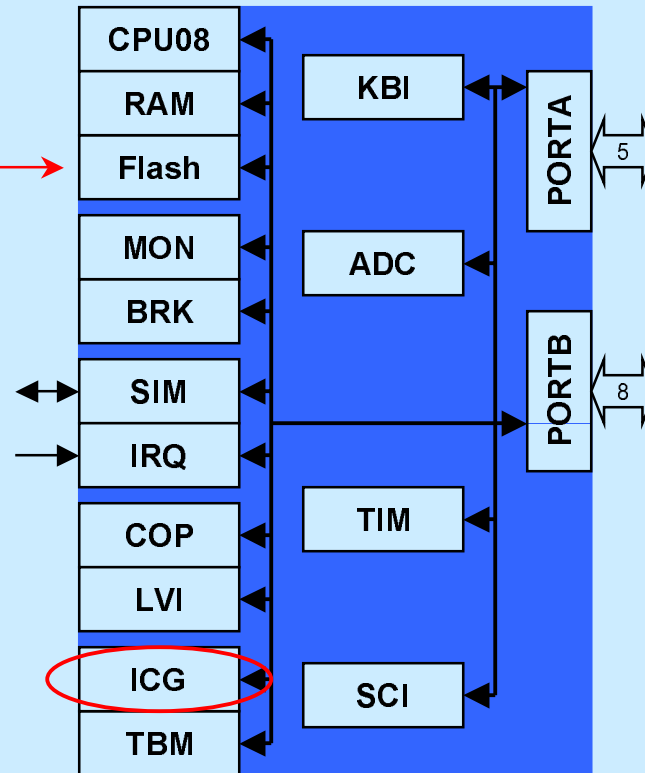
External Interrupt

Watchdog

Low-Voltage Inhibit

Internal Clock Generator Module

Time Base Module



5 Keyboard Interrupts

4 Channel / 8-Bit Analog-to-Digital Converter

13 Bi-directional I/O  
All Ports Pins Rated for

- 15mA Sink
- 15mA Source

2 Channel 16-Bit Timer

- Input Capture
- Output Compare
- Pulse Width Modulation

Asynchronous Serial Communications Interface

DIP 16, SOIC 16  
MC Qualified

# 68HC908JL3 E - EMC Improved

Upward HC05 Object Code Compatible

128 Bytes RAM

4,144 Bytes Flash / ROM

Single-Wire Development Interface

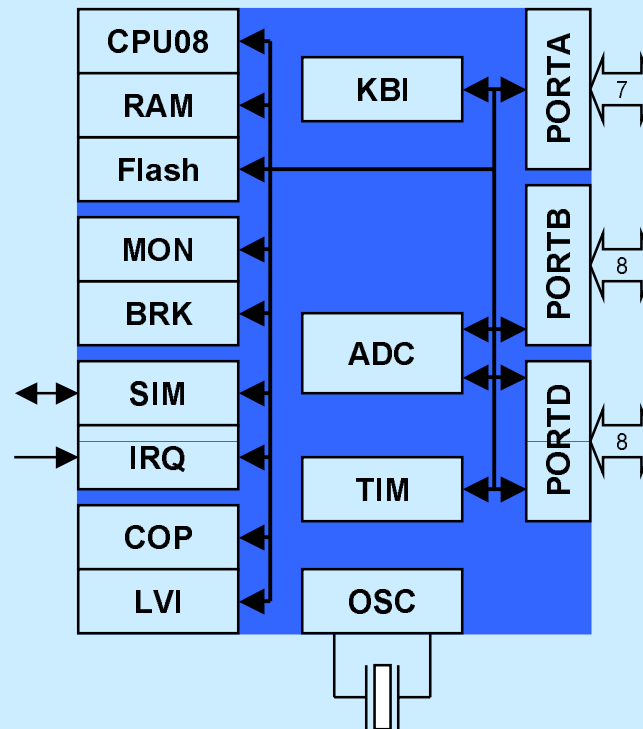
Address-Match Hardware Breakpoints

Reset / Interrupt Priority Control

External Interrupt

Watchdog

Low-Voltage Inhibit



7 Keyboard Interrupts

23 Bi-directional I/O

- 10mA Sink on 10 Outputs
- 25mA Sink on 2 Outputs

12 Channel 8-Bit Analog-to-Digital Converter

2 Channel 16-Bit Timer

- Input Capture
- Output Compare
- Pulse Width Modulation

DIP 28, SOIC 28  
7\*7 mm LQFP 48

- Move Down to 2.0V Vdd Operation - Xtal option only
- AN2158 - Designing with MC68HC908JL/JK family
- EMC improved version - 68HC908JL3E (Avail NOW)

# 68HC908JL8

Upward HC05 Object Code Compatible

256 Bytes RAM

8,192 Bytes FLASH

Single-Wire Development Interface

Address-Match Hardware Breakpoints

Reset / Interrupt Priority Control

External Interrupt

Watchdog (driven by internal OSC)

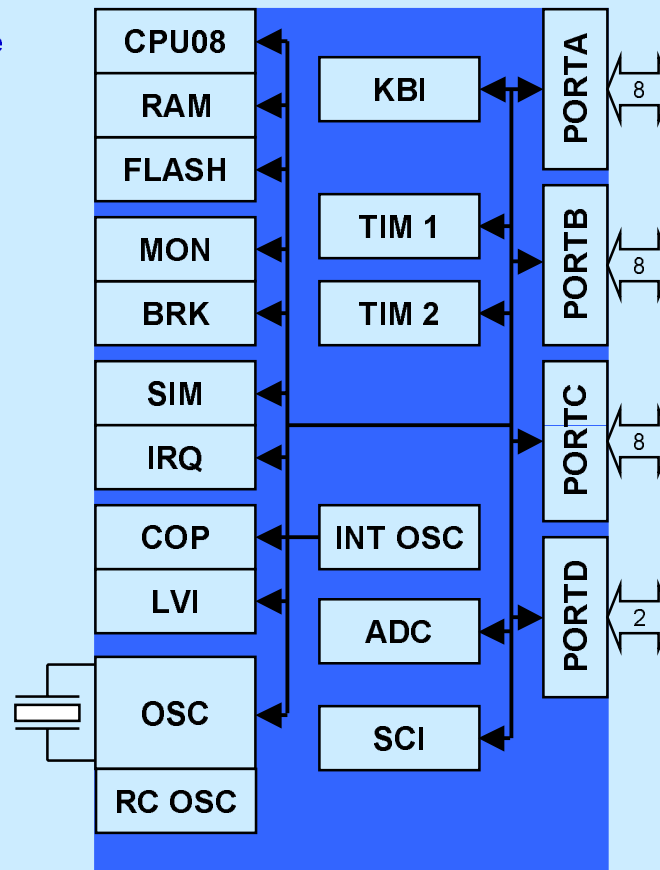
Low-Voltage Inhibit

Crystal Clock Oscillator /  
RC Oscillator Options

3V, 5V operating voltages

8MHz bus

32-LQFP, 28-PDIP



Up to 26 Bi-directional I/O  
(32 pin package)

- 25 mA on two port pins
- LED drive on 4 port pins

8 Keyboard Interrupts

Two 2-Channel 16-Bit Timer

- Input Capture
- Output Compare
- Pulse Width Modulation

12-Channel 8-Bit ADC

SCI

# 68HC908GR8

# 68HC908GR4

Upward HC05 Object Code Compatible

384 Bytes RAM

8K Bytes Flash    4K Bytes Flash →

Single-Wire Development Interface

Address-Match Hardware Breakpoints

Reset / Interrupt Priority Control

External Interrupt

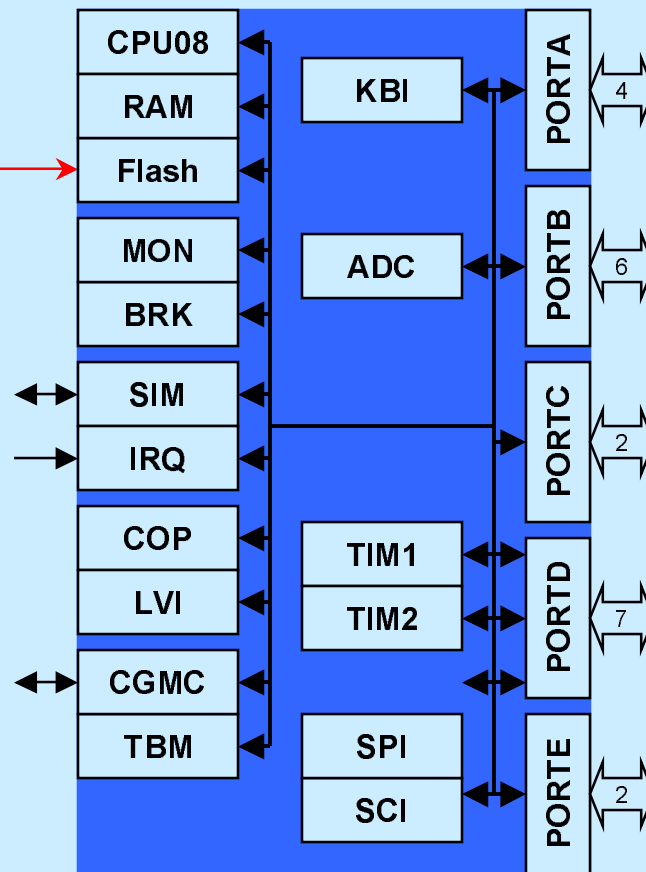
Watchdog

Low-Voltage Inhibit

32kHz Clock Generator Module

Time Base Module

DIP 28, QFP 32, 42Sdip  
MC Qual'ed



8 Keyboard Interrupts

6 Channel / 8-Bit  
Analog-to-Digital Converter

Up to 21 Bi-directional I/O  
All Ports Pins Rated for  
• 10mA Sink  
• 10mA Source

1 & 2 Channel 16-Bit Timers  
• Input Capture  
• Output Compare  
• Pulse Width Modulation

Synchronous Serial  
Peripheral Interface

Asynchronous Serial  
Communications Interface

# 68HC908SR12

Upward HC05 Object Code Compatible

512 Bytes RAM

12,288 Bytes Flash / ROM

Single-Wire Development Interface

Address-Match Hardware Breakpoints

Reset / Interrupt Priority Control

External Interrupt

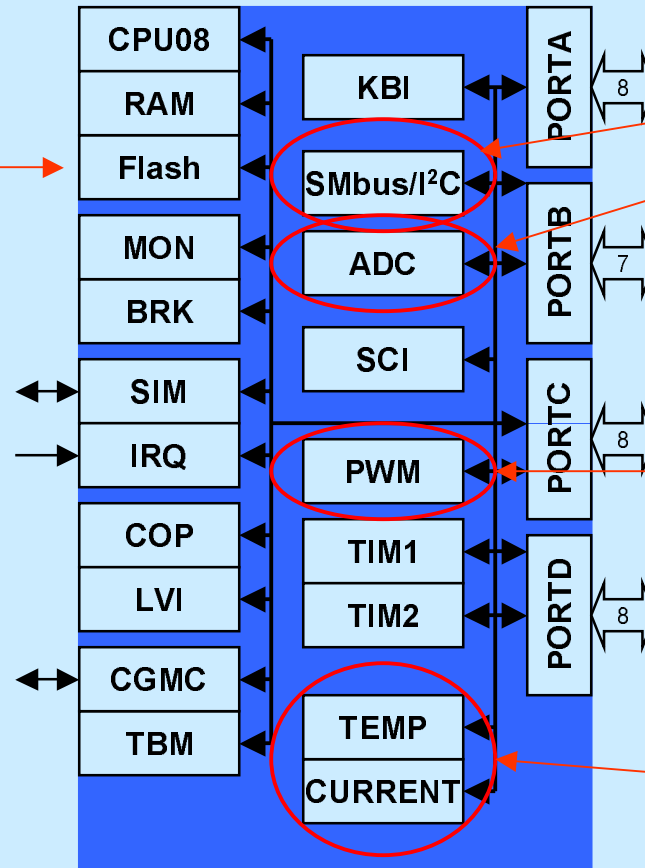
Watchdog

Low-Voltage Inhibit

32kHz Clock Generator Module

Time Base Module

SDIP 42, 48LQFP



8 Keyboard Interrupts

SMbus Smart Battery Bus/I<sup>2</sup>C

13 Channel 10-Bit Analog-to-Digital Converter  
Asynchronous Serial Communications Interface  
Up to 31 Bi-directional I/O

- 10mA on 11 pins
- 25mA on 2 pins

3 Channel PWM (125KHz)

Dual 2 Channel 16-Bit Timers

- Input Capture
- Output Compare
- Pulse Width Modulation

Temperature Sensor

Current Sensor

# 68HC908GT8/16

Upward HC05 Object Code Compatible

512 Bytes RAM

8192 or 16384 Bytes Flash

Single-Wire Development Interface

Address-Match Hardware Breakpoints

Reset / Interrupt Priority Control

External Interrupt

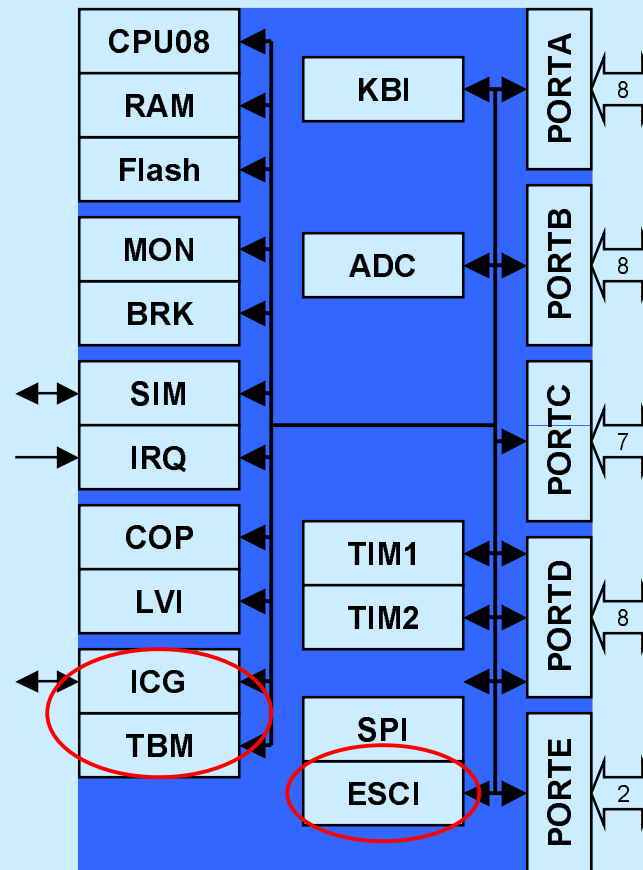
Watchdog

Low-Voltage Inhibit

Internal Clock Generator Module

Time Base Module

SDIP 42, QFP 44



8 Keyboard Interrupts

8 Channel / 8-Bit  
Analog-to-Digital Converter

33 Bi-directional I/O  
All Ports Pins Rated for  
• 10mA Sink  
• 10mA Source

Dual 2 Channel 16-Bit Timers  
• Input Capture  
• Output Compare  
• Pulse Width Modulation

Synchronous Serial  
Peripheral Interface

Enhanced Asynchronous  
Serial Communications  
Interface (LIN compatible)

In Sample

# 68HC908GP32

Upward HC05 Object Code Compatible

512 Bytes RAM

32,292 Bytes Flash / ROM

Single-Wire Development Interface

Address-Match Hardware Breakpoints

Reset / Interrupt Priority Control

External Interrupt

Watchdog

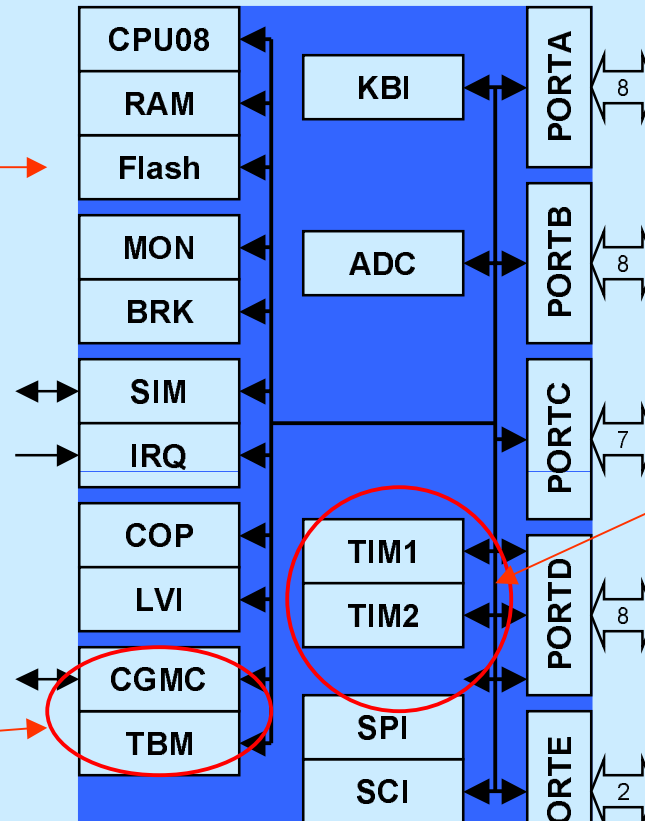
Low-Voltage Inhibit

32kHz Clock Generator Module/PLL

Time Base Module

SDIP 42, QFP 44

ROM MC Qualified



8 Keyboard Interrupts

8 Channel / 8-Bit  
Analog-to-Digital Converter

33 Bi-directional I/O  
All Ports Pins Rated for  
• 10mA Sink  
• 10mA Source

Dual 2 Channel 16-Bit Timers:  
• Input Capture  
• Output Compare  
• Pulse Width Modulation

Synchronous Serial  
Peripheral Interface

Asynchronous Serial  
Communication Interface

- ICP Demo board
- AN2105 - Power On, Clock Selection and Noise Reduction Technique

# GP32 and GT8/16 Differences

- 908GP32 and 908GT8/16 are pin compatible

## Differences:

- The GT8/16 has an ICG instead of a PLL.
- Because the GT8/16 does not have a PLL, the cgmxfc pin was converted to pte2.
- Because the GT8/16 has an ICG, osc2 and osc1 can be configured as pte3 and pte4 if the ICG is used.
- VrefH was split from Vddad on the GT8/16. Vddad is now controlled by Vdda.
- VrefL was split from Vssad on the GT8/16. Vssad is now controlled by Vdda.

# 68HC908AB32

Upward HC05 Object Code Compatible

1 K Bytes RAM

32,255 Bytes FLASH

512 Bytes EEPROM

ROM 16K

Single-Wire Development Interface

Address-Match Hardware Breakpoints

Reset / Interrupt Priority Control

External Interrupt

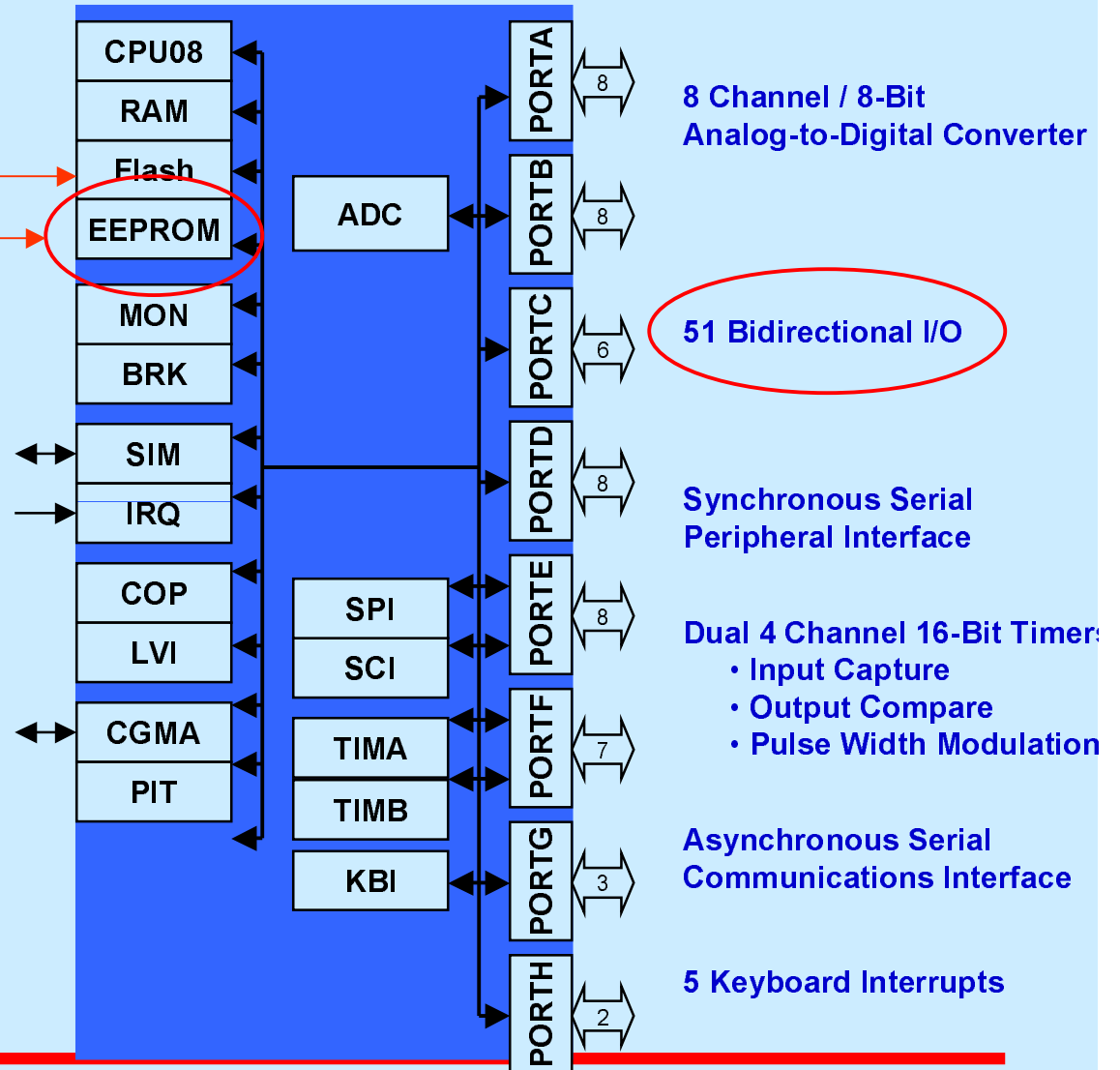
Watchdog

Low-Voltage Inhibit

4MHz Clock Generator Module

Periodic Interrupts

QFP64, MC Qualified  
9x9 mm, 64pin QFN



# 68HC908LJ12

Upward HC05 Object Code Compatible →

512 Bytes RAM →

12K Bytes Flash →

Address-Match Hardware Breakpoints →

Reset / Interrupt Priority Control →

External Interrupt →

Watchdog →

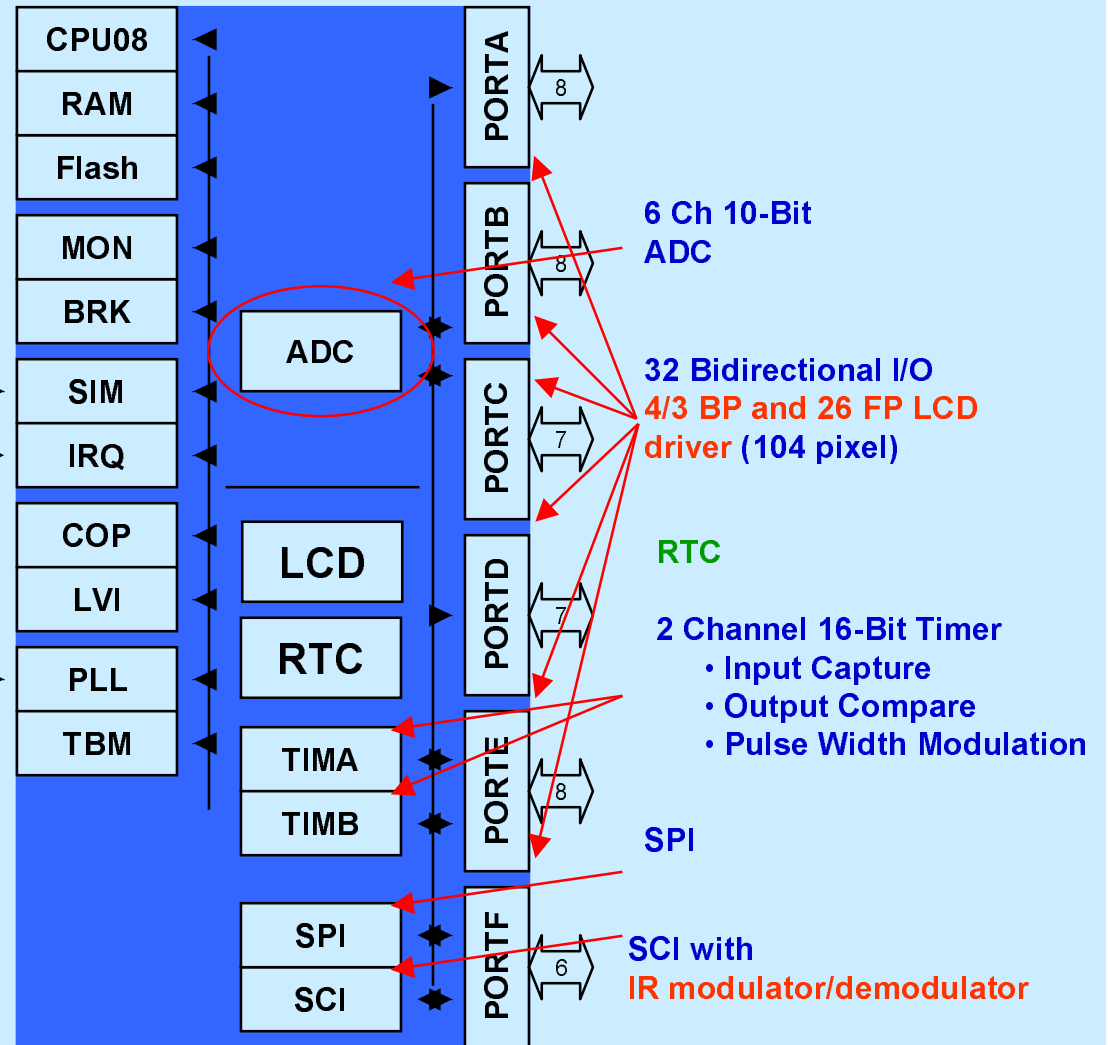
Low-Voltage Inhibit →

32KHz CLK with 32MHz internal PLL →

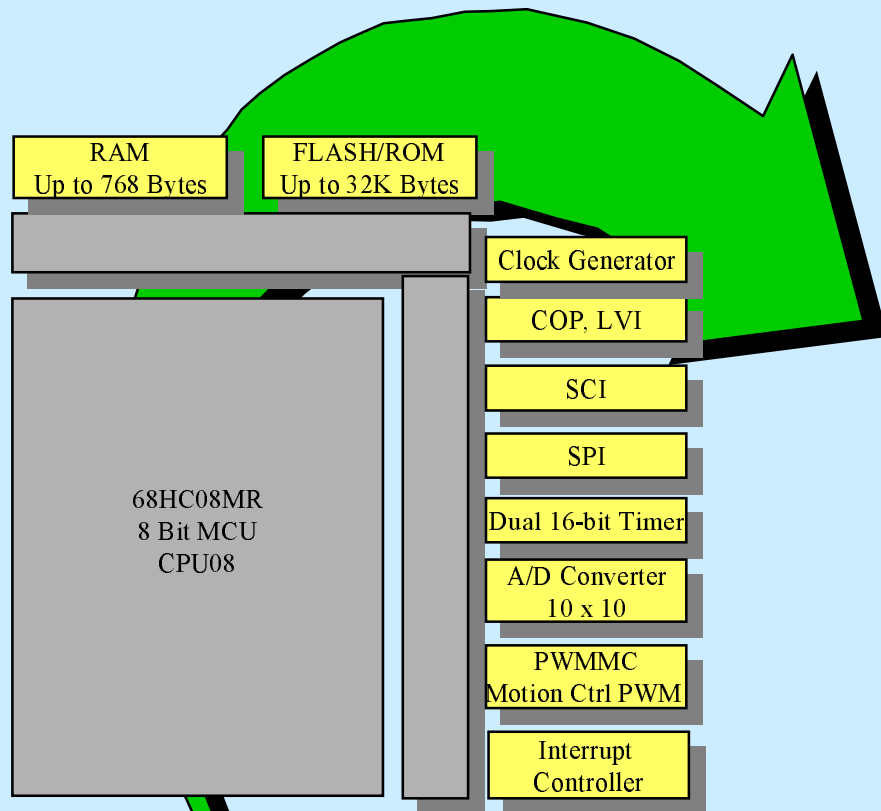
Periodic Interrupts →

2.4-5V Operation Voltage  
TQFP64, 52QFP

Spec : Available NOW!  
Sample/Tools : NOW!  
MC qual : NOW!



# 3 Ph Motion Control 8-bit MCU Portfolio



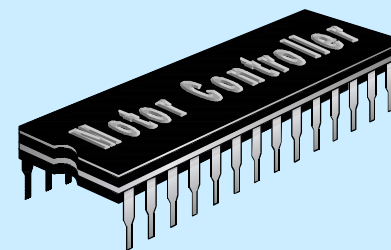
**68HC08 8-bit  
eMotion Portfolio  
Optimized for Motor Control**

	908MR32	908MR16	908MR8
Target Market	Variable Speed 3-Phase Motion Control		
Operating Frequency	8MHz	8MHz	8MHz
Core	CPU08	CPU08	CPU08
Technology	0.50μ	0.50μ	0.50μ
Temp Range	-40 to 105	-40 to 105	-40 to 105
I/O Voltage	5.0V	5.0V	5.0V
Bus Width (bits)	8	8	8
Flash Memory (bytes)	32K	16K	8K
Read Only Memory	N/A	N/A	N/A
PLL	☐	☐	☐
SCI	☐	☐	☐
SPI	☐	☐	☐
COP WatchDog Timer	☐	☐	☐
16-bit Timers	6 Channel	6 Channel	4 Channel
GPIO	44	44	16
Low Voltage Inhibit	☐	☐	☐
Ext Interrupt Controller	☐	☐	☐
PWM	6 Channel	6 Channel	6 Channel
Single Wire interface	☐	☐	☐
ADC	10 x 10-bit	10 x 10-bit	7 x 10-bit
Sample Production	Now	Now	NOW
Development Tool	Now	Now	NOW
Package	64 QFP 56 SDIP	64 QFP 56 SDIP	32 QFP 28 DIP/SOIC

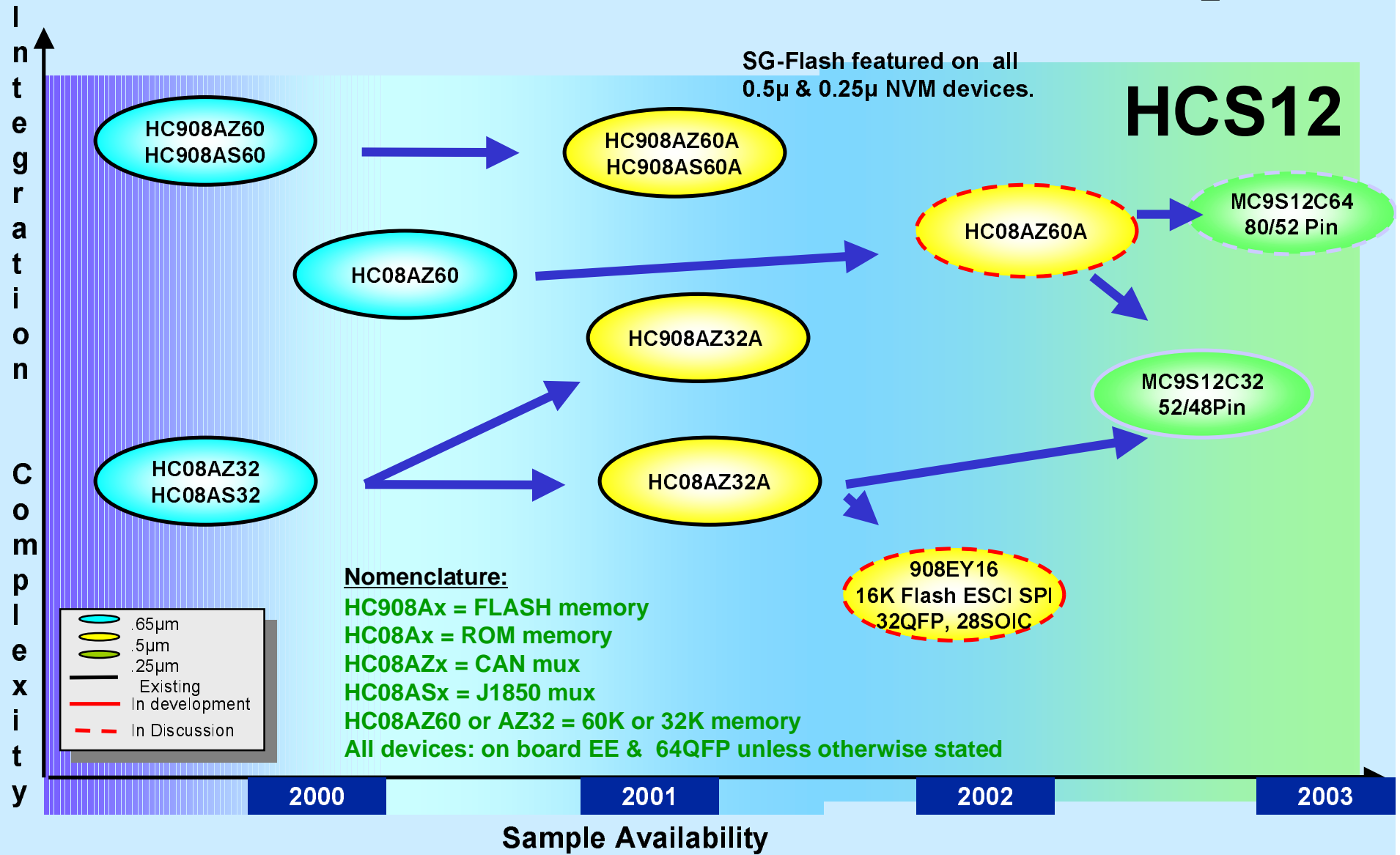
# Motorola Solutions

## Pre-programmed AC Motor Control

- Complete turnkey solution using 908MR8
- Features:
  - Three Phase Waveform Generation
  - Real-time user specified motor speed in 1 Hz
  - IIR digital filter is used to process ADC input for speed stability
  - Real-time user specified acceleration
  - Bus voltage integrity monitor
  - Resistive brake control
  - Dynamic bus ripple cancellation
- Available Q2 2002



# Low End CAN/J1850 Roadmap



# MC68HC908AZ32A / 60A

Upward HC05 Object Code Compatible

2,048 Bytes RAM

32K / 60KBytes Flash

1,024 Bytes EEPROM

Single-Wire Development Interface

Address-Match Hardware Breakpoints

Reset / Interrupt Priority Control

External Interrupt

Watchdog

Low-Voltage Inhibit

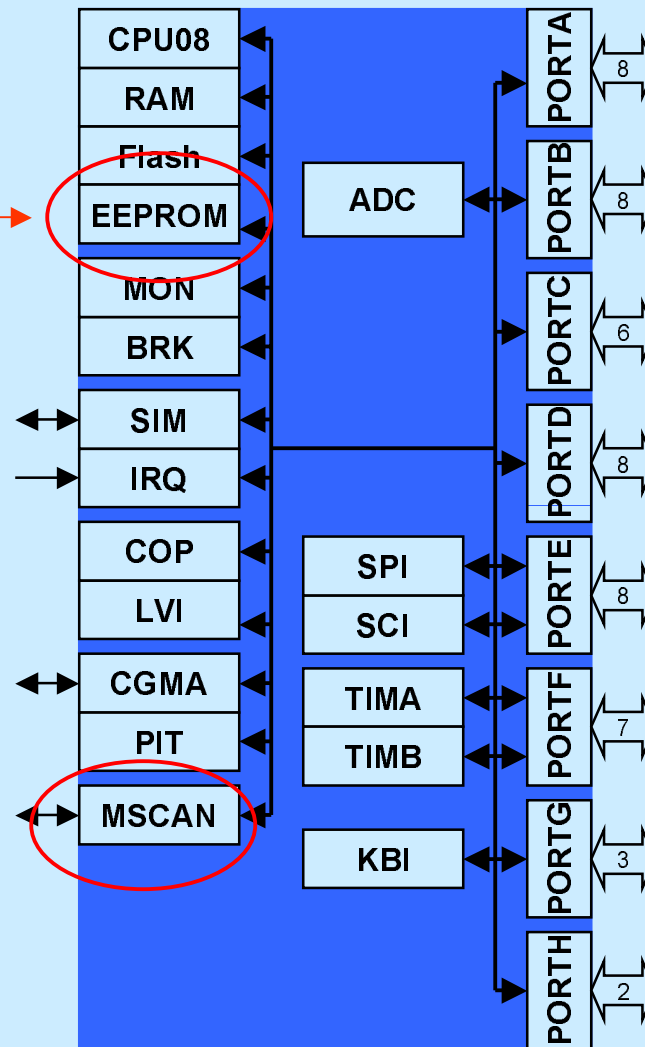
4MHz Clock Generator Module

Periodic Interrupts

CAN 2.0B

MC Qualified

QFP 64



15 Channel / 8-Bit  
Analog-to-Digital Converter

50 Bi-directional I/O

Synchronous Serial  
Peripheral Interface

6 & 2 Channel 16-Bit Timers  

- Input Capture
- Output Compare
- Pulse Width Modulation

Asynchronous Serial  
Communications Interface

5 Keyboard Interrupts

# 68HC908EY8/16

Upward HC05 Object Code Compatible

256 Bytes RAM

8K / 16K Bytes FLASH

Single-Wire Development Interface

Address-Match Hardware Breakpoints

Reset / Interrupt Priority Control

External Interrupt

Watchdog

Low-Voltage Inhibit

Clock Oscillator

Internal RC Oscillator

3V, 5V operating voltages

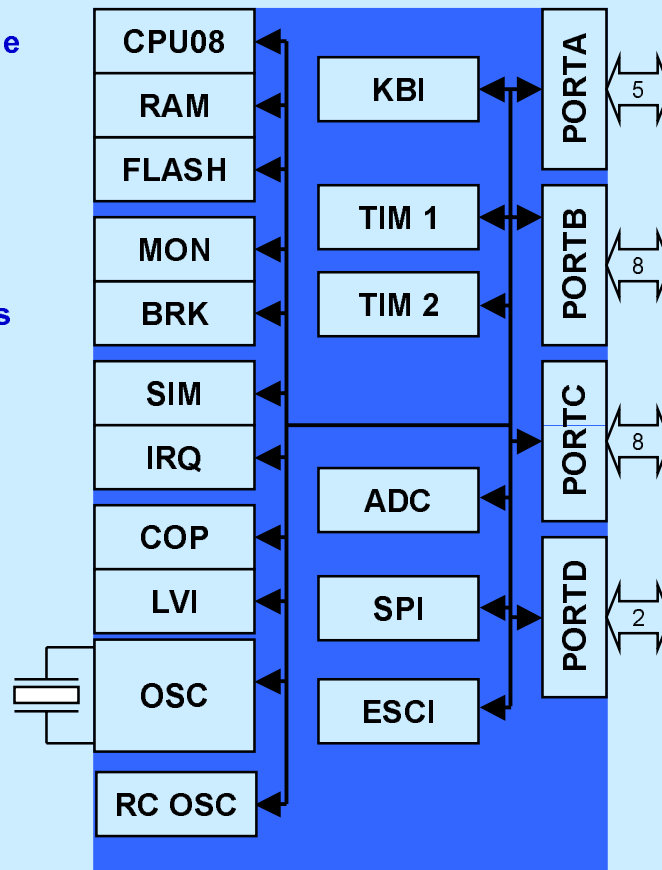
8MHz bus

32-QFP

0.5µm technology

Ideal for intelligent sub-bus nodes (LIN)

Q1 2002 Sample



Up to 23 Bi-directional I/O  
• 5 mA on all port pins

5 Keyboard Interrupts

Two 2-Channel 16-Bit Timer  
• Input Capture  
• Output Compare  
• Pulse Width Modulation

8-Channel 8-Bit ADC

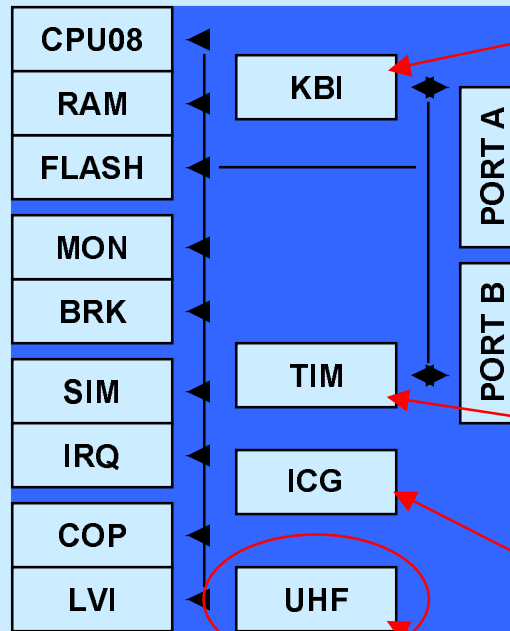
Serial Peripheral Interface

Enhanced Serial  
Communications Interface

# 68HC908RK2 / RF2

Particularly suited for Remote Keyless Entry (RKE) Applications.

- Upward HC05 Object Code Compatible →
- 128 Bytes RAM →
- 2K Bytes Flash →
- Single-Wire Development Interface →
- Address-Match Hardware Breakpoints →
- Reset / Interrupt Priority Control →
- External Interrupt →
- Watchdog →
- Low-Voltage Inhibit →



6 Keyboard Interrupts

12 Bi-directional I/O

2-Channel 16-Bit Timer  
 • Input Capture  
 • Output Compare  
 • Pulse Width Modulation

Internal Clock Generator

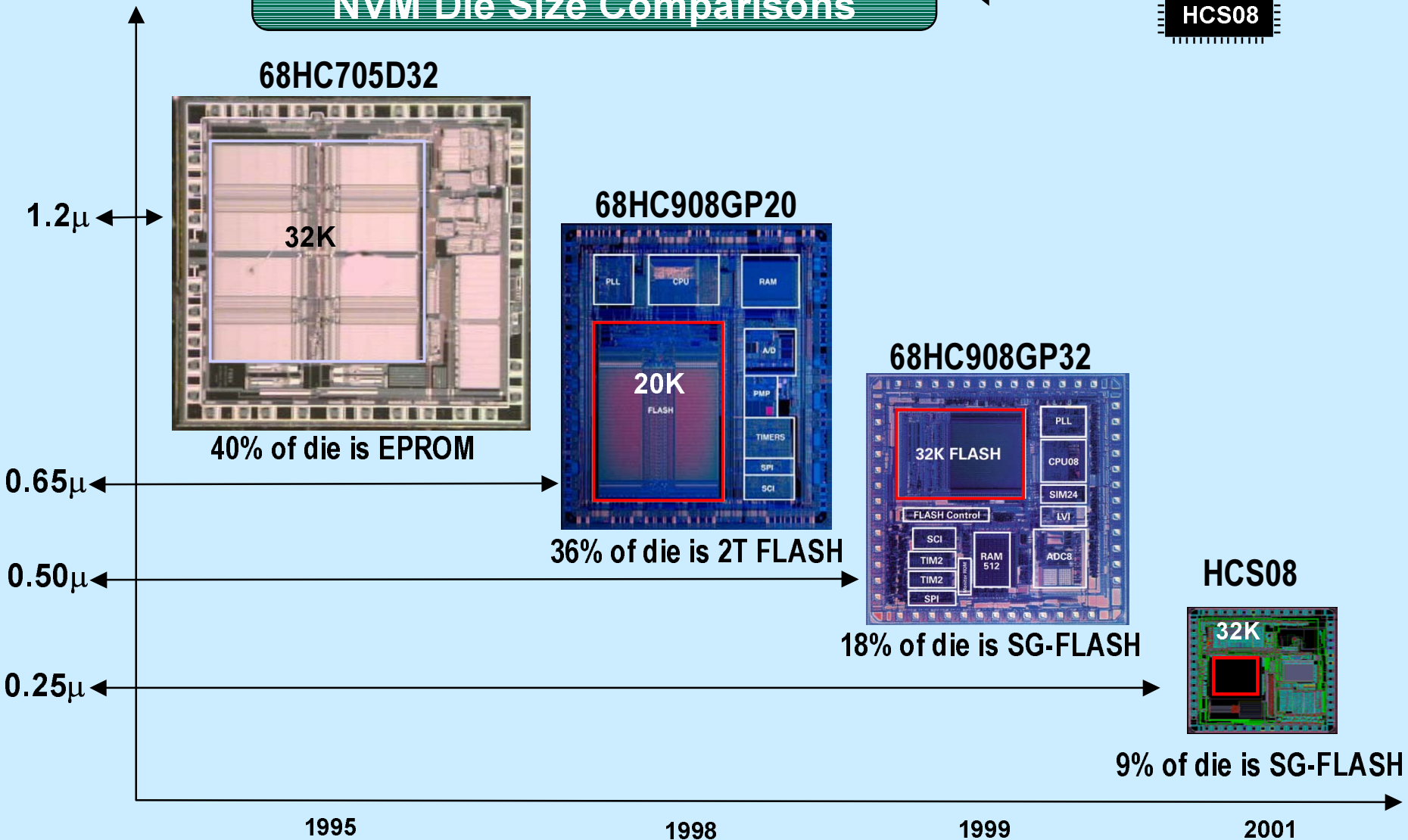
**RF2 ONLY:**  
 Ultra High Frequency Transmitter, 300, 400, 900Mhz

**Low power operation :**  
 - 3.3V at 4MHz bus freq  
 - 1.8V at 2MHz bus freq

Spec : Available NOW!  
 Sample/Tools : Now  
 MC qual : Now  
 32 LQFP

# HCS08

# FLASH Leadership: NVM Die Size Comparisons



# Revolutionary Development Tools

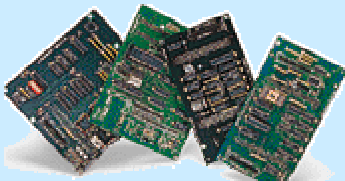


Old

Host System



Emulator



Platform Board



Flex Cable and Target Head Adapter

Host System

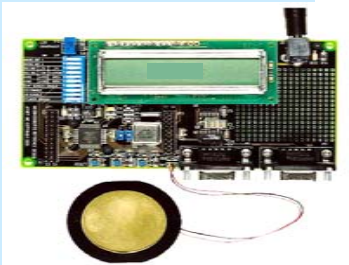


New & Improved

BDM Pod



Target System



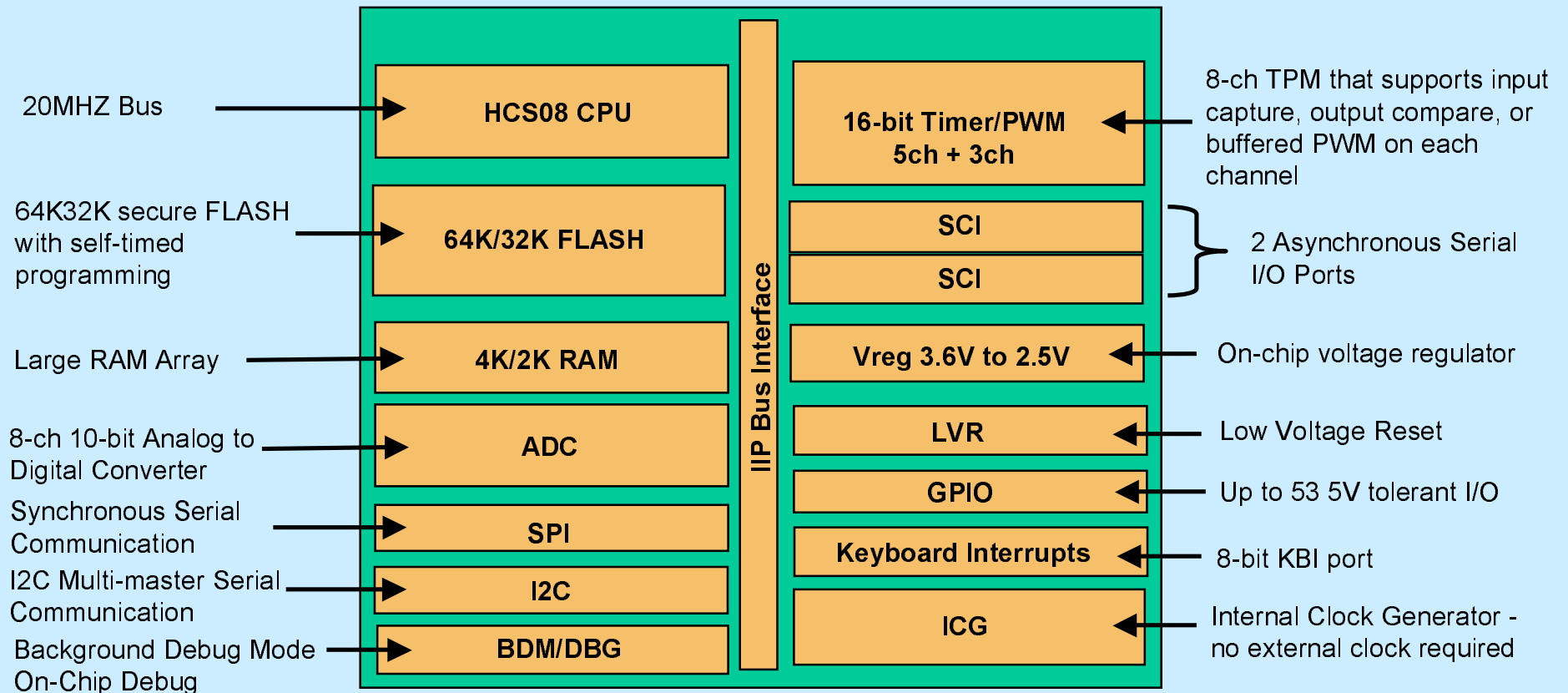
Making it simpler, less expensive, and easier to use!

## Migration for performance and power



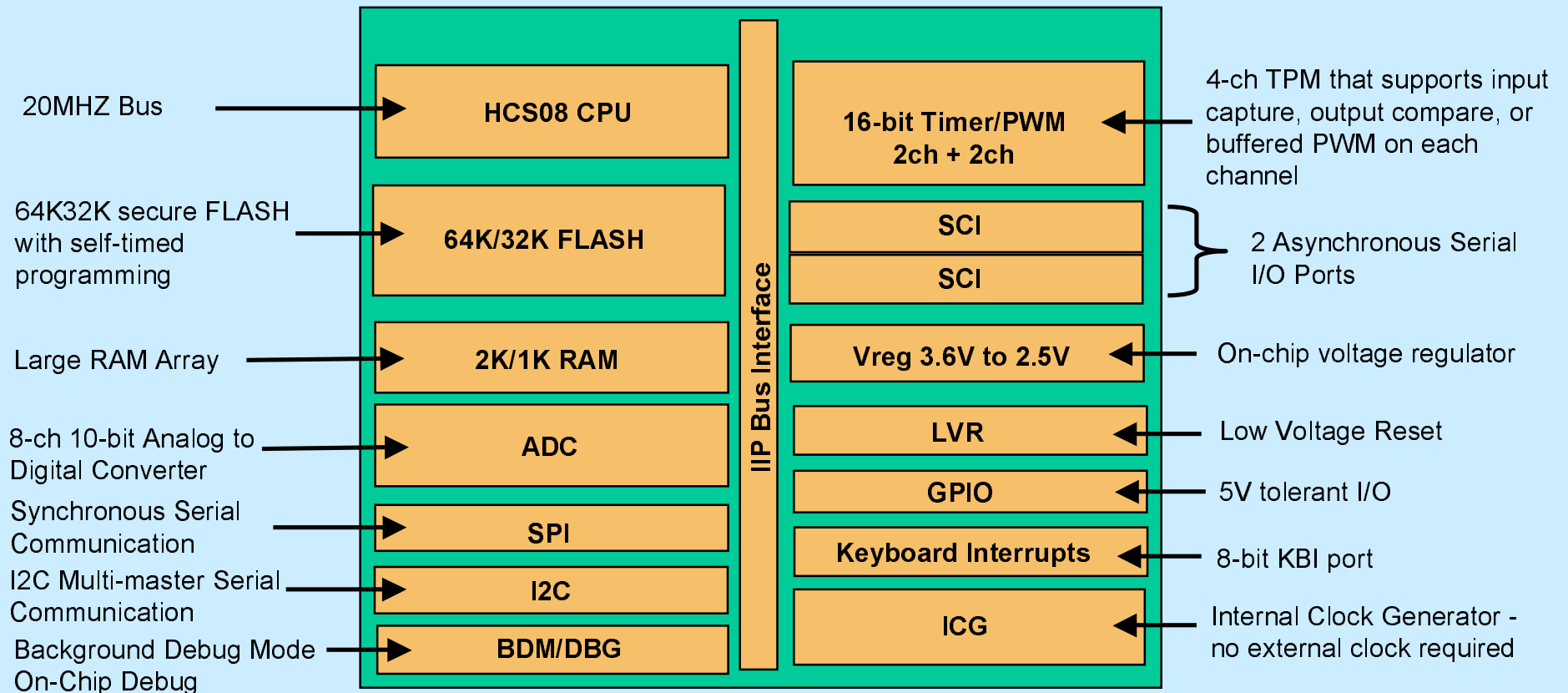
- 20MHz bus offers a performance migration path for the HC08s and HC05s
  - Support 32KHz to 40MHz crystals
- Extends battery life with lower power consumption
  - Targeted for 0.5mA/MHz Run IDD (HC908GP32 1.8mA, 1mA/MHz at 5, 3.6V)
- Designed for better EMC performance
  - Controlled rise and fall times on ports
  - Lower voltage operation
  - Built-in oscillator and protection of clock source
- Instruction set compatible with HC08s with expanded instructions and addressing modes to improve code efficiency
  - Estimated 10-15%

# 9S08GB60/GB32



64 lead 10x10mm QFP  
56 lead SDIP

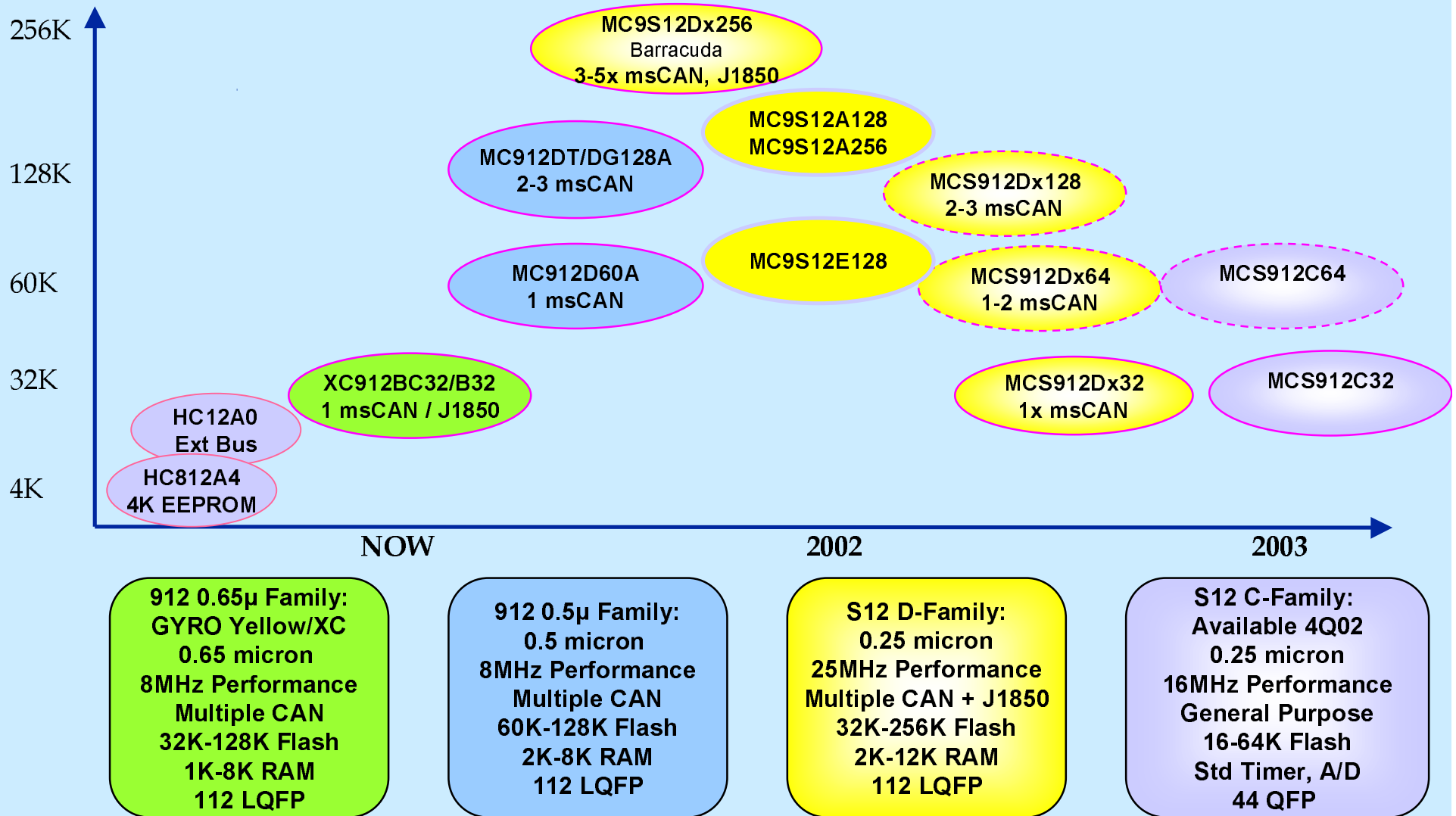
# 9S08GT60/GT32



44 lead 10x10mm QFP  
42 lead SDIP

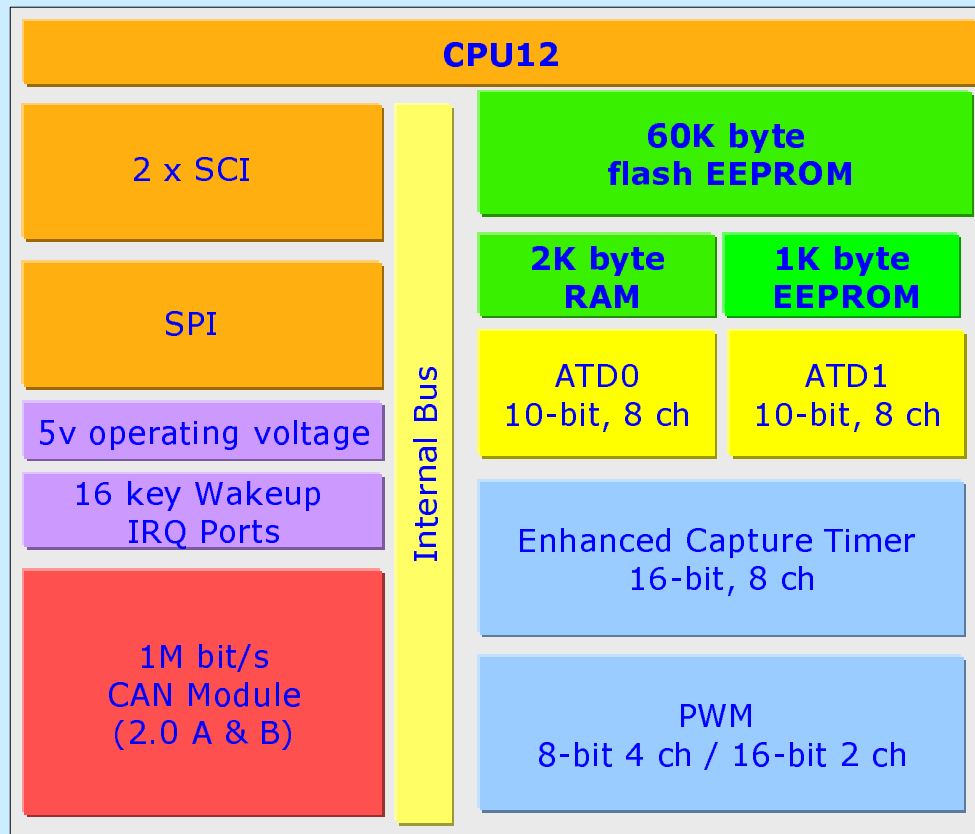
Pin-compatible with 68HC908GP32/GT16/GT8

# HC12 / HCS12 Roadmap



# 68HC912D60A

## Features



- CPU12
- 8MHz operation at 5V
- 60K byte flash EEPROM
- 1K byte EEPROM
- 2K byte RAM
- 1M bit/s CAN module (2.0 A & B)
- Enhanced Capture Timer: 8 ch, 16-bit
- PWM Module: 4ch, 8-bit or 2 ch, 16-bit
- 2 x ADC: 8-ch, 10-bit
- 2 x SCI (with MI bus implementation)
- SPI
- Up to 68 I/Os and 18 I/Ps

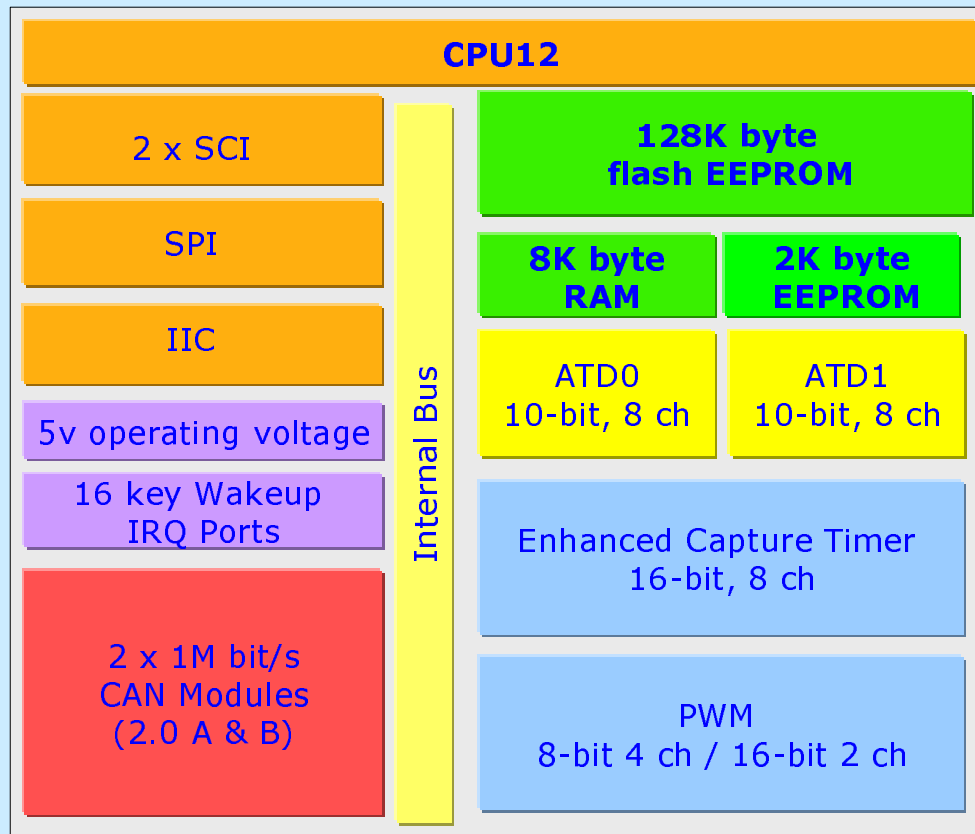
- Available in: 112-TQFP and 80-QFP

## Applications

Any application requiring large I/O, memory (Flash RAM and EEPROM) and sophisticated communication

# HC912DG128A

## Features



- CPU12
- 8MHz operation at 5V
- 128K byte flash EEPROM
- 2K byte EEPROM
- 8K byte RAM
- 2 x 1M bit/s CAN module (2.0 A & B)
- Enhanced Capture Timer: 8 ch, 16-bit
- PWM Module: 4ch, 8-bit or 2 ch, 16-bit
- 2 x ADC: 8-ch, 10-bit
- 2 x SCI (with MI bus implementation)
- SPI
- Up to 69 I/Os and 18 I/Ps

## Applications

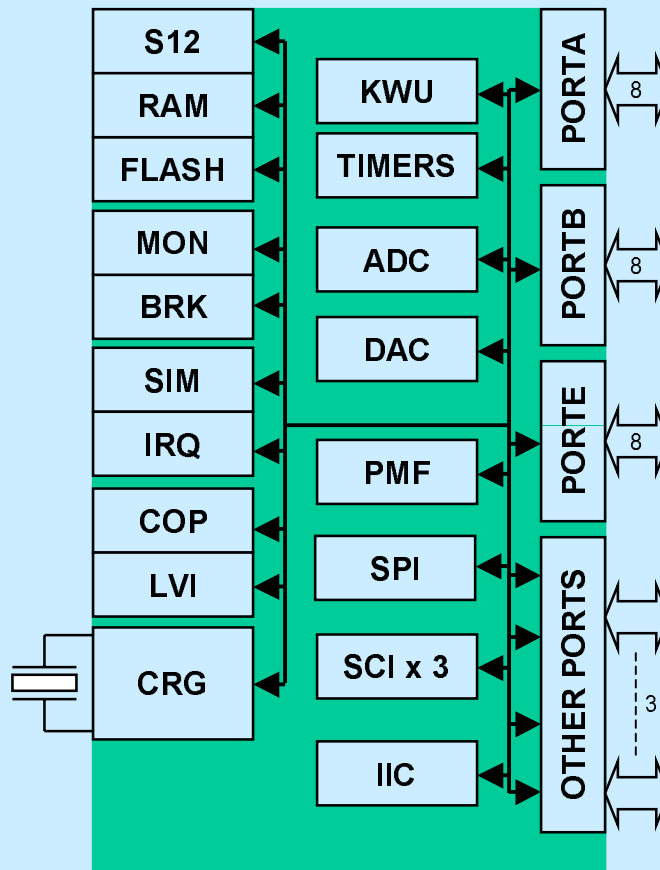
Any application requiring large I/O, memory (Flash RAM and EEPROM) and sophisticated communication

- Available in: 112-TQFP

# 9S12E128

S12 16-Bit CPU Core  
8K Bytes RAM  
128K Bytes FLASH EEPROM  
Single-Wire Background Debug  
Address-Match Hardware Breakpoints  
Reset / Interrupt Priority Control  
External Interrupt  
Watchdog  
Low-Voltage Inhibit  
Clock Generation and Reset Module

3.3V to 5V operating voltage  
25MHz bus  
80-QFP



60 Bi-directional I/O

20 Keypad Wakeup Inputs

3 x 4-Channel Timers  
• 8-bit programmable with IC and OC channels  
• 16-bit pulse accumulators

16-Channel 10-Bit ADC

2-Channel 10-Bit DAC

6-Channel Pulse Modulator  
with Fault Protection

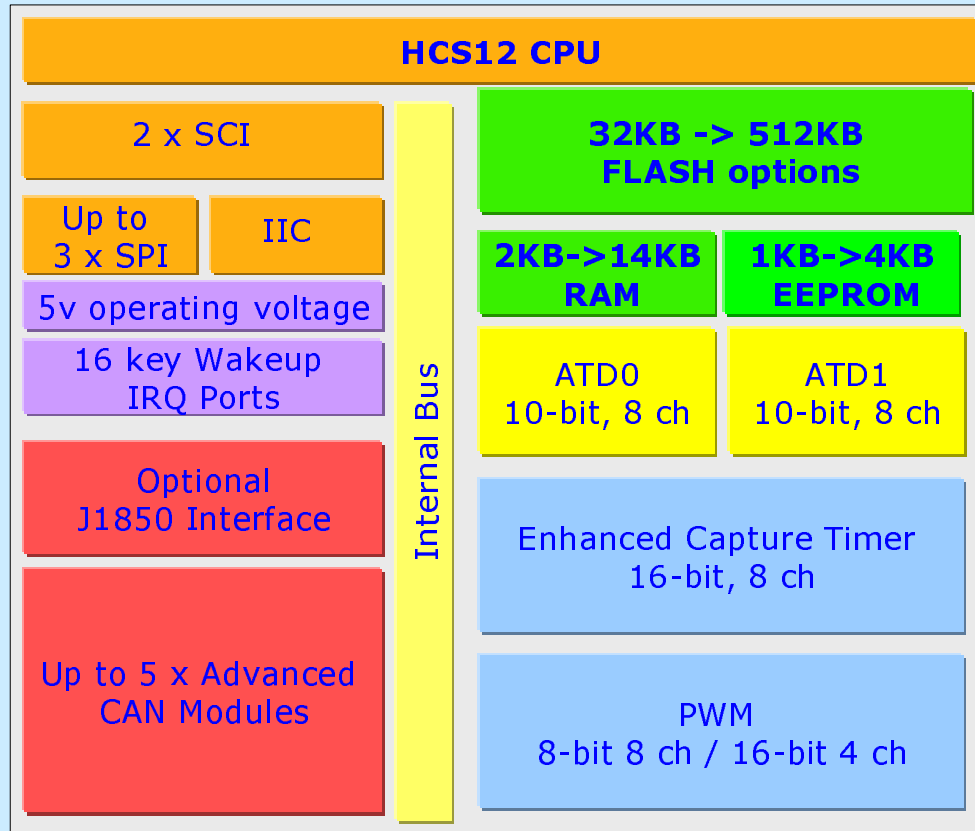
Serial Peripheral Interface

3 x Serial Communications  
Interface

Inter-IC Bus

# HCS12Dxxx Family

## Advantages



- up to 5 x advanced CAN modules
  - Optional J1850
  - Enhanced Capture Timer 8 ch, 16-bit
  - Pulse Width Module up to 8ch, 8-bit or 4 ch 16-bit
  - ADC up to 2 x 10-bit
  - 2 x SCI, up to 3x SPI, IIC
  - up to 4KB chip EEPROM,
  - 32KB to 512KB FLASH memory
  - up to 14KB of RAM
- Compatible code across D family
  - All memory options pin compatible
  - D family is also fully pin compatible with A family.

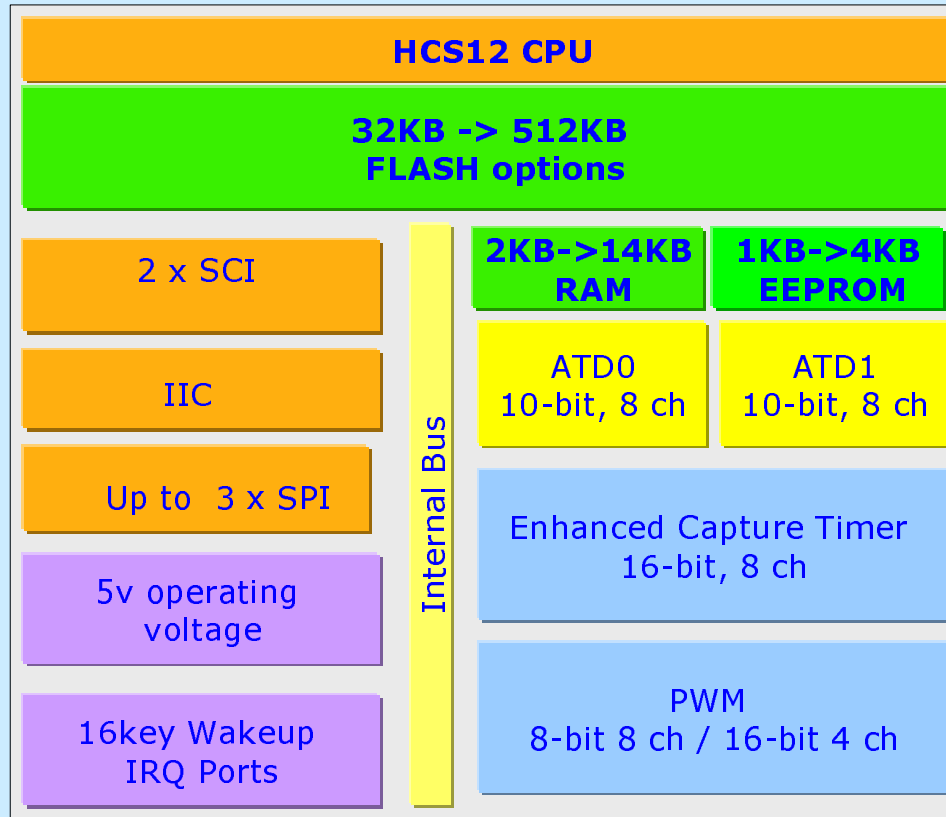
## Applications

Automotive / Industrial and any application requiring large I/O, memory (Flash RAM and EEPROM) and sophisticated communication

# HCS12Axxx Family

## Advantages

### General Purpose Family



- Enhanced Capture Timer 8 ch, 16-bit
- Pulse Width Module up to 8 ch, 8bit.
- ADC up to 2 x 10-bit
- 2 x SCI, up to 3x SPI, IIC
- up to 4KB chip EEPROM,
- 32KB to 512KB FLASH memory
- up to 14KB of RAM

- Compatible code across D family
- All memory options pin compatible
- A Family is also pin compatible with D family

## Applications

Any application requiring high performance, I/O, memory at low cost

# HCS12D and HCS12A Family

Device	Flash	RAM	EEPROM	Pkg.	CAN	J1850	SCI	SPI	IIC	A/D 10-bit	PWM channel	I/O	Speed MHz	ECT channel	Temp
DP512	512K	14K	4K	112 LQFP	5	1	2	3	1	2/16	8	91	25/33	8	c,v,m
DP256	256K	12K	4K	112 LQFP	5	1	2	3	1	2/16	8	91	25	8	c,v,m
DT256	256K	12K	4K	112 LQFP	3	0	2	3	1	2/16	8	91	25	8	c,v,m
DG256	256K	12K	4K	112 LQFP	2	0	2	3	1	2/16	8	91	25	8	c,v,m
DJ256	256K	12K	4K	112 LQFP	2	1	2	3	1	2/16	8	91	25	8	c,v,m
DJ256	256K	12K	4K	80 QFP	2	1	2	3	1	1/8	7	59	25	8	c,v,m
DG256	256K	12K	4K	80 QFP	2	0	2	3	1	1/8	7	59	25	8	c,v,m
DT128	128K	8K	2K	112 LQFP	3	0	2	2	1	2/16	8	91	25	8	c,v,m
DG128	128K	8K	2K	112 LQFP	2	0	2	2	1	2/16	8	91	25	8	c,v,m
DJ128	128K	8K	2K	112 LQFP	2	1	2	2	1	2/16	8	91	25	8	c,v,m
DG128	128K	8K	2K	80 QFP	2	0	2	2	1	1/8	7	59	25	8	c,v,m
DJ128	128K	8K	2K	80 QFP	2	1	2	2	1	1/8	7	59	25	8	c,v,m
DJ64	64K	4K	1K	112 LQFP	1	1	2	1	1	2/16	8	91	25	8	c,v,m
D64	64K	4K	1K	112 LQFP	1	0	2	1	1	2/16	8	91	25	8	c,v,m
DJ64	64K	4K	1K	80 QFP	1	1	2	1	1	1/8	7	59	25	8	c,v,m
D64	64K	4K	1K	80 QFP	1	0	2	1	1	1/8	7	59	25	8	c,v,m
D32	32K	2K	1K	80 QFP	1	0	2	1	0	1/8	7	59	25	8	c,v,m
A512	512K	14K	4K	112 LQFP	-	-	2	3	1	2/16	8	91	25/33	8	c
A256	256K	12K	4K	112 LQFP	-	-	2	3	1	2/16	8	91	25	8	c
A256	256K	12K	4K	80 QFP	-	-	2	3	1	1/8	7	59	25	8	c
A128	128K	8K	2K	112 LQFP	-	-	2	2	1	2/16	8	91	25	8	c
A128	128K	8K	2K	80 QFP	-	-	2	2	1	1/8	7	59	25	8	c
A64	64K	4K	1K	112 LQFP	-	-	2	1	1	2/16	8	91	25	8	c
A64	64K	4K	1K	80 QFP	-	-	2	1	1	1/8	7	59	25	8	c
A32	32K	2K	1K	80 QFP	-	-	2	1	0	1/8	7	59	25	8	c



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