

Cost-effective, high-performance secure solutions

# MC56F81xxx DSC Family

The new MC56F81xxx digital signal controller (DSC) family features up to 100 MIPS performance and many peripheral enhancements. These products provide extremely cost-effective solutions for digital power conversion and motor control applications.

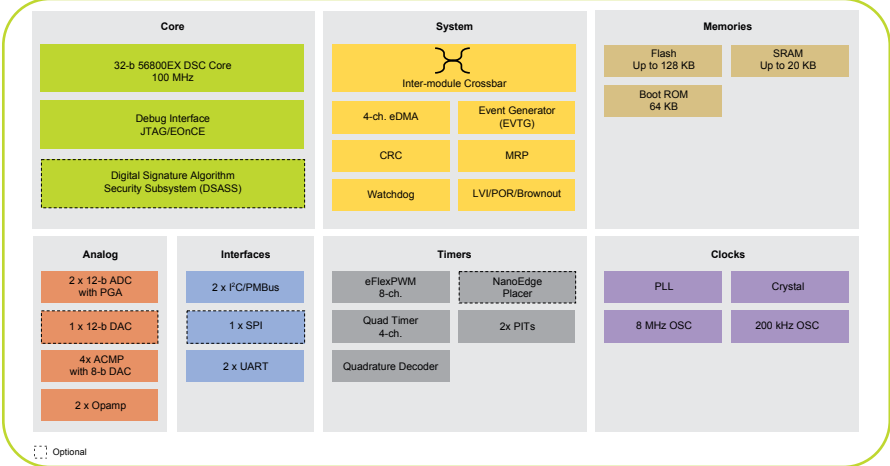
**OVERVIEW**

This high-efficiency DSC family is based on the high-performance 56800EX DSP core with frequencies of up to 100 MHz. The MC56F81xxx family also extends the DSC products' cost efficiency; it's NXP's first DSC product family to support ECC-based digital signature algorithm and high-speed operational amplifier. Compared with the MC56F82xxx family, the MC56F81xxx family extends the memory size to 128 KB flash and 20 KB RAM and adds 64 KB boot ROM. In addition, the MC56F81xxx family made many enhancements to the MC56F82xxx family, including an enhanced DMA function (eDMA), a more flexible event generator (EVTG), faster 12-bit ADC and full PMBus support.

**TARGET APPLICATIONS**

- ▶ Switched mode power supply
- ▶ Uninterruptable power supply
- ▶ Power distribution systems
- ▶ Photovoltaic systems
- ▶ Wireless charging
- ▶ Advanced lighting
- ▶ Advanced motor control
- ▶ Appliances motor
- ▶ Industrial motor

**MC56F81xxx DIGITAL SIGNAL CONTROLLERS BLOCK DIAGRAM**



## FEATURE AND BENEFITS

- ▶ 100 MHz 32-bit 56800EX DSP core provides math capabilities needed for advanced power conversion and motor control applications. Single-cycle math computations, fractional arithmetic support and parallel moves improve performance, driving tighter and faster control loops.
- ▶ Up to 8 channels of high-resolution PWM with 312 picosecond resolution enables higher switching frequencies, helping to reduce cost and increase efficiency.
- ▶ Two 12-bit high-speed low-power ADCs each with up to 1.6 MSPS sampling rate improve system accuracy. Advanced cyclic ADC technology provides high-input impedance and guaranteed monotonicity. Each ADC has inner PGA with configurable 2 x/4 x gain.
- ▶ Two high-speed, low-power operational amplifiers, each with up to 8 MHz gain bandwidth product (GBP) support multiple working modes, including open loop, PGA and voltage follower. The PGA mode supports up to 16x gain.
- ▶ Four analog comparators with integrated 8-bit DACs speed system event identification and emergency shutdown of the PWM outputs.
- ▶ 64 KB to 128 KB flash memory provides scalability needed for common digital power conversion and motor control applications.
- ▶ 20 KB SRAM enables more code to be executed from SRAM for faster speed.
- ▶ 64 KB boot ROM supports code update through I<sup>2</sup>C and UART and provides user-friendly APIs.

- ▶ These DSCs are pin-to-pin compatible with the MC56F84xxx, MC56F83xxx and MC56F82xxx families for performance and peripheral scalability.
- ▶ A digital signature algorithm security subsystem (DSASS) integrates the ECC-based digital signature authentication function with hardware hash logic and a true random number generator (TRNG), providing enhanced security capability and helping to save BOM cost.
- ▶ Inter-module crossbar and EVTG build an interconnection network between external pins and module I/Os with hardware logic/trigger operation capability to achieve extremely flexible system configuration.
- ▶ An enhanced direct memory access (eDMA) controller provides more flexible two-level loop control, further reducing core interruption and helping to increase overall performance.

## DEVELOPMENT TOOLS

### MC56F81000-EVK

The MC56F81000-EVK is an ultra-low-cost development platform for the MC56F81xxx family for rapid prototyping and application development.

### CodeWarrior® Development Studio IDE

Complimentary Special Edition Eclipse-based CodeWarrior Development Studio for Microcontrollers is a complete integrated development environment that provides a highly visual and automated framework to accelerate the development of the most complex embedded applications.

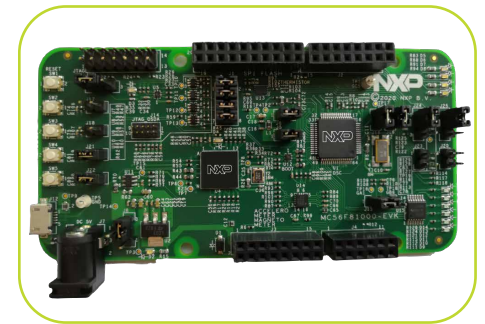
## Software Development Kit (SDK) and Config Tools

Comprehensive software enablement package designed to simplify and accelerate application development. Config tools allow developers to quickly build a custom SDK and leverage pins, clocks and peripheral tools to generate initialization C code for custom board support.

### FreeMASTER

FreeMASTER is a complimentary, user-friendly, real-time debug monitor and data visualization tool for application development and information management. Supporting non-intrusive variable monitoring on a running system, FreeMASTER allows the data from multiple variables to be viewed in an evolving oscilloscope-like display or in a common text format.

Some tools are under development. Visit [nxp.com/MC56F81xxx](http://nxp.com/MC56F81xxx) for the latest available tools.



## PACKAGE OPTIONS

| Sub-Family | Part Number | CPU (MHz) | Memory     |           | Features |        |     |       |     |     |         | Package and Temperature |         |        |           |           |   |
|------------|-------------|-----------|------------|-----------|----------|--------|-----|-------|-----|-----|---------|-------------------------|---------|--------|-----------|-----------|---|
|            |             |           | Flash (KB) | SRAM (KB) | DSASS    | PWM    | ADC | OPAMP | DAC | SPI | 64 LQFP | 48 LQFP                 | 32 LQFP | 32 QFN | Ta 105 °C | Ta 125 °C |   |
| 818xx      | MC56F8186*  | 100       | 128        | 20        | √        | 312 ps | √   | √     | √   | √   | √       | √                       | √       | √      | √         | √         | √ |
| 817xx      | MC56F8176*  | 100       | 128        | 20        |          | 312 ps | √   | √     | √   | √   | √       | √                       | √       | √      | √         | √         | √ |
| 817xx      | MC56F8174*  | 100       | 64         | 12        |          | 312 ps | √   | √     | √   | √   | √       | √                       | √       | √      | √         | √         | √ |
| 816xx      | MC56F8166*  | 100       | 128        | 20        |          | 10 ns  | √   | √     |     |     | √       | √                       | √       |        | √         |           |   |
| 816xx      | MC56F8164*  | 100       | 64         | 12        |          | 10 ns  | √   | √     |     |     | √       | √                       | √       |        | √         |           |   |

\*Some part numbers are under development. Visit [nxp.com/MC56F81xxx](http://nxp.com/MC56F81xxx) for the latest available part numbers.

[www.nxp.com/MC56F81xxx](http://www.nxp.com/MC56F81xxx)

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