

# STM32 F3 Series

Analog & DSP

STM32<sup>®</sup> Releasing your **creativity**



# STM32 today – platform effect

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## High-performance MCUs With DSP and FPU

Cortex-M4F

168 MHz/210 DMIPS



## Mixed Signals MCUs With DSP and FPU

Cortex-M4F

72 MHz/90 DMIPS



## High-performance MCUs

Cortex-M3

120 MHz/150 DMIPS



## Mainstream MCUs

Cortex-M3

72 MHz/61 DMIPS



## Entry-level MCUs

Cortex-M0

48 MHz/38 DMIPS



## Ultra-low-power MCUs

Cortex-M3

32 MHz/33 DMIPS



## Wireless MCUs

Cortex-M3

24 MHz/30 DMIPS



# STM32F Complete offer

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## STM32 F0 Entry



Cortex-M0  
48 MHz  
1.8 to 3.6V  
8/16-bit appli

## STM32 F1 Mainstream



Cortex-M3  
24 to 72 MHz  
2.0 to 3.6V  
Widest portfolio

## STM32 F2 Hi Perf



Cortex-M3  
120 MHz  
1.7 to 3.6V  
High  
performance

## STM32 F3 Analog / DSP



Cortex-M4F  
72 MHz  
1.8V or 2.0 to  
3.6V  
DSP & Analog

## STM32 F4 Hi Perf / DSP



Cortex-M4F  
168 MHz  
1.7 to 3.6V  
High perf & DSP

Platform  
optimized for  
cost  
effectiveness  
16KB – 128KB

Cost Smart

5 lines  
Foundation of  
STM32  
Best mix  
Features/Perf  
16KB -1MB

Broad Range

2 lines  
Advanced  
connectivity  
Encryption  
128KB -1MB  
128kB SRAM

High  
Performance

4 lines  
ADC 5Msps,  
16-bit ADC  $\Sigma\Delta$ ,  
PGA, Compar.,  
Hi-Resol. timer,  
32KB – 256KB

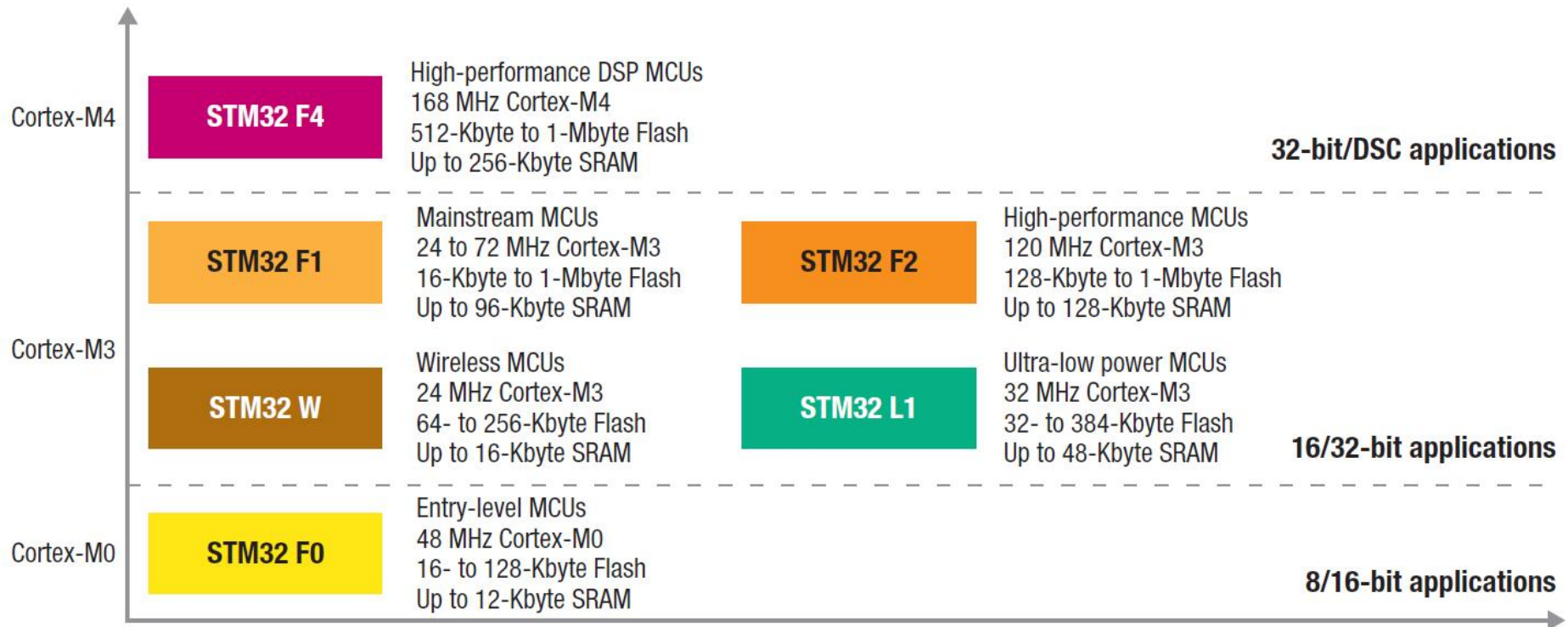
Mixed Signals  
w/DSP

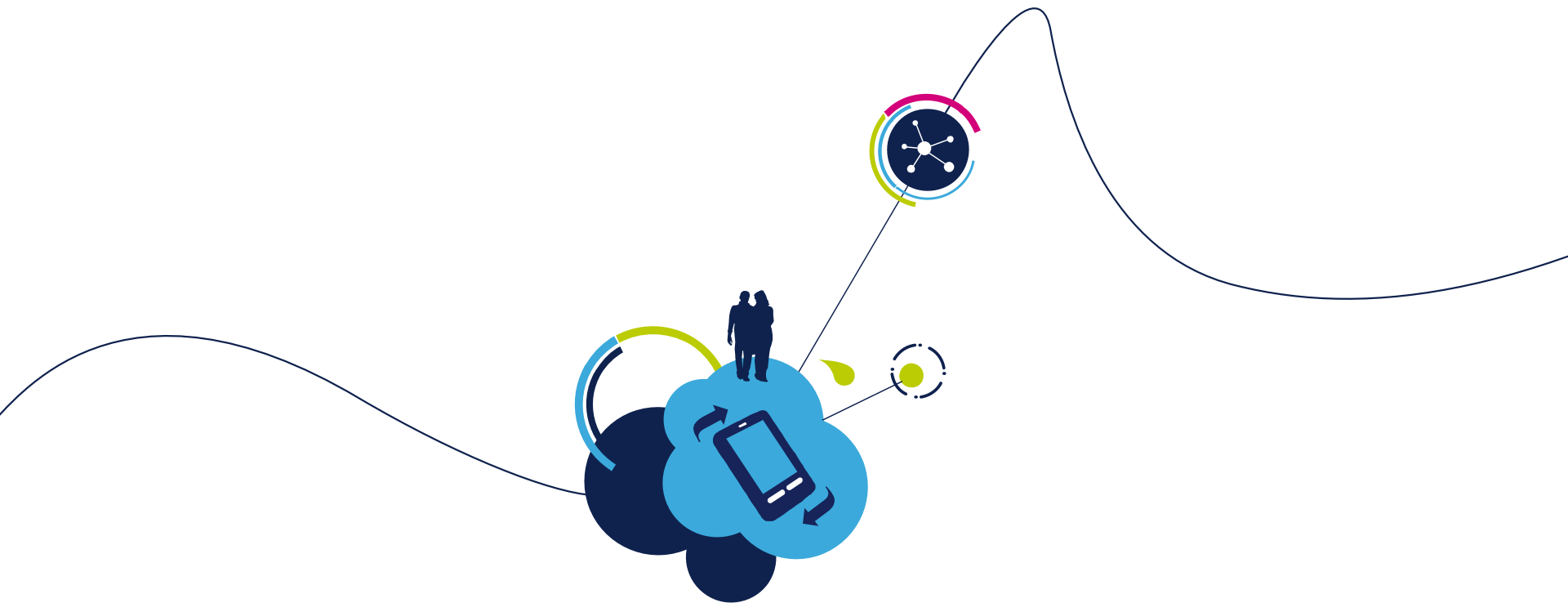
2 lines  
Advanced  
connectivity  
Encryption  
512KB -2MB  
256kB SRAM

High  
Performance  
w/ DSP

# STM32F – Series by core

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# STM32 F3 series

# F3 series key messages

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- STM32 F3 series **innovates** in embedded Digital Signal Control combining **Cortex-M4F** with **fast 12-bit 5Msps** and **precise 16-bit ADCs**, **op-amps**, **comparators** and **versatile time control units**.
- STM32 F3 series provides a **full set system of integration features** on chip resulting in simplified board designs and fewer external components
- STM32 **Cortex-M4F** based portfolio, now expanded **more than 350 devices**, offers both **entry level cost** with the **F3 series** and world highest performance with the F4 series.

# F3 series positioning / STM32

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- STM32 F3 series **enrich the F1 series** with:
  - DSC & FPU capability
    - Cortex-M4F core from ARM
  - Richer analog peripheral set
    - Fast 5Msps ADC, ADC  $\Sigma\Delta$ , Comparator, PGA
  - Renewed digital peripheral
  - **Pin and SW compatible with F1 series**
- STM32 F3 series **enlarge the STM32's Cortex-M4F platform** to address:
  - Medium memory size applications
  - Cost sensitive DSC applications

# STM32 F3 series: Fact sheet

- STM32 F3 series complement the F-1 series with:
  - More performance (Cortex-M4F & more DMips)
  - Richer analog peripherals set
  - Renewed digital peripheral set
  - **Pin and SW compatibility w/ F1 series**
- Performance
  - Core Cortex-M4F + FPU
  - Fmax = 72 MHz
  - Core Coupled Memory (CCM-SRAM) to execute critical loop at full speed (0 WS @ 72 MHz = 90 DMips)
- Safety
  - RAM with parity bit
  - Memory Protection Unit (MPU)
  - HW CRC
- Power supply
  - 2.0 to 3.6 V supply
  - Specific 1.8V -/+8% mode
- Rich analog peripherals
  - Comparators, DAC, PGA\*, 12-bit ADC 5Msps\*, 16-bit ADC  $\Sigma\Delta$ \*, Hi-Resolution timer\* (<1ns)
- Renewed digital peripherals
  - I<sup>2</sup>C, UART, SPI, CRC, RTC, faster I/Os, Capacitive Touch sensing (Charge Transfert)



# STM32 F3 series – Product lines

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All families include:

|                                                           |
|-----------------------------------------------------------|
| Cortex-M4 + FPU<br>Fmax = 72 MHz                          |
| MPU                                                       |
| PLL                                                       |
| Low and high speed internal oscillators                   |
| 2x watchdogs + RTC<br>Real-time clock                     |
| HW CRC                                                    |
| Reset circuitry<br>POR/PDR                                |
| Multiple DMA                                              |
| Communication peripherals<br>USART, SPI, I <sup>2</sup> C |
| Multiple 16-bit timers                                    |
| 1x 32-bit timer                                           |
| Temperature sensor                                        |
| Backup registers                                          |

+

STM32F302 and STM32F303 lines

|                             |                           |                                    |     |                       |                  |                  |                                |        |                          |             |                  |
|-----------------------------|---------------------------|------------------------------------|-----|-----------------------|------------------|------------------|--------------------------------|--------|--------------------------|-------------|------------------|
| Up to<br>256-Kbyte<br>Flash | Up to<br>40-Kbyte<br>SRAM | Up to<br>8-Kbyte<br>'code'<br>SRAM | ETM | Reset<br>+ BOR<br>PVD | 2x DAC<br>12-bit | 7x<br>comparator | 4x 12-bit<br>ADC<br>5 Msps SAR | 4x PGA | 2x16-bit<br>AMC<br>timer | CAN<br>2.0B | USB<br>2.0<br>FS |
|-----------------------------|---------------------------|------------------------------------|-----|-----------------------|------------------|------------------|--------------------------------|--------|--------------------------|-------------|------------------|

Number of instance differs  
between lines

STM32F372 and STM32F373 lines

|                             |                           |     |                                 |                       |                  |                  |                                |     |             |                  |
|-----------------------------|---------------------------|-----|---------------------------------|-----------------------|------------------|------------------|--------------------------------|-----|-------------|------------------|
| Up to<br>256-Kbyte<br>Flash | Up to<br>32-Kbyte<br>SRAM | ETM | 3x 16-bit<br>ADC $\Sigma\Delta$ | Reset<br>+ BOR<br>PVD | 3x DAC<br>12-bit | 2x<br>comparator | 1x 12-bit<br>ADC<br>1 Msps SAR | CEC | CAN<br>2.0B | USB<br>2.0<br>FS |
|-----------------------------|---------------------------|-----|---------------------------------|-----------------------|------------------|------------------|--------------------------------|-----|-------------|------------------|

Number of instance differs  
between lines

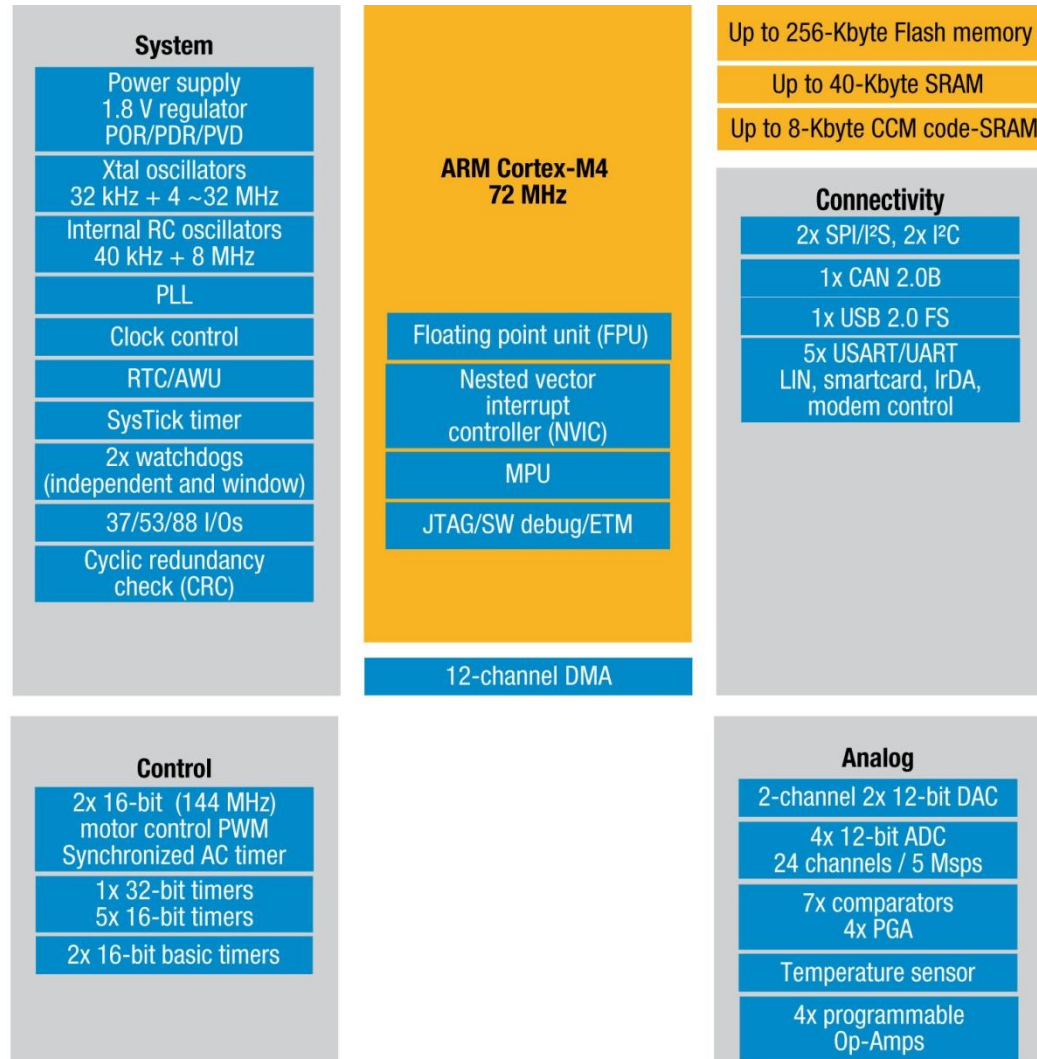
# STM32 with DSC & Analog: STM32F30x

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- Complement STM32 F1 series DSP & FPU capability
- Additional features vs F1 series
  - Renewed digital IPs
  - Fast comparators
  - Dual fast MC timer running @ 144MHz
  - Fast ADC 5Msps
  - PGA (Programmable Gain Amplifier)
  - Touch keys (capacitive Charge Transfer)
- Applications
  - DSP/DSC applications
  - Appliance
    - Advanced & dual motor control, Air conditioning
  - Industrial
    - Sensors
  - Medical
    - Glucose meter
    - ECG
    - Biometric sensors
  - Consumer
    - Printers
    - Weather sensors

# STM32F30x – Block diagram up to 256 KB

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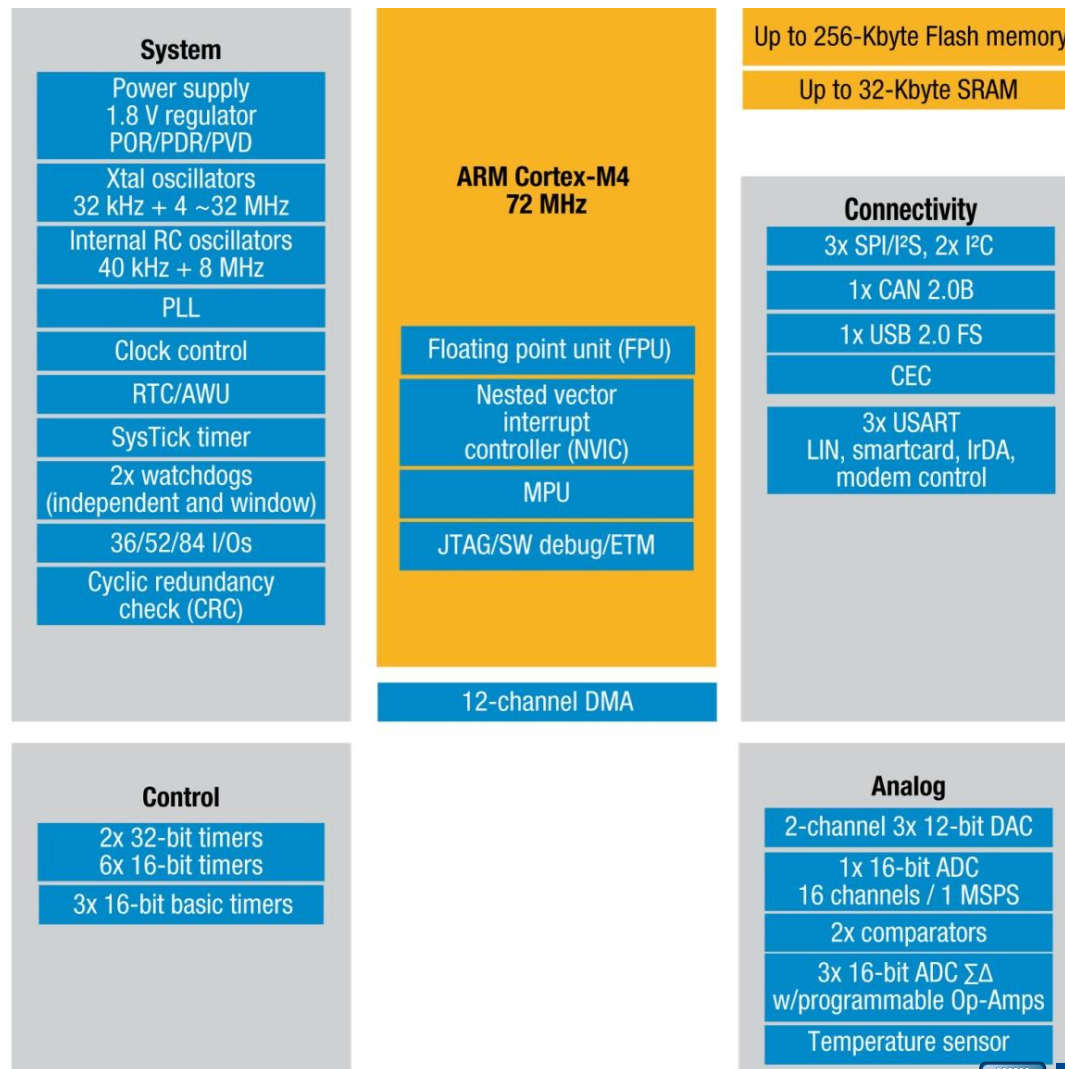
# STM32F37x: STM32 with ADC $\Sigma\Delta$

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- Complement our product line in medical, industrial and consumer segments with high end **ADC  $\Sigma\Delta$  16 bit** on board
- Additional features for new applications or new product ranges in known applications
  - Cortex-M4 on board
  - DSP Capability and Floating point unit
  - CEC
- Applications
  - **Medical and Gaming:**
    - low level signal measurement
    - precise measurement
  - **Metering**
    - **3 x ADC  $\Sigma\Delta$  16 bit**
    - wide measurement range
    - synchronized measurement between ADCs
  - **Consumer**
  - **Industrial**

# STM32F37x – Block diagram up to 256 KB

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# STM32 F3 series – Main differences

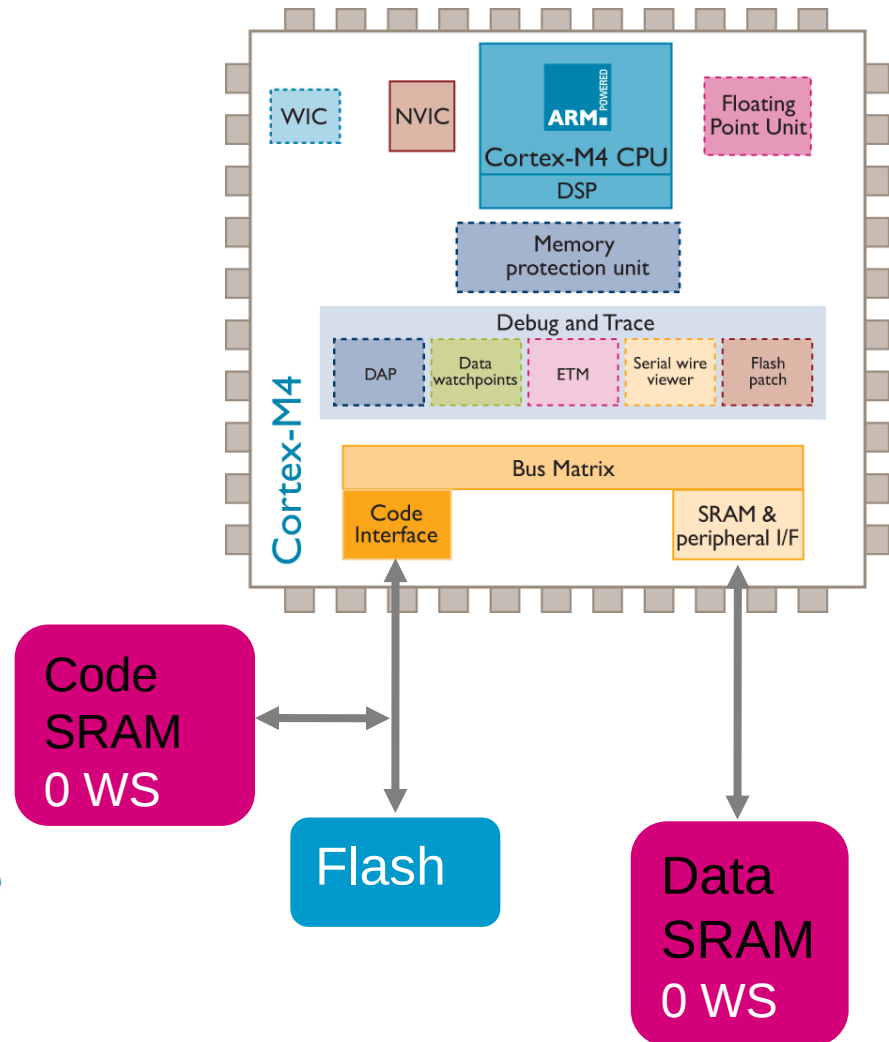
14

| Unit parameters                                        | STM32F303                                            | STM32F302                                            | STM32F373                                            | STM32F372                                            |
|--------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|------------------------------------------------------|
| Core                                                   | Cortex-M4F + FPU                                     | Cortex-M4F + FPU                                     | Cortex-M4F + FPU                                     | Cortex-M4F + FPU                                     |
| Freq max                                               | 72 MHz                                               | 72 MHz                                               | 72 MHz                                               | 72 MHz                                               |
| Flash max                                              | 256 Kbytes                                           | 256 Kbytes                                           | 256 Kbytes                                           | 256 Kbytes                                           |
| Ram (up to)                                            | 40 Kbytes                                            | 32 Kbytes                                            | 32 Kbytes                                            | 32 Kbytes                                            |
| CCM (Code-SRAM)                                        | 8 Kbytes                                             | 8 Kbytes                                             | -                                                    | -                                                    |
| ADC SAR                                                | 4x 12-bit 5 Msps                                     | 2x 12-bit 5 Msps                                     | 1x 12-bit 1 Msps                                     | 1x 12-bit 1 Msps                                     |
| ADC $\Sigma\Delta$                                     | -                                                    | -                                                    | 3x 16-bit                                            | 1x 16-bit                                            |
| Other Analog                                           | 7x Comp<br>4x PGA<br>2x DAC                          | 4x Comp<br>2x PGA<br>1x DAC                          | 2x Comp<br>-<br>3x DAC                               | 1x Comp<br>-<br>1x DAC                               |
| MC timer                                               | 2x (144 MHz)                                         | 1x (144 MHz)                                         | -                                                    | -                                                    |
| Other Digital<br>(except SPI, UASRT, I <sup>2</sup> C) | 1x USB <i>FS device</i><br>1x CAN,<br>CT Touch sense | 1x USB <i>FS device</i><br>1x CAN,<br>CT Touch sense | 1x USB <i>FS device</i><br>1x CAN,<br>CT Touch sense | 1x USB <i>FS device</i><br>1x CAN,<br>CT Touch sense |

# Performance improvement: CCM

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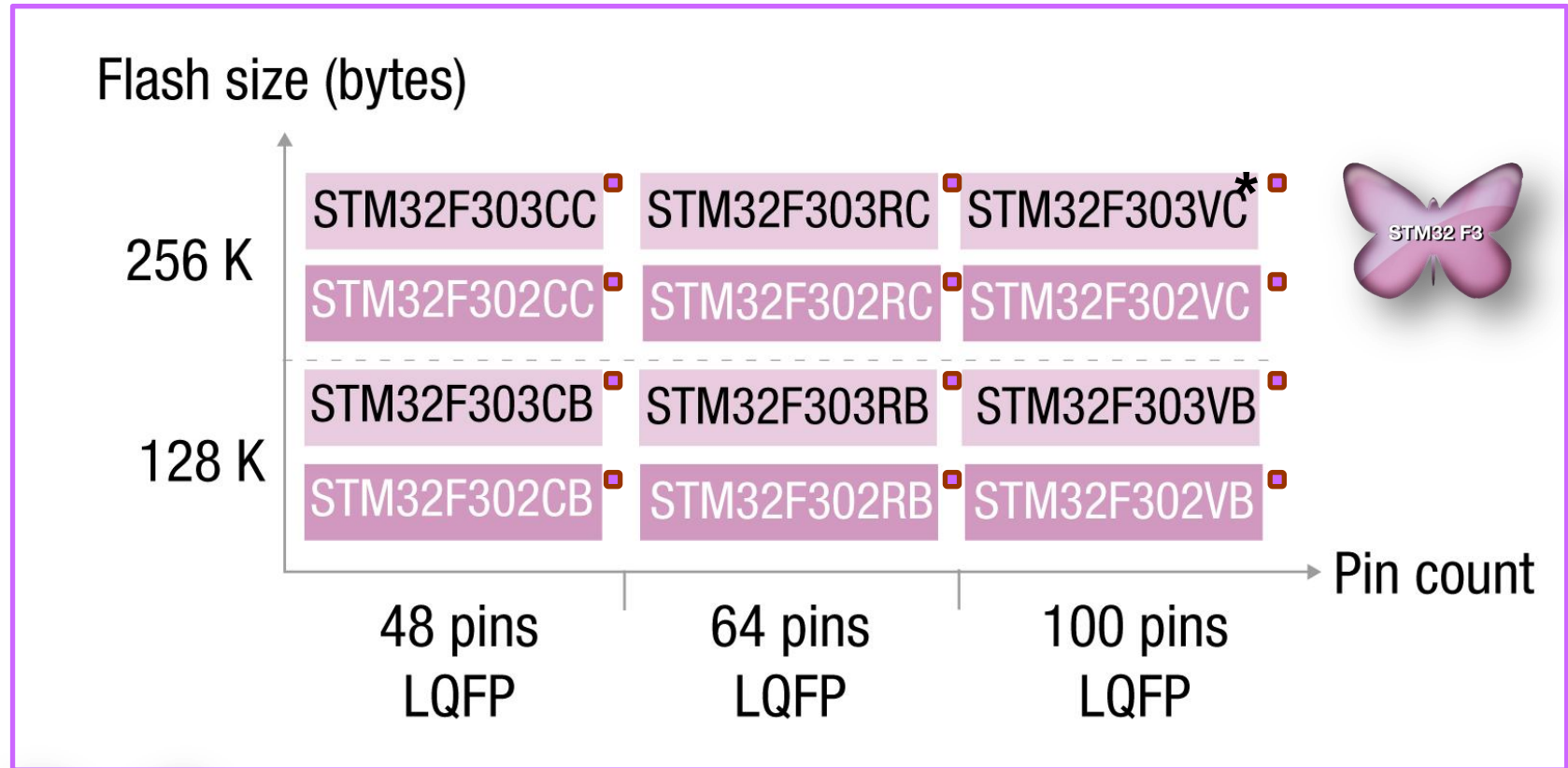
- **Cortex-M4** processors are Harvard
  - Instruction Bus I-bus
  - Data Bus D-bus
- **SRAM on I-bus CCM\***
  - 0 WS
  - Maximum speed execution
  - For critical routines (motor control loop, ...)
  - Size 8-Kbyte
  - Can be used for Data storage as a 'pure' Data SRAM (w/o penalties)



# STM32F30x – Portfolio

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Sample mid September 2012



## Notes:

\* STM32F303VC will be the first device available for sample

1.8 V power supply option

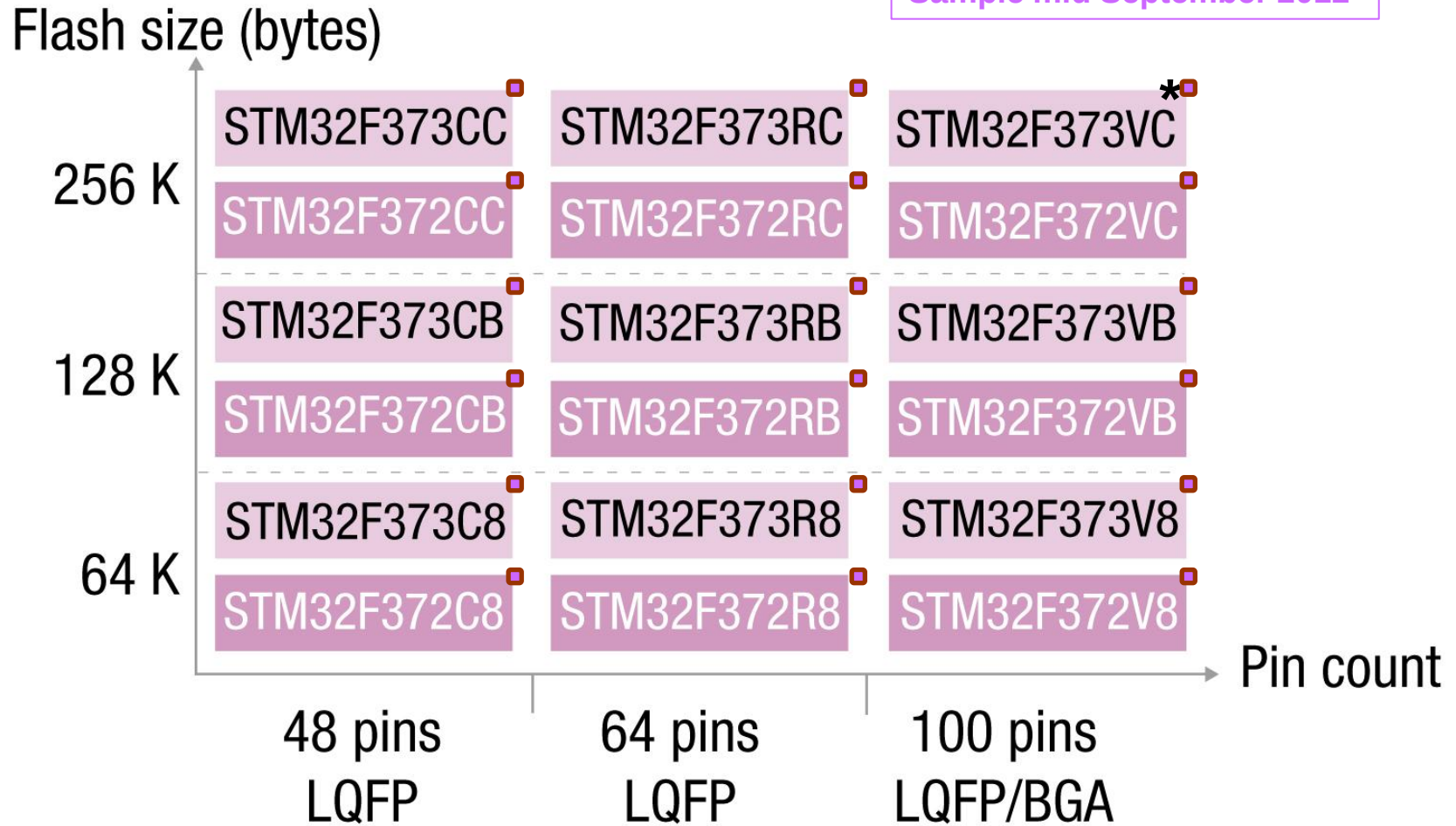


**PROMETRONICS**  
TO ANTICIPATE FUTURE

# STM32F372/73 – Portfolio

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Sample mid September 2012



**Note:**

\* STM32F373VC will be the first device available for sample

■ 1.8 V power supply option

# Large tools offer STM32F3- series



- **Evaluation board** for full product feature evaluation

Available Mid September 2012 (For any support before please contact the local ST office )

Sales types : STM32303C-EVAL  
STM32373C-EVAL



- **STM32F3 discovery kit** : low-cost evaluation kit is the cheapest and quickest way to discover the STM32F3 series

- For fast evaluation or prototyping at less than \$ 13

Available in September 2012



- Large choice of development IDE solutions

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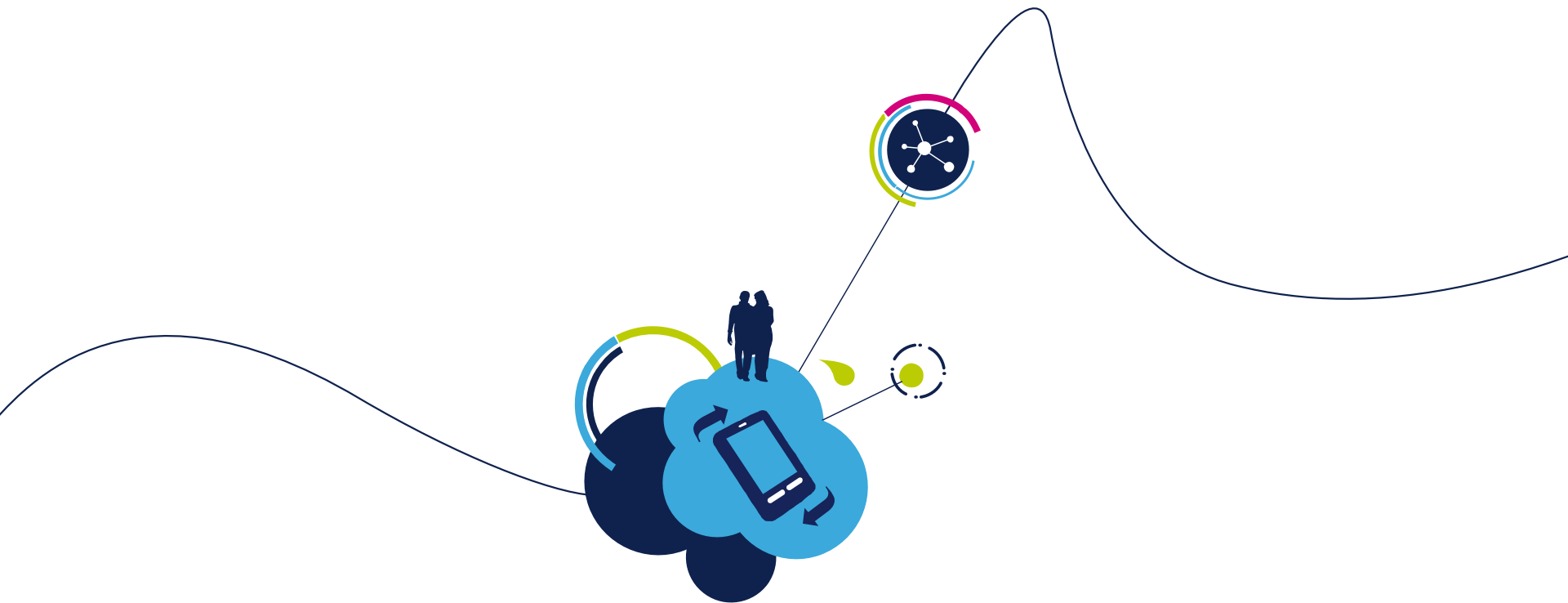
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SYSTEMS

**TASKING**  
Embedded software development tool

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SYSTEMS





# Thank you

[www.st.com/stm32](http://www.st.com/stm32)