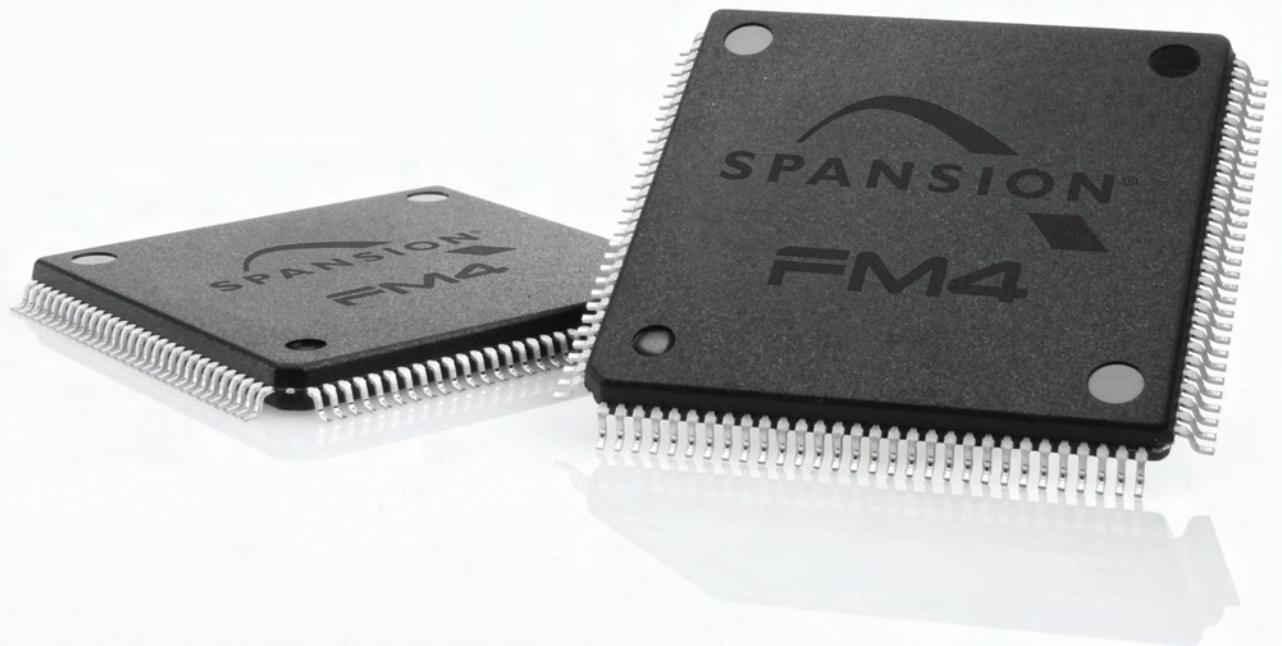




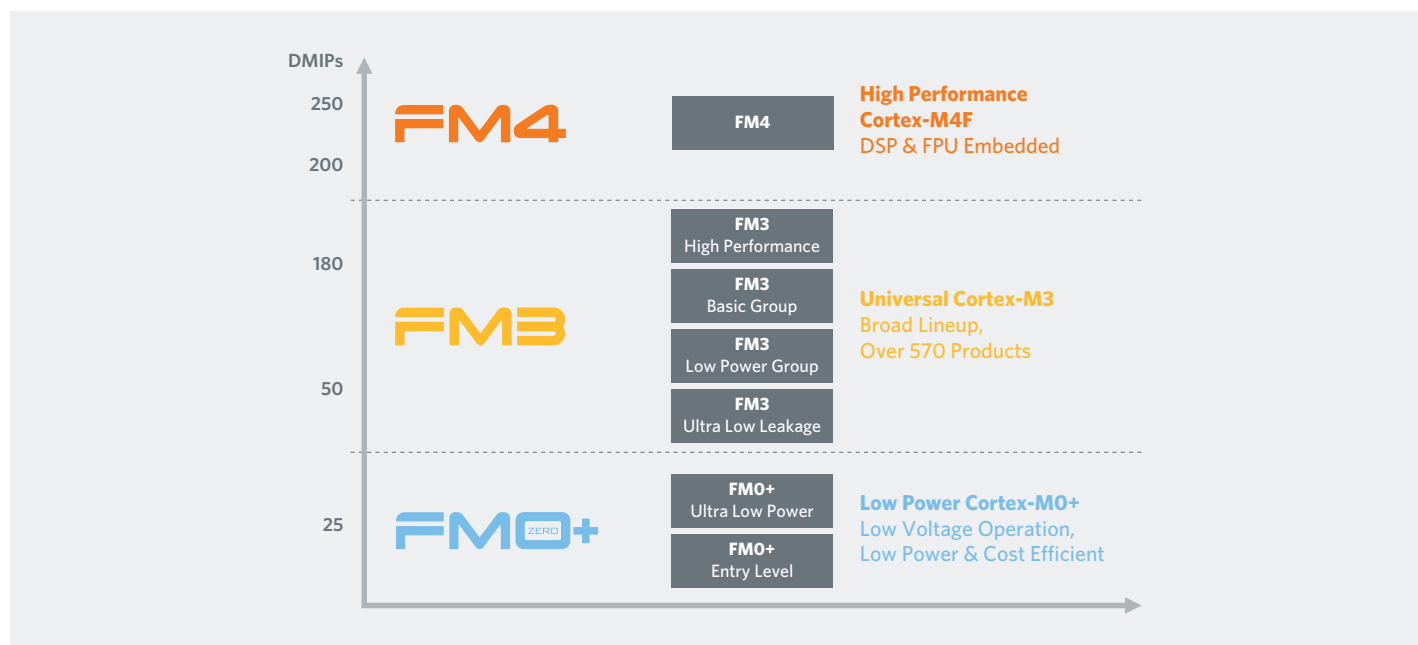
Spansion[®] FM Family: ARM[®] Cortex[™]-M based Microcontrollers



Spansion® FM Microcontrollers

The Spansion® FM microcontrollers (MCUs) incorporate the latest ARM® Cortex™ standard cores (M0+, M3 and M4), offering users the optimal product for a wide range of industrial and consumer applications.

The scalable platform ranges from low-pin-count, low-power microcontrollers to high-performance products with a rich set of peripherals (including CAN, USB and Ethernet) and up to 2MB Flash memory. The high-speed, embedded Flash process technology offers the endurance of 100K erase/write cycles and up to 20 years of data retention.



ARM Cortex-M CPU comparison

	M0	M0+ (used in FM0+)	M3 (used in FM3)	M4 (used in FM4)
Power consumption (CPU)	16µW/MHz	11.2µW/MHz	0.1mW/MHz	-
Performance	0.84 DMIPS/MHz	0.93 DMIPS/MHz	1.25 DMIPS/MHz	Same as M3
IRQs	NMI + 32	NMI + 32	NMI + 240 8-256 levels	Same as M3
Pipeline	3 stage	2 stage	3 stage + branch speculation	Same as M3
Instruction set	Thumb®/Thumb-2 subset	Thumb®/Thumb-2 subset	Thumb®/Thumb-2	Same as M3
Single cycle multiply 32x32	✓	✓	✓	Same as M3
Hardware divided (2-12 cycles)	-	-	✓	Same as M3
Debug	Up to 4 Breakpoints and 2 Watchpoints	Up to 4 Breakpoints and 2 Watchpoints	Up to 8 Breakpoints and 4 Watchpoints	Same as M3
Trace	-	Micro trace buffer	ETM	Same as M3
Bit manipulation	✓	✓	✓	Same as M3
DSP instructions	-	-	-	✓
Single precision FPU	-	-	-	✓

Key features

Outstanding Performance

- ARM Cortex-M series core
- High CPU clock frequencies of up to 200MHz (FM4) and 144MHz (FM3)
- Highly reliable, high-speed, secure embedded Flash memory
 - True zero-wait-state Flash operation at 72MHz
 - Pre-fetch buffer for zero-wait-state operation at 200MHz
- Support for voltages ranging from 1.65-5.5V
 - 1.65-3.6V: low-power products
 - 1.8-5.5V: ultra-low-leakage products
 - 2.7-5.5V: high-performance products
- DMA controller with dedicated bus layer and up to eight independent channels

Functional Safety

- Internal, trimmed RC oscillators as an independent clock source
- Clock supervisor
- Two-stage (interrupt and reset), programmable LVD (Low Voltage Detector)
- CRC hardware module
- MPU (Memory Protection Unit)
- Programmable emergency stop input for PWM motor control
- Self-test library for IEC61509 and IEC60730
- Watchdog timer

High-Performance Flash Memory

- Memory densities up to 2MB Flash/256KB RAM
- Highly reliable Flash memory
 - 100,000 write/erase cycles endurance
 - Up to 20 years of data retention
- Flash security function
- Dual-operation Flash for EEPROM emulation on many devices

Low Power

- Dedicated low-power chip design with clock and power gating
- Multiple low-power options for finely grained power-saving modes
- Dedicated power domain for deep standby modes
- Low-power, low-leakage products for handheld, battery-powered applications

I/O Ports

- Internal pull-up resistors (enable/disable)
- Flexible resource relocation: most peripheral functions can be routed to two or more MCU pins
- 12mA general-purpose IOs
- Readable external pin state

Connectivity

- Up to two channels CAN controller
- CAN-FD controller on some series
- Full-speed USB host/device, up to two channels each
- Up to two channels Ethernet MAC
- Flexible, multi-function serial interfaces covering I²C, SPI (up to 20 Mbps), LIN and UART
 - I²C/SPI/LIN/UART selectable within each channel
- 8/16-bit external bus interface with support for SRAM, NOR-, NAND-Flash and SDRAM (FM4)
- HDMI-CEC macro (with IR receive macro)

Advanced Peripherals

- Up to three multifunction timers (for motor control)
 - Includes waveform generator with dead time insertion
 - Includes advanced A/D converter trigger unit
- Quadrature decoder unit for motor-control feedback and HMI input devices, multi-turn capability
- Base timer (PWM, PWC, PPG and reload timer)
- Sub-clock option
- Up to three independent (synchronously triggerable), high-speed 12-bit A/D converters, conversion time: 0.5µs on FM4, 1µs on FM3
- Up to two channels, 12-bit D/A converters

Debug Interface

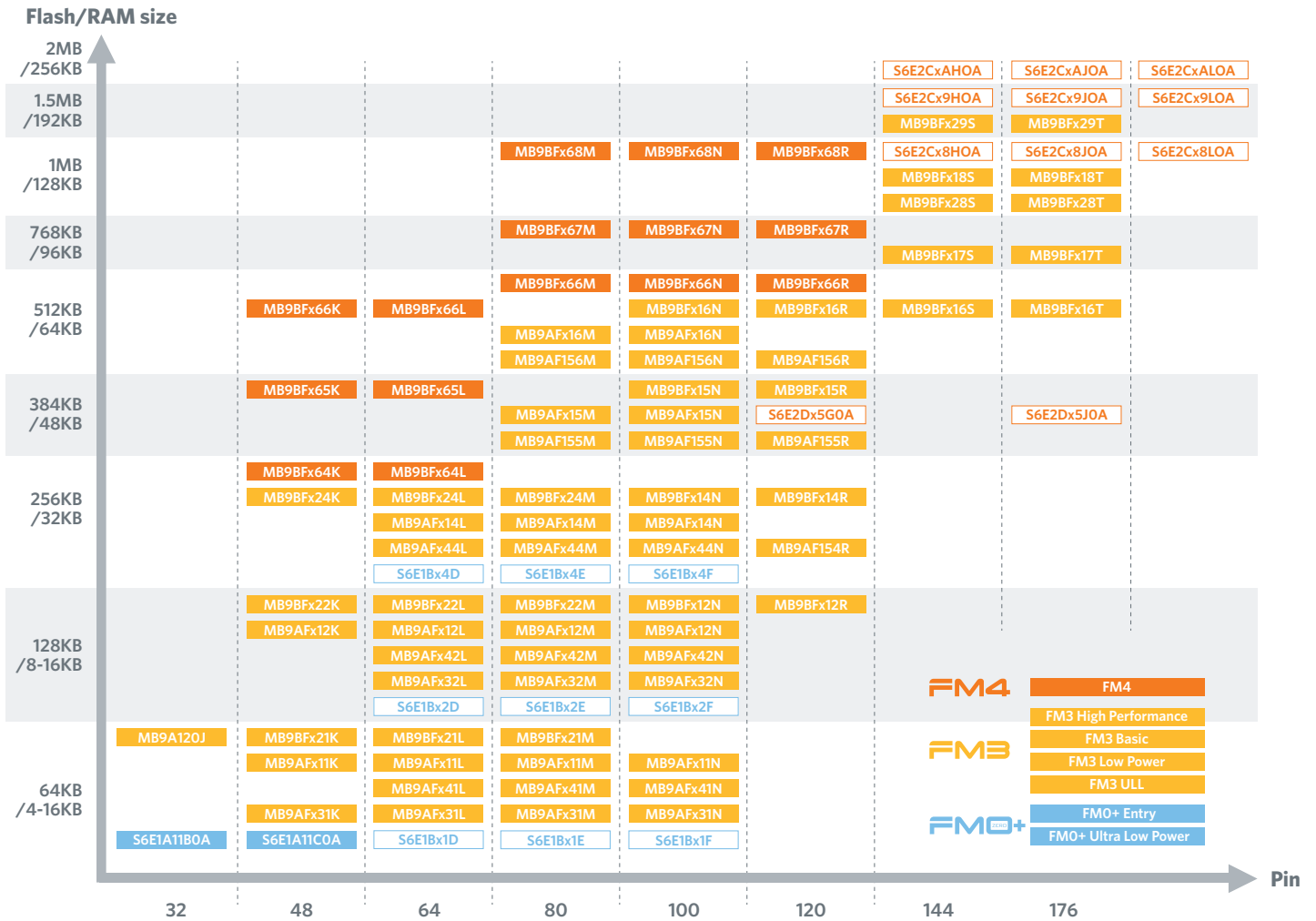
- JTAG and SWJ debug interfaces
- Embedded trace macro-cell on many devices

Applications

Spansion FM microcontrollers are appropriate for a wide variety of applications, including:

- Industrial
- Motor control and other inverter applications
- Factory automation
- White goods
- Home appliances
- Home automation and sensor control
- Power tools
- Medical and healthcare applications
- Handheld devices

The Spanion FM MCU lineup



The Spanion FM MCU lineup consists of three families—FM0+, FM3 and FM4—each of which uses a specific ARM Cortex-M core. Users can easily transition between device types and families because of the compatibility of the instruction sets.

Spanion FM4 family

The FM4 family of 32-bit, general purpose MCUs is based on the ARM Cortex-M4F processor core. This family, which features DSP and floating point (FPU) functions, covers the highest end of the product range.

The MCUs are designed for applications that require advanced, high-speed computing performance such as general-purpose inverters, servomotors, PLCs and other industrial equipment, as well as inverter-based home appliances such as washing machines and air conditioners.

Key features

- Frequency: up to 200MHz
- Operating voltage: 2.7-5.5V
- Low power consumption: 0.4mA/MHz, 1.5uA RTC mode
- Flash: 256KB-2MB
- Up to 256KB RAM
- 48-216 pin packages
- IP: Ethernet, CAN, USB2.0, motor control

Applications

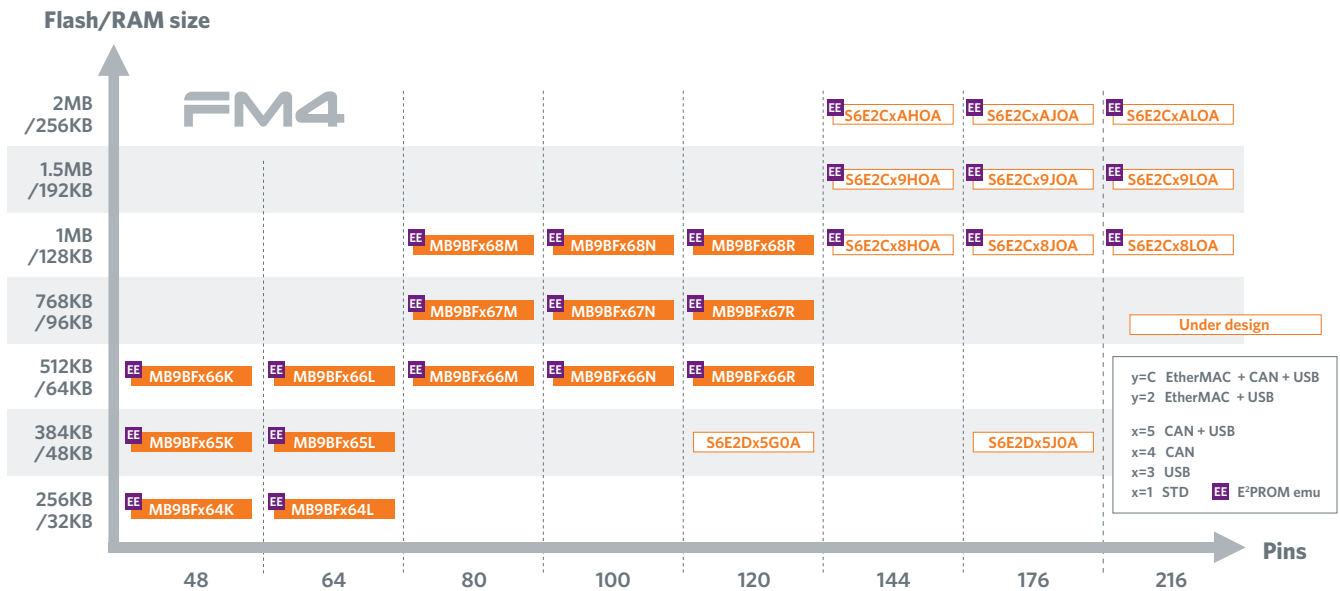
- Inverter motor control
- Factory automation, PLCs
- Highly efficient white goods
- Medical
- Surveillance

FM4 features

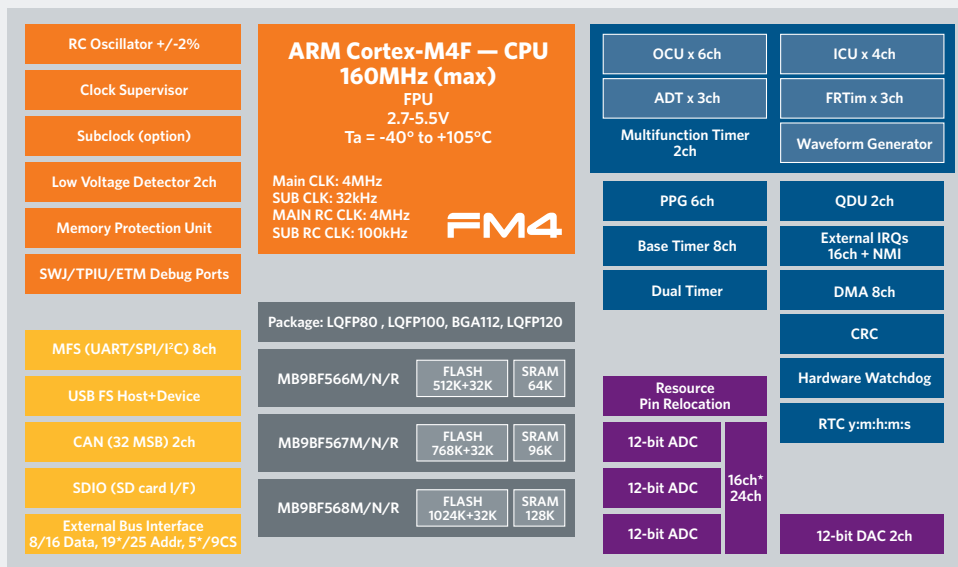
Series	Pins	Packages (Planned)	Flash	2nd Flash	RAM	Unique ID	CPU [MHz]	RC osc +/-2%, 100kHz	ETM	MPU	Sub Clock	Flash Security	ECC on (Main) Flash	External Bus	NAND Flash I/F	SDRAM I/F	SD CARD I/F	12-bit ADC (Units) ch	12-bit DAC	MFT/QDU	BT	WDG	RTC	MFS (USART, SPI, I ² C)	USB Host+Device FS	CAN	Ethernet MAC	CRC	LCD	Max I/O's	External IRQ	Supply Voltage	Temperature Range	Special Features Comments
FM4 Group																																		
MB9B560K	48	LQFP, QFN	256K, 384K, 512K	32K	32K, 48K, 64K	-	160	✓	-	✓	✓	✓	✓	-	-	-	-	(2) 14	2	1/1	8	✓	✓	4	1	1	-	✓	-	35	15	2.7 - 5.5V	-40 - +105°C	
MB9B560L	64	LQFP, QFN	256K, 384K, 512K	32K	32K, 48K, 64K	-	160	✓	-	✓	✓	✓	✓	-	-	-	-	(2) 14	2	1/1	8	✓	✓	6	1	1	-	✓	-	50	15	2.7 - 5.5V	-40 - +105°C	
MB9B560M	80	LQFP	512K, 768K, 1024K	32K	64K, 96K, 128K	-	160	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	(3) 16	2	2/2	8	✓	✓	8	1	2	-	✓	-	63	17	2.7 - 5.5V	-40 - +105°C	DSTC
MB9B460M	80	LQFP	512K, 768K, 1024K	32K	64K, 96K, 128K	-	160	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	(3) 16	2	2/2	8	✓	✓	8	-	2	-	✓	-	63	17	2.7 - 5.5V	-40 - +105°C	DSTC
MB9B360M	80	LQFP	512K, 768K, 1024K	32K	64K, 96K, 128K	-	160	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	(3) 16	2	2/2	8	✓	✓	8	1	-	-	✓	-	63	17	2.7 - 5.5V	-40 - +105°C	DSTC
MB9B160M	80	LQFP	512K, 768K, 1024K	32K	64K, 96K, 128K	-	160	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	(3) 16	2	2/2	8	✓	✓	8	-	-	-	✓	-	63	17	2.7 - 5.5V	-40 - +105°C	DSTC
MB9B560N	100	LQFP, BGA	512K, 768K, 1024K	32K	64K, 96K, 128K	-	160	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	(3) 24	2	2/2	8	✓	✓	8	1	2	-	✓	-	80	17	2.7 - 5.5V	-40 - +105°C	DSTC
MB9B460N	100	LQFP, BGA	512K, 768K, 1024K	32K	64K, 96K, 128K	-	160	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	(3) 24	2	2/2	8	✓	✓	8	-	2	-	✓	-	80	17	2.7 - 5.5V	-40 - +105°C	DSTC
MB9B360N	100	LQFP, BGA	512K, 768K, 1024K	32K	64K, 96K, 128K	-	160	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	(3) 24	2	2/2	8	✓	✓	8	1	-	-	✓	-	80	17	2.7 - 5.5V	-40 - +105°C	DSTC
MB9B160N	100	LQFP, BGA	512K, 768K, 1024K	32K	64K, 96K, 128K	-	160	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	(3) 24	2	2/2	8	✓	✓	8	-	-	-	✓	-	80	17	2.7 - 5.5V	-40 - +105°C	DSTC
MB9B560R	120	LQFP, BGA	512K, 768K, 1024K	32K	64K, 96K, 128K	-	160	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	(3) 24	2	2/2	8	✓	✓	8	1	2	-	✓	-	100	17	2.7 - 5.5V	-40 - +105°C	DSTC
MB9B460R	120	LQFP, BGA	512K, 768K, 1024K	32K	64K, 96K, 128K	-	160	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	(3) 24	2	2/2	8	✓	✓	8	-	2	-	✓	-	100	17	2.7 - 5.5V	-40 - +105°C	DSTC
MB9B360R	120	LQFP, BGA	512K, 768K, 1024K	32K	64K, 96K, 128K	-	160	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	(3) 24	2	2/2	8	✓	✓	8	1	-	-	✓	-	100	17	2.7 - 5.5V	-40 - +105°C	DSTC
MB9B160R	120	LQFP, BGA	512K, 768K, 1024K	32K	64K, 96K, 128K	-	160	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	(3) 24	2	2/2	8	✓	✓	8	-	-	-	✓	-	100	17	2.7 - 5.5V	-40 - +105°C	DSTC

WDG: Watchdog, ADC: Analogue Digital Converter, RTC: Real Time Clock, DAC: Digital Analogue Converter, BT: Base Timer (Reload, PPG, PWM, PWC), MPU: Memory Protection Unit
MFT: Multi Function Timer (e.g. for motor control), ETM: Embedded Trace Macrocell - Debug Interface, QDU: Quadrature Decoder Unit, CRC: Cyclic Redundancy Check
MFS: Multi Function Serial (USART, I2C, SPI), IRQ: Interrupt Request Input, DSTC: Descriptor System Data Transfer Controller

FM4 product lineup



MB9B560M/N/R



*80-pin package

Spanion FM3 family

The FM3 family of 32-bit general-purpose MCUs is based on the ARM Cortex-M3 CPU, providing a scalable platform for many consumer and industrial applications. Popular applications range from motor control, factory automation, white goods and power tools to medical devices, major home appliances, digital consumer devices and office automation equipment.

The MCUs include a host of peripheral features, including multiple motor-control timers, high-speed ADCs, and a variety of communication interfaces. The wide operating voltage range (1.8V to 5.5V) improves the signal-to-noise ratio, resulting in a robust design that is unique among Cortex-M3 microcontroller families. Available packages range from 32 pin to 176 pin with memory densities ranging from 64KB to 1.5MB Flash.

The FM3 family, which features a maximum operating frequency of 20-144 MHz, is split into four groups: high-performance, basic, low-power and ultra-low-leakage. All these products are based on the same architecture for software compatibility, use the same peripherals, and are pin compatible in most cases. The main differences between the groups are the CPU operating frequency and supply voltage.

High-performance group

- Up to 144MHz, 72MHz Flash, prefetch buffer
- 2.7 - 5.5V
- Up to 1MB Flash, 128K RAM
- CAN, Ethernet
- USB
- Extra Flash memory for EEPROM emulation

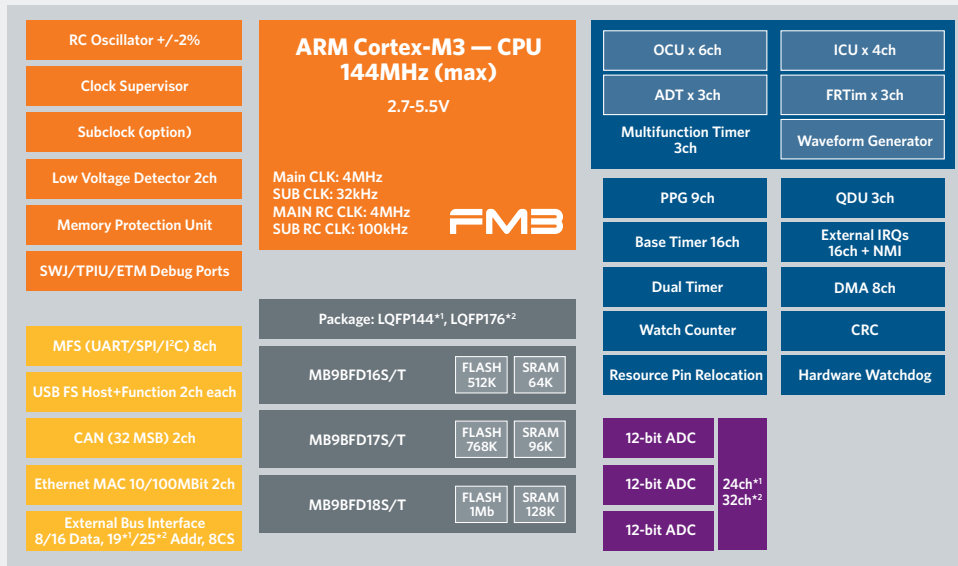
Applications

- Factory automation
- Home automation
- Motor control
- Medical

FM3 high-performance group



MB9BD10S/T



*1 MB9BD10S: LQFP144 *2 MB9BD10T: LQFP176

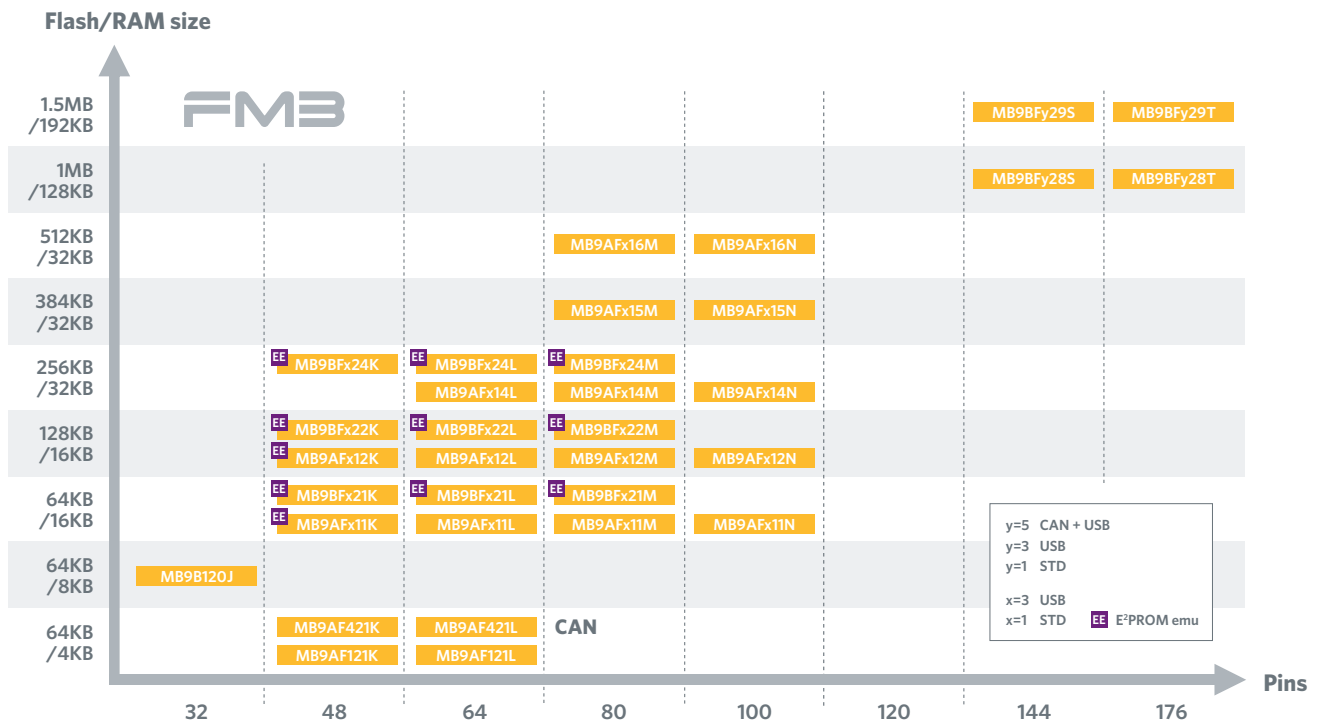
Basic group

- Frequency: up to 72MHz
- Operating voltage: 2.7-5.5V
- Flash: 64KB-1.5MB
- Up to 192KB RAM
- 32-176 pin packages
- IP: CAN, USB2.0, motor control

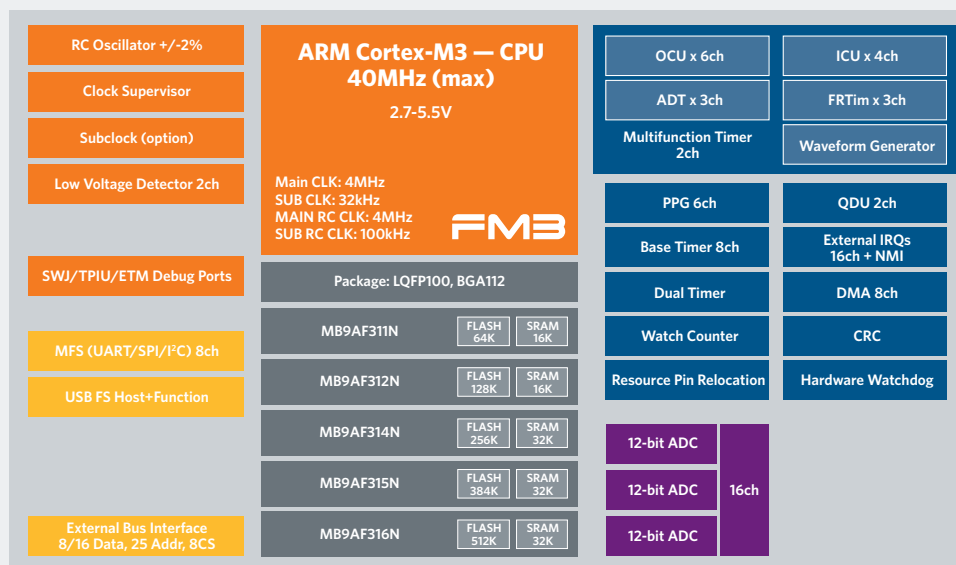
Applications

- Household appliances
- Motor control
- Office automation
- Power tools
- Factory automation sensors

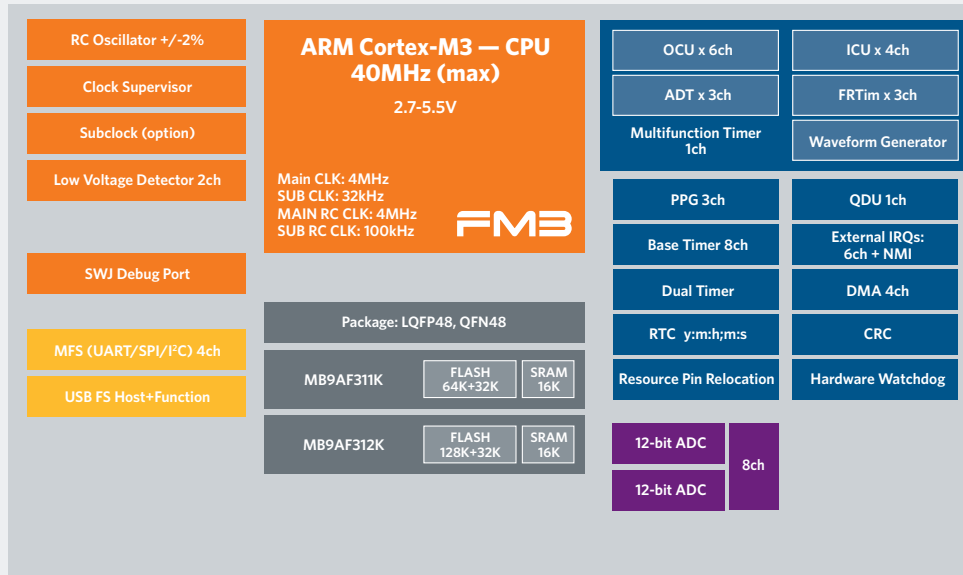
FM3 basic group



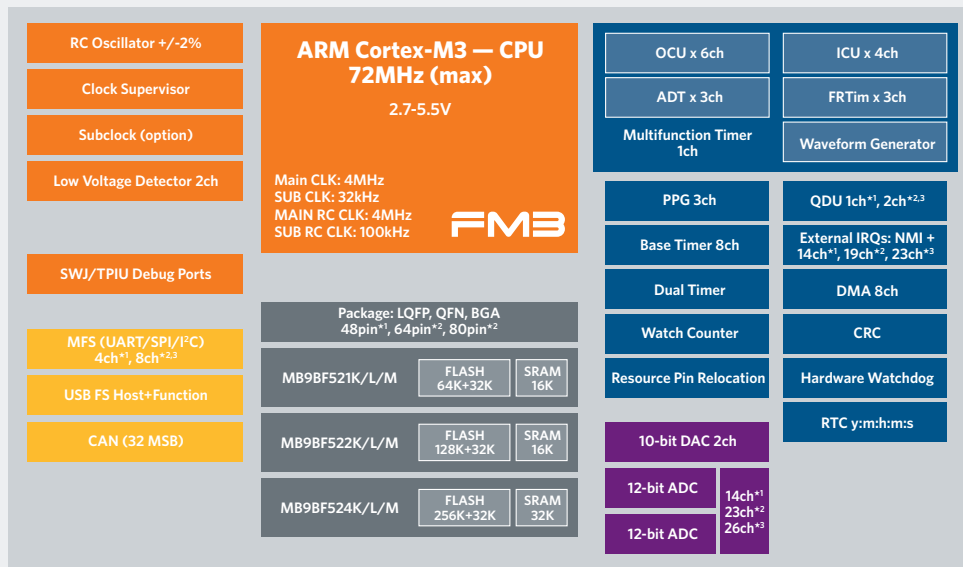
MB9A310N



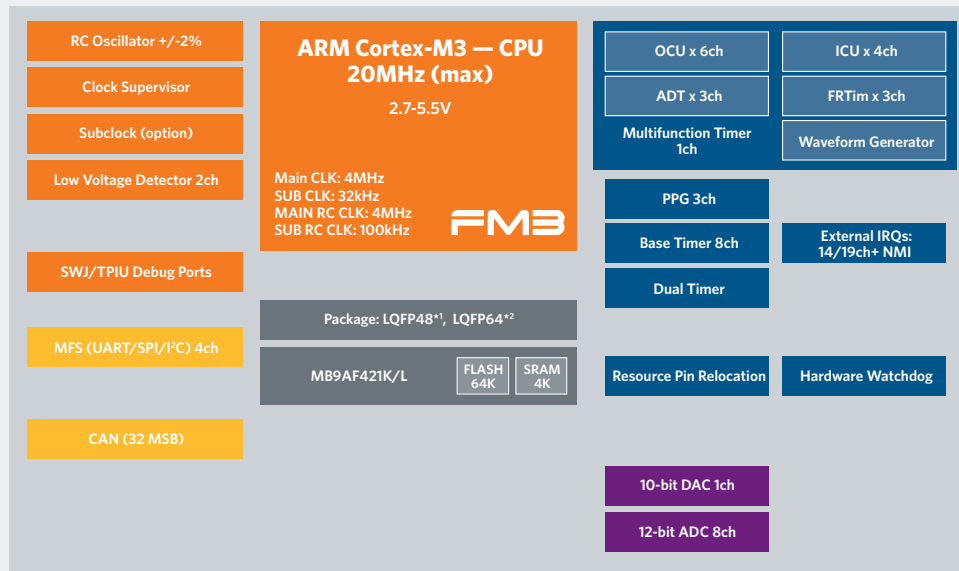
MB9A310K



MB9B520K/L/M



^{*1} MB9B520K: LQFP48, QFN48 ^{*2} MB9B520L: LQFP64, QFN64 ^{*3} MB9B520M: LQFP80, BGA96



*1 MB9A420K: LQFP48, QFN48 *2 MB9A420L: LQFP64

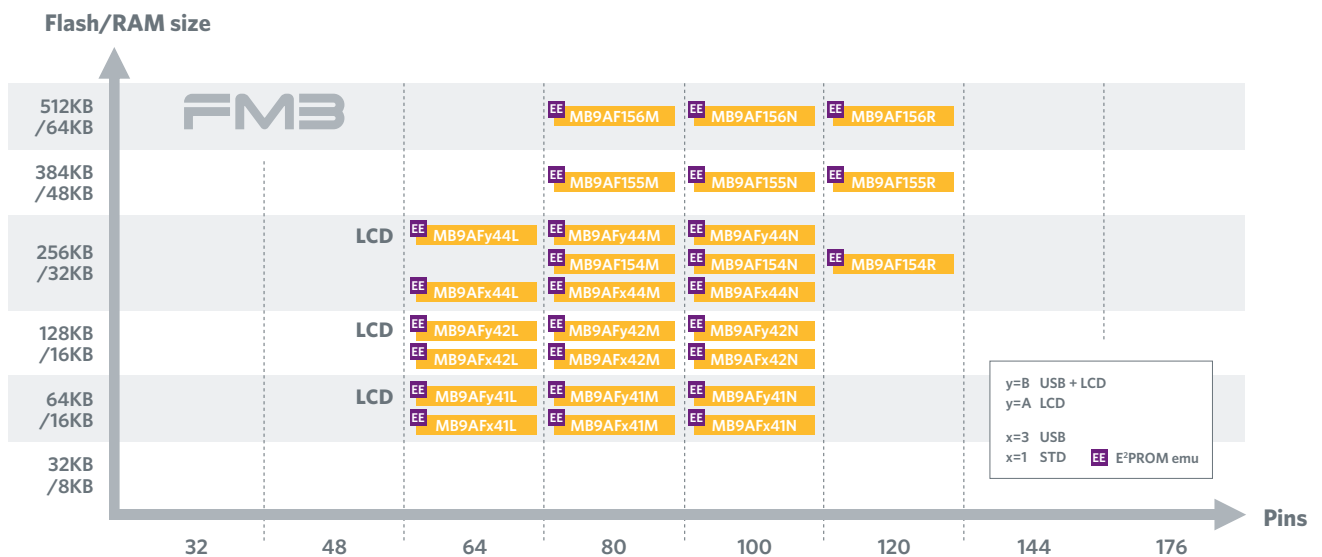
Low-power group

- Frequency: 40MHz
- Operating voltage: 1.65-3.6V
- Separated power domains
- Low-power current: 200µA/MHz (typical)
- USB2.0, LCD, HDMI-CEC

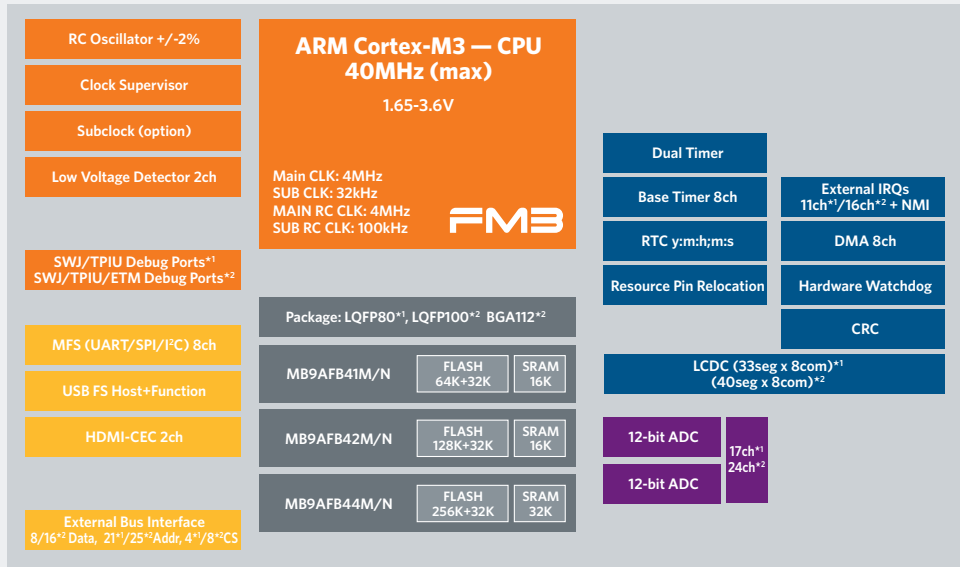
Applications

- Handheld devices
- Metering
- Medical devices
- Battery-powered applications

FM3 low-power group

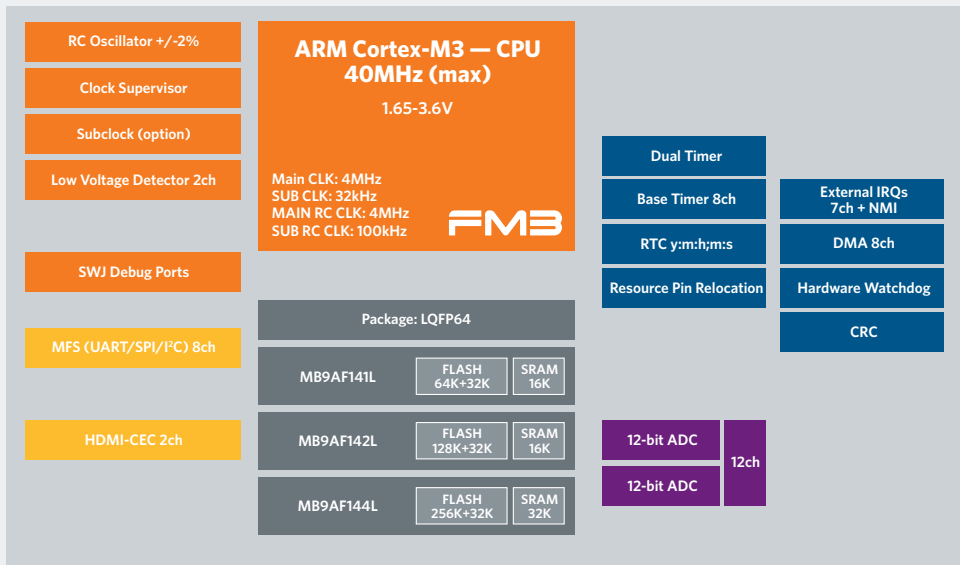


MB9AB40M/N



*1 MB9AB40M: LQFP80 *2 MB9AB40N: LQFP100, BGA112

MB9A140L



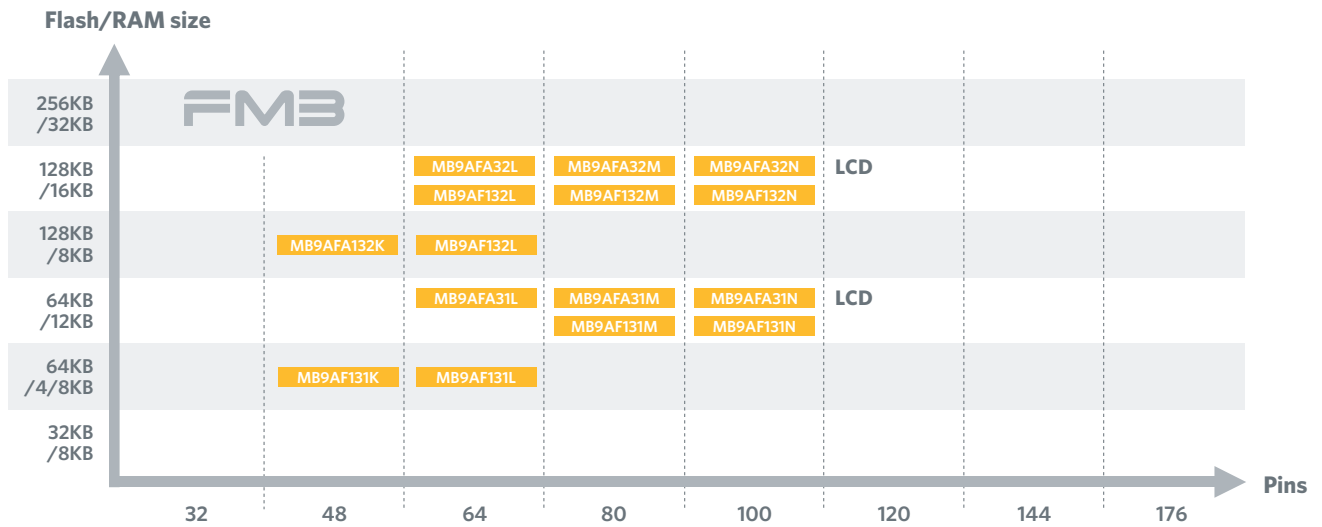
Ultra-low-leakage group

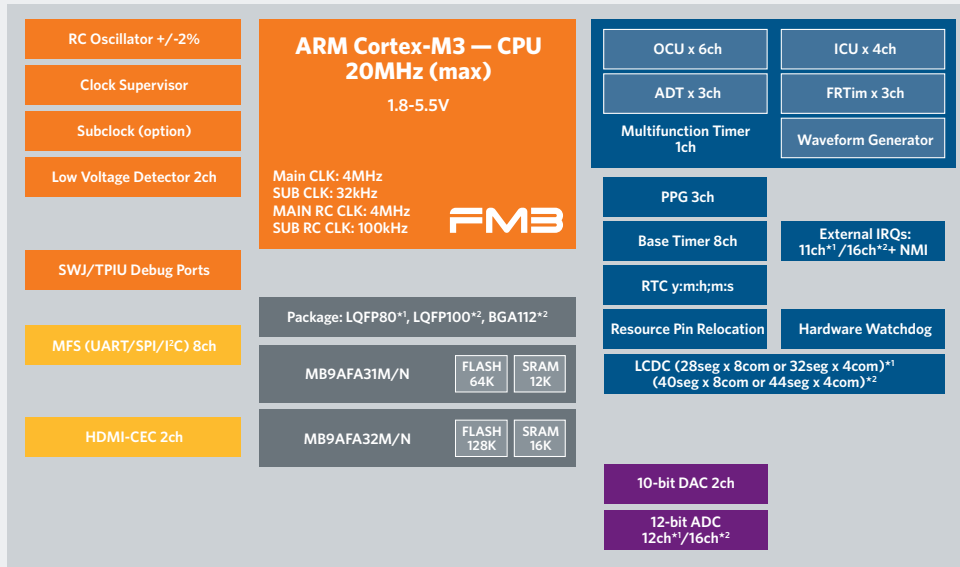
Applications

- Frequency: 20MHz
- Operating voltage: 1.8-5.5V
- Low leakage current, ~ 0.4µA (at DS-Stop mode)
- Low-power-consumption mode
- Various IP: LCDC, HDMI-CEC
- Standard set of peripherals
- Optimized low-leakage process technology

- Metering
- Mobile devices
- Handheld devices

FM3 ultra-low-leakage group





^{*1} MB9AA30M: LQFP80 ^{*2} MB9AA30N: LQFP100, BGA112

FM3 features

Series	Pins	Packages (Planned)	Flash	2nd Flash	RAM	Unique ID	CPU [MHz]	RC osc +/-2%, 100kHz	ETM	MPU	Sub Clock	Flash Security	ECC on (Main) Flash	External Bus	NAND Flash I/F	SDRAM I/F	SD CARD I/F	12-bit ADC (Units) ch	10-bit DAC	MFT/QDU	BT	WDG	RTC	MFS (USART, SPI, I ² C)	USB Host+Device FS	CAN	Ethernet MAC	CRC	LCD	Max I/O's	External IRQ	Supply Voltage	Temperature Range	Special Features Comments
FM3 High Performance Group																																		
MB9B500N	100	LQFP, QFP, BGA	256K, 384K, 512K	-	32K, 48K, 64K	-	80	✓	✓	✓	✓	✓	-	✓	-	-	-	(3) 16	-	2/2	8	✓	-	8	1	2	-	✓	-	80	17	2.7 - 5.5V	-40° - +85°C	-
MB9B400N	100	LQFP, QFP, BGA	256K, 384K, 512K	-	32K, 48K, 64K	-	80	✓	✓	✓	✓	✓	-	✓	-	-	-	(3) 16	-	2/2	8	✓	-	8	-	2	-	✓	-	80	17	2.7 - 5.5V	-40° - +85°C	-
MB9B300N	100	LQFP, QFP, BGA	256K, 384K, 512K	-	32K, 48K, 64K	-	80	✓	✓	✓	✓	✓	-	✓	-	-	-	(3) 16	-	2/2	8	✓	-	8	1	-	-	✓	-	80	17	2.7 - 5.5V	-40° - +85°C	-
MB9B100N	100	LQFP, QFP, BGA	256K, 384K, 512K	-	32K, 48K, 64K	-	80	✓	✓	✓	✓	✓	-	✓	-	-	-	(3) 16	-	2/2	8	✓	-	8	-	-	-	✓	-	80	17	2.7 - 5.5V	-40° - +85°C	-
MB9B500R	120	LQFP	256K, 384K, 512K	-	32K, 48K, 64K	-	80	✓	✓	✓	✓	✓	-	✓	✓	-	-	(3) 16	-	2/2	8	✓	-	8	1	2	-	✓	-	100	17	2.7 - 5.5V	-40° - +85°C	-
MB9B400R	120	LQFP	256K, 384K, 512K	-	32K, 48K, 64K	-	80	✓	✓	✓	✓	✓	-	✓	✓	-	-	(3) 16	-	2/2	8	✓	-	8	-	2	-	✓	-	100	17	2.7 - 5.5V	-40° - +85°C	-
MB9B300R	120	LQFP	256K, 384K, 512K	-	32K, 48K, 64K	-	80	✓	✓	✓	✓	✓	-	✓	✓	-	-	(3) 16	-	2/2	8	✓	-	8	1	-	-	✓	-	100	17	2.7 - 5.5V	-40° - +85°C	-
MB9B100R	120	LQFP	256K, 384K, 512K	-	32K, 48K, 64K	-	80	✓	✓	✓	✓	✓	-	✓	✓	-	-	(3) 16	-	2/2	8	✓	-	8	-	-	-	✓	-	100	17	2.7 - 5.5V	-40° - +85°C	-
MB9BD10S	144	LQFP	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 24	-	3/3	16	✓	-	8	2	2	2	✓	-	122	33	2.7 - 5.5V	-40° - +85°C	-
MB9B610S	144	LQFP	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 24	-	3/3	16	✓	-	8	2	-	2	✓	-	122	33	2.7 - 5.5V	-40° - +85°C	-
MB9B510S	144	LQFP	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 24	-	3/3	16	✓	-	8	2	2	-	✓	-	122	33	2.7 - 5.5V	-40° - +85°C	-
MB9B410S	144	LQFP	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 24	-	3/3	16	✓	-	8	-	2	-	✓	-	122	33	2.7 - 5.5V	-40° - +85°C	-
MB9B310S	144	LQFP	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 24	-	3/3	16	✓	-	8	2	-	-	✓	-	122	33	2.7 - 5.5V	-40° - +85°C	-
MB9B210S	144	LQFP	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 32	-	3/3	16	✓	-	8	2	-	1	✓	-	122	33	2.7 - 5.5V	-40° - +85°C	-
MB9B110S	144	LQFP	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 24	-	3/3	16	✓	-	8	-	-	-	✓	-	122	33	2.7 - 5.5V	-40° - +85°C	-
MB9BD10T	176	LQFP, BGA	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 32	-	3/3	16	✓	-	8	2	2	2	✓	-	154	33	2.7 - 5.5V	-40° - +85°C	-
MB9B610T	176	LQFP, BGA	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 32	-	3/3	16	✓	-	8	2	-	2	✓	-	154	33	2.7 - 5.5V	-40° - +85°C	-
MB9B210T	176	LQFP, BGA	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 32	-	3/3	16	✓	-	8	2	-	1	✓	-	154	33	2.7 - 5.5V	-40° - +85°C	-
MB9B510T	176	LQFP, BGA	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 32	-	3/3	16	✓	-	8	2	2	-	✓	-	154	33	2.7 - 5.5V	-40° - +85°C	-
MB9B410T	176	LQFP, BGA	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 32	-	3/3	16	✓	-	8	-	2	-	✓	-	154	33	2.7 - 5.5V	-40° - +85°C	-
MB9B310T	176	LQFP, BGA	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 32	-	3/3	16	✓	-	8	2	-	-	✓	-	154	33	2.7 - 5.5V	-40° - +85°C	-
MB9B110T	176	LQFP, BGA	512K, 768K, 1024K	-	64K, 96K, 128K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 32	-	3/3	16	✓	-	8	-	-	-	✓	-	154	33	2.7 - 5.5V	-40° - +85°C	-
MB9B510N	100	LQFP, QFP, BGA	128K, 256K, 384K, 512K	32K	16K, 32K, 48K, 64K	-	144	✓	✓	✓	✓	✓	✓	✓	-	-	-	(3) 16	-	3/3	8	✓	✓	8	1	2	-	✓	-	80	17	2.7 - 5.5V	-40° - +85°C	-
MB9B410N	100	LQFP, QFP, BGA	128K, 256K, 384K, 512K	32K	16K, 32K, 48K, 64K	-	144	✓	✓	✓	✓	✓	✓	✓	-	-	-	(3) 16	-	3/3	8	✓	✓	8	-	2	-	✓	-	80	17	2.7 - 5.5V	-40° - +85°C	-

FM3 features

Series	Pins	Packages (Planned)	Flash	2nd Flash	RAM	Unique ID	CPU [MHz]	RC osc +/-2%, 100kHz	ETM	MPU	Sub Clock	Flash Security	ECC on (Main) Flash	External Bus	NAND Flash I/F	SDRAM I/F	SD CARD I/F	12-bit ADC (Units) ch	10-bit DAC	MFT/QDU	BT	WDG	RTC	MFS (USART, SPI, I ² C)	USB Host+Device FS	CAN	Ethernet MAC	CRC	LCD	Max I/O's	External IRQ	Supply Voltage	Temperature Range	Special Features Comments
MB9B310N	100	LQFP, QFP, BGA	128K, 256K, 384K, 512K	32K	16K, 32K, 48K, 64K	-	144	✓	✓	✓	✓	✓	✓	✓	-	-	-	(3) 16	-	3/3	8	✓	✓	8	1	-	-	✓	-	80	17	2.7 - 5.5V	-40° - +85°C	-
MB9B110N	100	LQFP, QFP, BGA	128K, 256K, 384K, 512K	32K	16K, 32K, 48K, 64K	-	144	✓	✓	✓	✓	✓	✓	✓	-	-	-	(3) 16	-	3/3	8	✓	✓	8	-	-	-	✓	-	80	17	2.7 - 5.5V	-40° - +85°C	-
MB9B510R	120	LQFP	128K, 256K, 384K, 512K	32K	16K, 32K, 48K, 64K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 16	-	3/3	8	✓	✓	8	1	2	-	✓	-	100	17	2.7 - 5.5V	-40° - +85°C	-
MB9B410R	120	LQFP	128K, 256K, 384K, 512K	32K	16K, 32K, 48K, 64K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 16	-	3/3	8	✓	✓	8	-	2	-	✓	-	100	17	2.7 - 5.5V	-40° - +85°C	-
MB9B310R	120	LQFP	128K, 256K, 384K, 512K	32K	16K, 32K, 48K, 64K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 16	-	3/3	8	✓	✓	8	1	-	-	✓	-	100	17	2.7 - 5.5V	-40° - +85°C	-
MB9B110R	120	LQFP	128K, 256K, 384K, 512K	32K	16K, 32K, 48K, 64K	-	144	✓	✓	✓	✓	✓	✓	✓	✓	-	-	(3) 16	-	3/3	8	✓	✓	8	-	-	-	✓	-	100	17	2.7 - 5.5V	-40° - +85°C	-

FM3 Basic Group

MB9B120J	32	LQFP, QFN	64K	-	8K	✓	72	✓	-	-	✓	✓	-	-	-	-	-	(1) 8	-	1/1	8	✓	✓	4	-	-	-	-	-	23	8	2.7 - 5.5V	-40° - +105°C	-
MB9A420K	48	LQFP, QFN	64K	-	4K	✓	40	✓	-	-	✓	✓	-	-	-	-	-	(1) 8	1	1/0	8	✓	✓	4	-	1	-	-	-	36	15	2.7 - 5.5V	-40° - +105°C	-
MB9A120K	48	LQFP, QFN	64K	-	4K	✓	40	✓	-	-	✓	✓	-	-	-	-	-	(1) 8	1	1/0	8	✓	✓	4	-	-	-	-	-	36	15	2.7 - 5.5V	-40° - +105°C	-
MB9A420L	64	LQFP, QFN	64K	-	4K	✓	40	✓	-	-	✓	✓	-	-	-	-	-	(1) 8	1	1/0	8	✓	✓	4	-	1	-	-	-	51	20	2.7 - 5.5V	-40° - +105°C	-
MB9A120L	64	LQFP, QFN	64K	-	4K	✓	40	✓	-	-	✓	✓	-	-	-	-	-	(1) 8	1	1/0	8	✓	✓	4	-	-	-	-	-	51	20	2.7 - 5.5V	-40° - +105°C	-
MB9B120K	48	LQFP, QFN	48K, 112K, 240K	48K	16K, 16K, 32K	✓	72	✓	-	-	✓	✓	-	-	-	-	-	(2) 14	2	1/1	8	✓	✓	4	-	-	-	✓	-	35	15	2.7 - 5.5V	-40° - +105°C	-
MB9B320K	48	LQFP, QFN	48K, 112K, 240K	48K	16K, 16K, 32K	✓	72	✓	-	-	✓	✓	-	-	-	-	-	(2) 14	2	1/1	8	✓	✓	4	1	-	-	✓	-	35	15	2.7 - 5.5V	-40° - +105°C	-
MB9B520K	48	LQFP, QFN	48K, 112K, 240K	48K	16K, 16K, 32K	✓	72	✓	-	-	✓	✓	-	-	-	-	-	(2) 14	2	1/1	8	✓	✓	4	1	1	-	✓	-	35	15	2.7 - 5.5V	-40° - +105°C	-
MB9B120L	64	LQFP, QFN	48K, 112K, 240K	48K	16K, 16K, 32K	✓	72	✓	-	-	✓	✓	-	-	-	-	-	(2) 23	2	1/2	8	✓	✓	8	-	-	-	✓	-	50	20	2.7 - 5.5V	-40° - +105°C	-
MB9B320L	64	LQFP, QFN	48K, 112K, 240K	48K	16K, 16K, 32K	✓	72	✓	-	-	✓	✓	-	-	-	-	-	(2) 23	2	1/2	8	✓	✓	8	1	-	-	✓	-	50	20	2.7 - 5.5V	-40° - +105°C	-
MB9B520L	64	LQFP, QFN	48K, 112K, 240K	48K	16K, 16K, 32K	✓	72	✓	-	-	✓	✓	-	-	-	-	-	(2) 23	2	1/2	8	✓	✓	8	1	1	-	✓	-	50	20	2.7 - 5.5V	-40° - +105°C	-
MB9B120M	80	LQFP	48K, 112K, 240K	48K	16K, 16K, 32K	✓	72	✓	-	-	✓	✓	-	-	-	-	-	(2) 26	2	1/2	8	✓	✓	8	-	-	-	✓	-	65	24	2.7 - 5.5V	-40° - +105°C	-
MB9B320M	80	LQFP	48K, 112K, 240K	48K	16K, 16K, 32K	✓	72	✓	-	-	✓	✓	-	-	-	-	-	(2) 26	2	1/2	8	✓	✓	8	1	-	-	✓	-	65	24	2.7 - 5.5V	-40° - +105°C	-

FM3 features

Series	Pins	Packages (Planned)	Flash	2nd Flash	RAM	Unique ID	CPU [MHz]	RC osc +/-2%, 100kHz	ETM	MPU	Sub Clock	Flash Security	ECC on (Main) Flash	External Bus	NAND Flash I/F	SDRAM I/F	SD CARD I/F	12-bit ADC (Units) ch	10-bit DAC	MFT/QDU	BT	WDG	RTC	MFS (USART, SPI, I ² C)	USB Host+Device FS	CAN	Ethernet MAC	CRC	LCD	Max I/O's	External IRQ	Supply Voltage	Temperature Range	Special Features Comments
MB9B520M	80	LQFP	48K, 112K, 240K	48K	16K, 16K, 32K	✓	72	✓	-	-	✓	✓	-	-	-	-	-	(2) 26	2	1/2	8	✓	✓	8	1	1	-	✓	-	65	24	2.7 - 5.5V	-40° - +105°C	-
MB9A310K	48	LQFP, QFN	64K, 128K	32K	16K, 16K	-	40	✓	-	-	✓	✓	✓	-	-	-	-	(2) 8	-	1/1	8	✓	✓	4	1	-	-	✓	-	36	7	2.7 - 5.5V	-40° - +105°C	-
MB9A110K	48	LQFP, QFN	64K, 128K	32K	16K, 16K	-	40	✓	-	-	✓	✓	✓	-	-	-	-	(2) 8	-	1/1	8	✓	✓	4	-	-	-	✓	-	36	7	2.7 - 5.5V	-40° - +105°C	-
MB9A310L	64	LQFP, QFN	64K, 128K, 256K	-	16K, 16K, 32K	-	40	✓	-	-	✓	✓	✓	-	-	-	-	(2) 9	-	2/2	8	✓	-	8	1	-	-	✓	-	51	8	2.7 - 5.5V	-40° - +105°C	-
MB9A110L	64	LQFP, QFN	64K, 128K, 256K	-	16K, 16K, 32K	-	40	✓	-	-	✓	✓	✓	-	-	-	-	(2) 9	-	2/2	8	✓	-	8	-	-	-	✓	-	51	8	2.7 - 5.5V	-40° - +105°C	-
MB9A310M	80	LQFP	64K, 128K, 256K, 384K, 512K	-	16K, 16K, 32K, 32K, 32K	-	40	✓	-	-	✓	✓	✓	✓	-	-	-	(3) 12	-	2/2	8	✓	-	8	1	-	-	✓	-	66	12	2.7 - 5.5V	-40° - +105°C	-
MB9A110M	80	LQFP	64K, 128K, 256K, 384K, 512K	-	16K, 16K, 32K, 32K, 32K	-	40	✓	-	-	✓	✓	✓	✓	-	-	-	(3) 12	-	2/2	8	✓	-	8	-	-	-	✓	-	66	12	2.7 - 5.5V	-40° - +105°C	-
MB9A310N	100	LQFP, QFP, BGA	64K, 128K, 256K, 384K, 512K	-	16K, 16K, 32K, 32K, 32K	-	40	✓	✓	-	✓	✓	✓	✓	-	-	-	(3) 16	-	2/2	8	✓	-	8	1	-	-	✓	-	83	17	2.7 - 5.5V	-40° - +105°C	-
MB9A110N	100	LQFP, QFP, BGA	64K, 128K, 256K, 384K, 512K	-	16K, 16K, 32K, 32K, 32K	-	40	✓	✓	-	✓	✓	✓	✓	-	-	-	(3) 16	-	2/2	8	✓	-	8	-	-	-	✓	-	83	17	2.7 - 5.5V	-40° - +105°C	-
MB9B520T	176	LQFP, BGA	1MB, 1.5MB	64K	160K, 192K	✓	60	✓	✓	-	✓	✓	-	✓	✓	-	-	(2) 24	2	1/2	16	✓	✓	16	1	1	-	✓	-	154	33	2.7 - 5.5V	-40° - +105°C	HDMI-CEC 2ch
MB9B420T	176	LQFP, BGA	1MB, 1.5MB	64K	160K, 192K	✓	60	✓	✓	-	✓	✓	-	✓	✓	-	-	(2) 24	2	1/2	16	✓	✓	16	-	1	-	✓	-	154	33	2.7 - 5.5V	-40° - +105°C	HDMI-CEC 2ch
MB9B320T	176	LQFP, BGA	1MB, 1.5MB	64K	160K, 192K	✓	60	✓	✓	-	✓	✓	-	✓	✓	-	-	(2) 24	2	1/2	16	✓	✓	16	1	-	-	✓	-	154	33	2.7 - 5.5V	-40° - +105°C	HDMI-CEC 2ch
MB9B120T	176	LQFP, BGA	1MB, 1.5MB	64K	160K, 192K	✓	60	✓	✓	-	✓	✓	-	✓	✓	-	-	(2) 24	2	1/2	16	✓	✓	16	-	-	-	✓	-	154	33	2.7 - 5.5V	-40° - +105°C	HDMI-CEC 2ch
MB9B520S	144	LQFP	1MB, 1.5MB	64K	160K, 192K	✓	60	✓	✓	-	✓	✓	-	✓	✓	-	-	(2) 24	2	1/1	16	✓	✓	16	1	1	-	✓	-	122	33	2.7 - 5.5V	-40° - +105°C	HDMI-CEC 2ch
MB9B420S	144	LQFP	1MB, 1.5MB	64K	160K, 192K	✓	60	✓	✓	-	✓	✓	-	✓	✓	-	-	(2) 24	2	1/1	16	✓	✓	16	-	1	-	✓	-	122	33	2.7 - 5.5V	-40° - +105°C	HDMI-CEC 2ch
MB9B320S	144	LQFP	1MB, 1.5MB	64K	160K, 192K	✓	60	✓	✓	-	✓	✓	-	✓	✓	-	-	(2) 24	2	1/1	16	✓	✓	16	1	-	-	✓	-	122	33	2.7 - 5.5V	-40° - +105°C	HDMI-CEC 2ch
MB9B120S	144	LQFP	1MB, 1.5MB	64K	160K, 192K	✓	60	✓	✓	-	✓	✓	-	✓	✓	-	-	(2) 24	2	1/1	16	✓	✓	16	-	-	-	✓	-	122	33	2.7 - 5.5V	-40° - +105°C	HDMI-CEC 2ch

FM3 features

Series	Pins	Packages (Planned)	Flash	2nd Flash	RAM	Unique ID	CPU [MHz]	RC osc +/- 2%, 100kHz	ETM	MPU	Sub Clock	Flash Security	ECC on (Main) Flash	External Bus	NAND Flash I/F	SDRAM I/F	SD CARD I/F	12-bit ADC (Units) ch	10-bit DAC	MFT/QDU	BT	WDG	RTC	MFS (USART, SPI, I ² C)	USB Host+Device FS	CAN	Ethernet MAC	CRC	LCD	Max I/O's	External IRQ	Supply Voltage	Temperature Range	Special Features Comments
FM3 Low Power Group																																		
MB9AB40L	64	LQFP, QFN	48K, 112K, 240K	48K	16K, 16K, 32K	✓	40	✓	-	-	✓	✓	-	-	-	-	-	(2) 12	-	-	8	✓	✓	8	1	-	-	✓	20 x8	51	8	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9AA40L	64	LQFP, QFN	48K, 112K, 240K	48K	16K, 16K, 32K	✓	40	✓	-	-	✓	✓	-	-	-	-	-	(2) 12	-	-	8	✓	✓	8	-	-	-	✓	20 x8	51	8	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9A340L	64	LQFP, QFN	48K, 112K, 240K	48K	16K, 16K, 32K	✓	40	✓	-	-	✓	✓	-	-	-	-	-	(2) 12	-	-	8	✓	✓	8	1	-	-	✓	-	51	8	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9A140L	64	LQFP, QFN	48K, 112K, 240K	48K	16K, 16K, 32K	✓	40	✓	-	-	✓	✓	-	-	-	-	-	(2) 12	-	-	8	✓	✓	8	-	-	-	✓	-	51	8	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9AB40M	80	LQFP	48K, 112K, 240K	48K	16K, 16K, 32K	✓	40	✓	-	-	✓	✓	-	✓	-	-	-	(2) 17	-	-	8	✓	✓	8	1	-	-	✓	33 x8	66	12	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9AA40M	80	LQFP	48K, 112K, 240K	48K	16K, 16K, 32K	✓	40	✓	-	-	✓	✓	-	✓	-	-	-	(2) 17	-	-	8	✓	✓	8	-	-	-	✓	33 x8	66	12	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9A340M	80	LQFP	48K, 112K, 240K	48K	16K, 16K, 32K	✓	40	✓	-	-	✓	✓	-	✓	-	-	-	(2) 17	-	-	8	✓	✓	8	1	-	-	✓	-	66	12	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9A140M	80	LQFP	48K, 112K, 240K	48K	16K, 16K, 32K	✓	40	✓	-	-	✓	✓	-	✓	-	-	-	(2) 17	-	-	8	✓	✓	8	-	-	-	✓	-	66	12	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9AB40N	100	LQFP	48K, 112K, 240K	48K	16K, 16K, 32K	✓	40	✓	✓	-	✓	✓	-	✓	-	-	-	(2) 24	-	-	8	✓	✓	8	1	-	-	✓	40 x8	83	17	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9AA40N	100	LQFP	48K, 112K, 240K	48K	16K, 16K, 32K	✓	40	✓	✓	-	✓	✓	-	✓	-	-	-	(2) 24	-	-	8	✓	✓	8	-	-	-	✓	40 x8	83	17	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9A340N	100	LQFP	48K, 112K, 240K	48K	16K, 16K, 32K	✓	40	✓	✓	-	✓	✓	-	✓	-	-	-	(2) 24	-	-	8	✓	✓	8	1	-	-	✓	-	83	17	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9A140N	100	LQFP	48K, 112K, 240K	48K	16K, 16K, 32K	✓	40	✓	✓	-	✓	✓	-	✓	-	-	-	(2) 24	-	-	8	✓	✓	8	-	-	-	✓	-	83	17	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9A150M	80	LQFP	240K, 368K, 496K	48K	32K, 48K, 64K	✓	40	✓	✓	-	✓	✓	-	✓	-	-	-	(2) 17	-	1/2	15	✓	✓	8	-	-	-	✓	-	66	24	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9A150N	100	LQFP	240K, 368K, 496K	48K	32K, 48K, 64K	✓	40	✓	✓	-	✓	✓	-	✓	-	-	-	(2) 24	-	1/2	16	✓	✓	8	-	-	-	✓	-	83	25	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch
MB9A150R	120	LQFP	240K, 368K, 496K	48K	32K, 48K, 64K	✓	40	✓	✓	-	✓	✓	-	✓	✓	-	-	(2) 24	-	1/2	16	✓	✓	8	-	-	-	✓	-	103	25	1.65 - 3.6V	-40° - +85°C	HDMI-CEC 2ch

FM3 features

Series	Pins	Packages (Planned)	Flash	2nd Flash	RAM	Unique ID	CPU [MHz]	RC osc +/-2%, 100KHz	ETM	MPU	Sub Clock	Flash Security	ECC on (Main) Flash	External Bus	NAND Flash I/F	SDRAM I/F	SD CARD I/F	12-bit ADC (Units) ch	10-bit DAC	MFT/QDU	BT	WDG	RTC	MFS (USART, SPI, I ² C)	USB Host+Device FS	CAN	Ethernet MAC	CRC	LCD	Max I/O's	External IRQ	Supply Voltage	Temperature Range	Special Features Comments
FM3 Ultra Low Leakage Group																																		
MB9A130K	48	LQFP, QFN	64K, 128K	-	8K, 8K	-	20	✓	-	-	✓	✓	-	-	-	-	-	(1) 6	-	1/1	8	✓	✓	4	-	-	-	-	37	7	1.8 - 5.5V	-40° - +85°C	-	
MB9A130L	64	LQFP, QFN	64K, 128K	-	8K, 8K	-	20	✓	-	-	✓	✓	-	-	-	-	-	(1) 8	-	1/1	8	✓	✓	8	-	-	-	-	52	9	1.8 - 5.5V	-40° - +85°C	-	
MB9AA30L	64	LQFP, QFN	64K, 128K	-	12K, 16K	-	20	✓	-	-	✓	✓	-	-	-	-	-	(1) 9	2	1/1	8	✓	✓	8	-	-	-	20 x8	52	9	1.8 - 5.5V	-40° - +85°C	HDMI-CEC 2ch	
MB9AA30M	80	LQFP	64K, 128K	-	12K, 16K	-	20	✓	-	-	✓	✓	-	-	-	-	-	(1) 12	2	-	8	✓	✓	8	-	-	-	33 x8	67	12	1.8 - 5.5V	-40° - +85°C	HDMI-CEC 2ch	
MB9A130M	80	LQFP	64K, 128K	-	12K, 16K	-	20	✓	-	-	✓	✓	-	✓	-	-	-	(1) 12	2	1/1	8	✓	✓	8	-	-	-	-	67	12	1.8 - 5.5V	-40° - +85°C	HDMI-CEC 2ch	
MB9AA30N	100	LQFP, BGA	64K, 128K	-	12K, 16K	-	20	✓	✓	-	✓	✓	-	-	-	-	-	(1) 16	2	-	8	✓	✓	8	-	-	-	40 x8	84	17	1.8 - 5.5V	-40° - +85°C	HDMI-CEC 2ch	
MB9A130N	100	LQFP, BGA	64K, 128K	-	12K, 16K	-	20	✓	✓	-	✓	✓	-	✓	-	-	-	(1) 16	2	1/1	8	✓	✓	8	-	-	-	-	84	17	1.8 - 5.5V	-40° - +85°C	HDMI-CEC 2ch	

Spansion FM0+ family

The FM0+ family, which is based on the ARM Cortex-M0+ core, is designed for industrial and cost-sensitive applications with low power requirements such as white goods, sensors, meters, HMI systems and power tools.

The family, which operates at 40MHz, has a run-mode current of 70µA/MHz and an RTC mode current of 0.7µA. The FM0+ family can be easily embedded into systems adopting Spansion's 8-, 16- or 32-bit MCUs, accelerating product development and reducing development costs. The FM0+ family includes two groups for ultra-low-power and cost-effective applications.

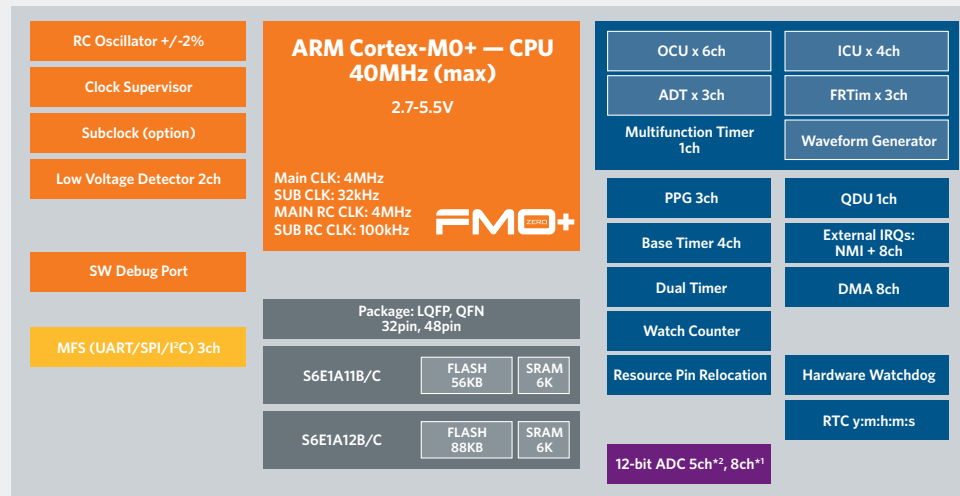
Ultra-low-power group

- Operating voltage: 1.65-3.6V
- Frequency: 40MHz
- Low power consumption
- EEPROM emulation
- Analogue peripherals

Entry-level group

- Operating voltage: 2.7-5.5V
- Frequency: 40MHz
- Flash: 56KB to 88KB
- 6KB RAM
- Cost efficient

S6E1A1

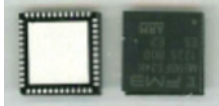
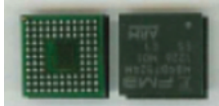
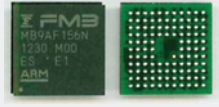
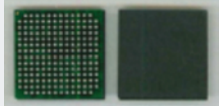


*1 S6E1A1xB: LQFP48, QFN48 *2 S6E1A1xC: LQFP32, QFN32

FM0+ features

Series	Pins	Packages (Planned)	Flash	2nd Flash	RAM	Unique ID	CPU [MHz]	RC osc +/-2%, 100kHz	ETIM	MPU	Sub Clock	Flash Security	ECC on (Main) Flash	External Bus	NAND Flash I/F	SDRAM I/F	SD CARD I/F	12-bit ADC (Units) ch	10-bit DAC	MFT/QDU	BT	WDG	RTC	MFS (USART, SPI, I²C)	USB Host+Device FS	CAN	Ethernet MAC	CRC	LCD	Max I/O's	External IRQ	Supply Voltage	Temperature Range	Special Features Comments
FM0+ Entry																																		
S6E1A1xB	32	LQFP, QFN	56K, 88K	-	6K, 6K	✓	40	✓	-	-	✓	✓	-	-	-	-	-	(1) 5	-	1/1	4	✓	✓	3	-	-	-	-	23	8	2.7 - 5.5V	-40 - +105°C	-	
S6E1A1xC	48	LQFP, QFN	56K, 88K	-	6K, 6K	✓	40	✓	-	-	✓	✓	-	-	-	-	-	(1) 8	-	1/1	4	✓	✓	3	-	-	-	-	37	8	2.7 - 5.5V	-40 - +105°C	-	

Package Code

Part Number Package Code	Functional Pins	Package	Dimensions in mm (pitch)	Package Code	Photo
JPMC	32	LQFP	7x7 (0.8)	FPT-32P-M30	
JWQN	32	QFN	5x5 (0.5)	LCC-32P-M19	
KPMC	48	LQFP	7x7 (0.5)	FPT-48P-M49	
KQN	48	QFN	7x7 (0.5)	LCC-48P-M73	
LPMC	64	LQFP	12x12 (0.65)	FPT-64P-M39	
LPMC1	64	LQFP	10x10 (0.5)	FPT-64P-M38	
LQN	64	QFN	9x9 (0.5)	LCC-64P-M24	
MPMC	80	LQFP	12x12 (0.5)	FPT-80P-M37	
MPMC1	80	LQFP	14x14 (0.65)	FPT-80P-M40	
MBGL	80 (96 balls)	BGA	6x6 (0.5)	BGA-96P-M07	
NPF	100	QFP	14x20 (0.65)	FPT100P-M36	
NPMC	100	LQFP	14x14 (0.5)	FPT-100P-M23	
NBGL	100 (112 balls)	BGA	10x10 (0.8)	BGA-112P-M04	
NBGL	100 (112 balls)	BGA	7x7 (0.5)	BGA-112P-M05	
RBGL	120 (144 balls)	BGA	7x7 (0.5)	BGA-114P-M09	
RPMC	120	LQFP	16x16 (0.5)	FPT-120P-M37	
SPMC	144	LQFP	20x20 (0.5)	FPT-144P-M08	
TPMC	176	LQFP	24x24 (0.5)	FPT-176P-M07	
TBGL	176 (192 balls)	BGA	12x12 (0.8)	BGA-192P-M06	

Development Tools


Spansion's microcontroller families are supported by development tools—including integrated development environments (IDEs), middleware and evaluation boards—that have a proven track record with partner vendors.

IDE, Compilers, Debuggers

The Spansion FM families are supported by market-leading tool-chain suppliers such as IAR Systems, Keil and Atollic. These companies offer enhanced IDEs with a compiler, assembler, linker and debugger within a common GUI. A free Open Source GNU/Eclipse-based tool chain is also available. Popular JTAG emulators such as Segger J-Link, Keil ULINK and many low-cost FTDI-based adapters can be utilized. FM devices with an Embedded Trace Macrocell (ETM) feature a trace port interface unit (TRPIU), as well as the standard serial wire JTAG debug port. The TRPIU allows the connection of JTAG adapters with trace functionality.

Supplier	Product	Supplier	Product
 <small>Embedded software development from Altium™</small>	Altium TASKING VX toolset for ARM - Standard Edition Eclipse IDE, C and C++ compiler, debugger http://www.tasking.com/products/arm/		Open Source GNU toolchain Eclipse IDE, GNU compiler, OpenOCD debugger (for many low-cost JTAG probes)
	TrueSTUDIO™ IDE, C and C++ compiler, debugger, many tools http://www.atollic.com TrueINSPECTOR™ A tool for professional static source code analysis to reduce the number of errors and cut development time TrueANALYZER™ A tool for dynamic execution flow analysis, plus rigorous code and test coverage measurements TrueVERIFIER™ A professional tool for advanced test automation that helps find bugs automatically		IAR Embedded Workbench® - Basic Line (256KB Code) IAR Embedded Workbench® - Cortex Line IDE, C and C++ compiler, debugger http://www.iar.com
	Sourcery G++ Personal Edition (30 days' support) Sourcery G++ Standard Edition (unlimited support, debuggable libs) Eclipse IDE, C and C++ GNU compiler, Debug Sprite http://www.mentor.com/embedded-software/codesourcery	 <small>Tools by ARM</small>	MDK-ARM MCU Development Kit - Basic Edition (256KB) MDK-ARM MCU Development Kit - Standard Edition IDE, C and C++ compiler, debugger http://www.keil.com/arm/mdk.asp
			Debugger hardware and software Debugger, Trace32, SIM, MON http://www.lauterbach.com
			CrossWorks for ARM CrossStudio IDE, C and C++ compiler, debugger http://www.rowley.co.uk
			iTAG ARM/Cortex debug and test tool package IDE winIDEA, GNU compiler, debugger, low-cost JTAG adapter http://www.isystem.com/products/itag

Flash Programmer for FM3

Supplier	Product	Type
	Serial Flash Programmer - Software http://www.spansion.com	UART
	USB Flash Programmer - Software http://www.spansion.com	USB
	JTAG Flash Programmer - Software http://www.segger.com/cms	JTAG
	Parallel Flash Programmer - Hardware & Software http://www.elnec.com/	Parallel
	Parallel Flash Programmer - Hardware & Software http://www.phyton.com	Parallel
	Parallel Flash Programmer - Hardware & Software http://www.conitec.net	Parallel
	http://www.j-fsg.co.jp/en/index.html	Serial, Parallel
	http://www.yokogawa-digital.com/en/	Serial
	http://www.wavetechnology.co.jp/en/index.html	Parallel
	http://www.dediprogram.com	JTAG and Serial
	http://www.xeltek.com	Parallel

Middleware

A diverse range of middleware components is available, including real-time operating systems, low-level peripheral libraries and protocol stacks. In many cases, the user can choose between commercial and free solutions.

Spanion Low-level and Middleware Components

- Peripheral, low-level library
- CMSIS compliant
- USB library
- Ethernet TCP/IP stack, software switch
- Functional safety self-test libraries (IEC60730 - Class B, IEC61508 SIL2)
- EEPROM emulation library
- Motor control platform
- Capacitive touch library

Operating Systems

- FreeRTOS
- Micrium μ C/OS-II
- Segger emboss
- Avix/RT

Partner Middleware Components

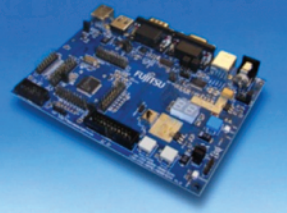

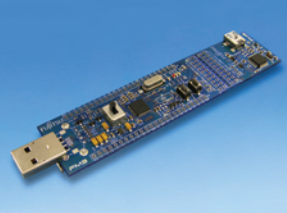
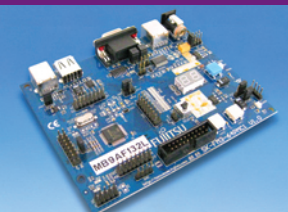

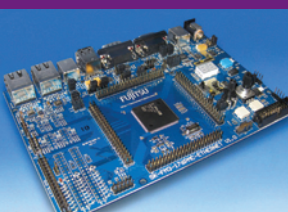
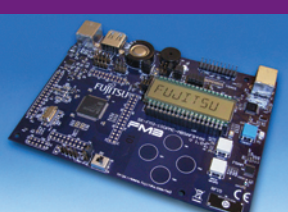
- USB library
- Ethernet TCP/IP stacks and applications layers
- CANopen protocol stacks

Middleware

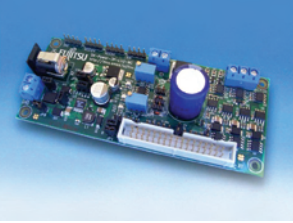
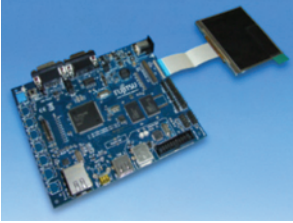
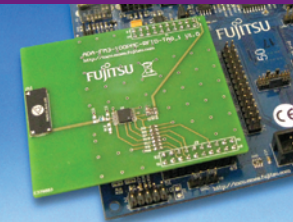
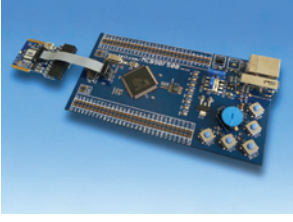
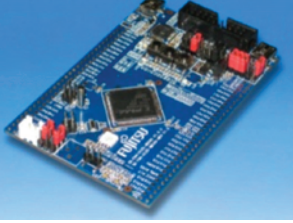
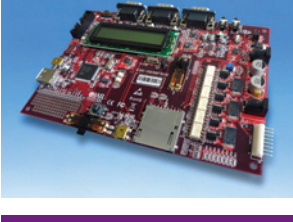



Supplier	Product	Type
	embOS, emWin, emFile, emUSB http://www.segger.com/cms/fujitsu.html	RTOS USB FS Graphics
	Micrium μ C/OS-II http://micrium.com	RTOS USB, TCP/IP FS
	FreeRTOS http://www.freertos.org/	RTOS
	AVIX/RT http://www.avix-rt.com/	RTOS
	Middleware Components http://www.iar.com	TCP/IP
	MDK-ARM Middleware Components http://www.keil.com/arm/mdk.asp	
	TCP/IP, Embedded Webserver, ZeroConfig www.sevenstax.de	TCP/IP
	Micro ITRON, TCP/IP Stack http://www.eforce.co.jp/english.html	RTOS TCP/IP

Evaluation Boards

Developers can select the right-sized solution from a wide range of MCU evaluation boards. In addition to the basic MCU motherboards, application-specific adapter boards are available. These boards come with sample software and libraries to guarantee an out-of-the-box experience. Some boards are available bundled with a JTAG adapter.

Tool	Features	Tool	Features
SK-FM3-100PMC-MB9BF516N SK-FM3-100PMC-9BF516N-JL 	Starter Kit with MB9BF516N MCU (100pin MCU) <ul style="list-style-type: none"> All MCU pins accessible CAN, USB Host+Func, RS232 2 x 7seg LEDs, buttons 3V and 5V operation Optionally available with J-Link JTAG adapter Extendable through pin headers (different extension boards available)	SK-FM3-80PMC-MB9BF524M SK-FM3-48PMC-MB9BF524K 	Starter Kit with MB9BF524M/K MCU (80pin/48pin MCU) <ul style="list-style-type: none"> All MCU pins accessible USB Host+Func, RS232 CAN 2 x 7seg LEDs, buttons 3V and 5V operation
SK-FM3-64PMC1 SK-FM3-64PMC1-JLINK 	Starter Kit with MB9AF314L MCU (64pin MCU) <ul style="list-style-type: none"> All MCU pins accessible USB Host+Func, RS232 2 x 7seg LEDs, buttons 3V and 5V operation Optionally available with J-Link JTAG adapter 	SK-FM3-48PMC-USBSTICK 	Starter Kit with MB9AF312K MCU (48pin MCU) <ul style="list-style-type: none"> All MCU pins accessible USB Host USB Device JTAG debug Interface adapter included Temp sensor, button, LED
SK-FM3-64PMC1-MB9AF132L 	Starter Kit with MB9AF132L MCU (64pin MCU) <ul style="list-style-type: none"> All MCU pins accessible USB Host+Func, RS232 2 x 7seg LEDs, buttons 3V and 5V operation 	SK-FM3-9BF516N-TOUCHKIT 	Starter Kit with MB9BF516N MCU (100pin MCU) and capacitive touch board <ul style="list-style-type: none"> Includes SK-FM3-100PMC-MB9BF516N Capacitive touch board (4 buttons, slider, circular slider) Ribbon cable Capacitive touch software library
SK-FM3-176PMC-ETHERNET 	Starter Kit with MB9BFD18T MCU (176pin MCU) <ul style="list-style-type: none"> JTAG/USB adapter on board All MCU pins accessible Dual EtherMAC I/F USB Host+Func, RS232 CAN 2 x 7seg LEDs, buttons, rotary encoder, poti 3V and 5V operation 	ADA-FM3-100PMC-MC 	Adapter board for SK-FM3-100PMC-MB9BF516N <ul style="list-style-type: none"> Allows the connection of Spansion's inverter boards like SK-POWER-3P-LV2-MC (not included) to the starter kit Extension board for SK-FM3-100PMC-MB9BF516N (not included) Complete evaluation system consists of SK-FM3-100PMC-MB9BF516N, ADA-FM3-100PMC-MC, SK-POWER-3P-LV2-MC and a motor
SK-FM3-100PMC-MB9AFB44N 	Starter Kit with MB9AFB44N MCU (100pin MCU) <ul style="list-style-type: none"> JTAG/USB adapter on board All MCU pins accessible Segment LC display USB Host+Func, RS232 Buzzer FRAM UHF RFID memory Capacitive touch buttons 3V and 5V operation 		

Evaluation Boards

Tool	Features	Tool	Features
SK-POWER-3P-LV2-MC 	<p>3-phase MOSFET Power Stage, 24V, 8A max.</p> <ul style="list-style-type: none"> Allows the connection of BLDC or PMSM motors (not included) Current and voltage measurements Temperature sensor and overvoltage/current detection with indicator LEDs Fits ADA-FM3-100PMC-MC, SK-FM3-176PMC-ETHERNET, SK-FM3-176PMC-FA, etc. (not included) <p>Complete evaluation system consists of MCU evaluation board (e.g., SK-FM3-100PMC-MB9BF516N + ADA-FM3-100PMC-MC), SK-POWER-3P-LV2-MC and a motor</p>	SK-FM3-176PMC-TFT SK-FM4-120PMC-TFT 	<p>TFT Direct-Drive Starter Kit with FM3 MB9BFD18T (176pin) or FM4 MB9BF568R (120pin) MCU</p> <ul style="list-style-type: none"> Includes QVGA color TFT display Ethernet, USB, CAN interfaces on board Cap touch buttons 8MB external Flash and 2MB external RAM
ADA-FM3-100PMC-RFID-TAG1 	<p>UHF RFID Module with 4KByte FRAM</p> <ul style="list-style-type: none"> Extension board for SK-FM3-100PMC (not included) Based on dual-interface UHF RFID chip MB97R804B with SPI interface and 4KByte FRAM The memory can be accessed from the MCU via a SPI interface and via RFID reader/writer devices 	Keil MCB9BF500UME 	<p>Starter Kit with MB9BF506R MCU (120pin MCU) ULINK-ME JTAG adapter</p> <ul style="list-style-type: none"> Limited set of peripherals USB Host+Func. Buttons All MCU pins accessible
SK-FM4-U120-9B560 SK-FM4-U120-9B560-MEM 	<p>Starter Kit with FM4 MB9BF568R MCU (120pin MCU)</p> <ul style="list-style-type: none"> All MCU pins accessible USB device (mini-USB Type B) CMSIS-DAP JTAG adapter on board RGB LED User buttons, potentiometer, reset button SD-card slot 3V and 5V operation Available with external 32MB NAND Flash and 16MB SDRAM (optional) 	IAR Kickstart KSK-MB9BF506 	<p>Starter Kit with MB9BF506R MCU (120pin MCU) J-Link Lite (on board)</p> <ul style="list-style-type: none"> Many peripherals LCD SD card slot CAN, USB, RS232 Motor control power stage
SK-FM3-176PMC-FA 	<p>Fieldbus Starter Kit with FM3 MB9BFD18T MCU (176pin MCU)</p> <ul style="list-style-type: none"> Covers various protocols <ul style="list-style-type: none"> EtherCAT Powerlink Profinet MODBUS TCP Ethernet/IP 2 x CAN, USB User interface (push buttons, LCD module, RGB LED) External RAM and Flash memory Motor control interface Debug interface 	IAR KickStart Kit for MB9BF618T 	<p>FM3 MB9BF618T</p> <ul style="list-style-type: none"> All MCU pins accessible On-board JTAG adapter plus standard JTAG connector Trace connector USB Host and Device Dual Ethernet (2 connectors) Reset button, user button Power LED, user LED
		IAR KickStart Kit for MB9BF516R 	<p>FM3 MB9BF516R</p> <ul style="list-style-type: none"> All MCU pins accessible On-board JTAG adapter plus standard JTAG connector Trace connector USB Host and Device Reset button, user button Power LED, user LED

Spancion FM Family Solutions

In addition to other development tools, Spancion offers a range of solutions packages including FM Touch, FM Connect USB, FM Connect Ethernet, FM Inverter, FM Safety and FM Color.

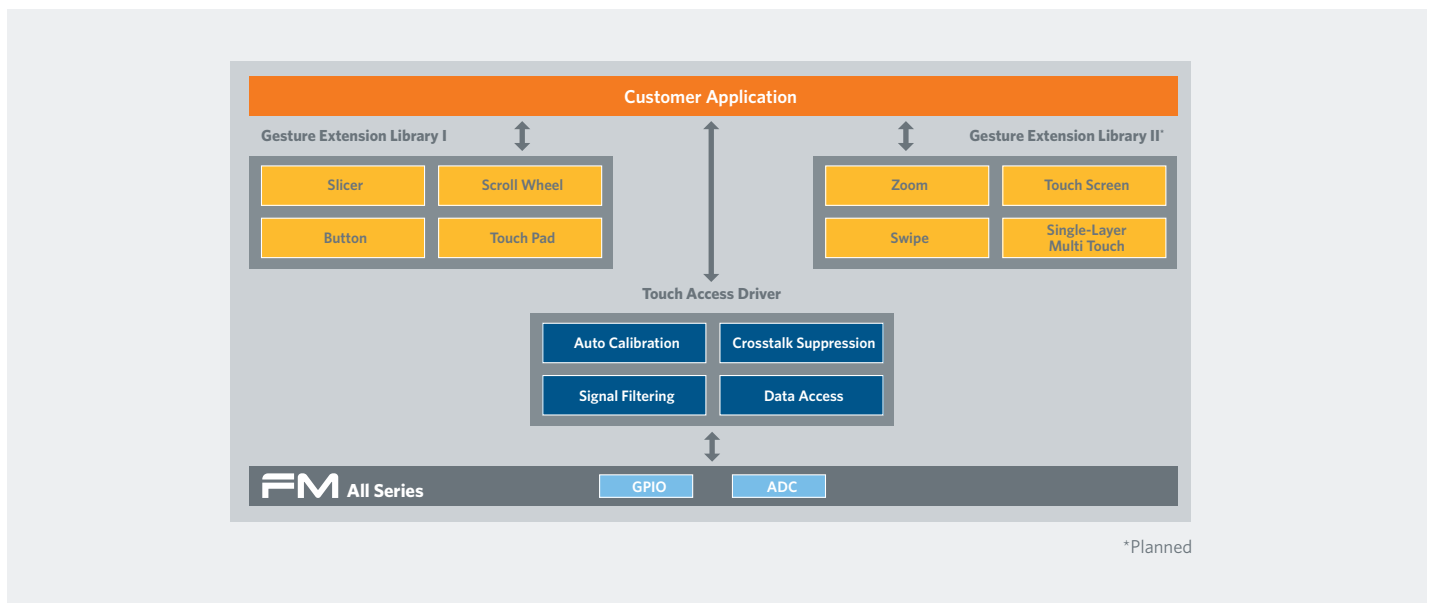
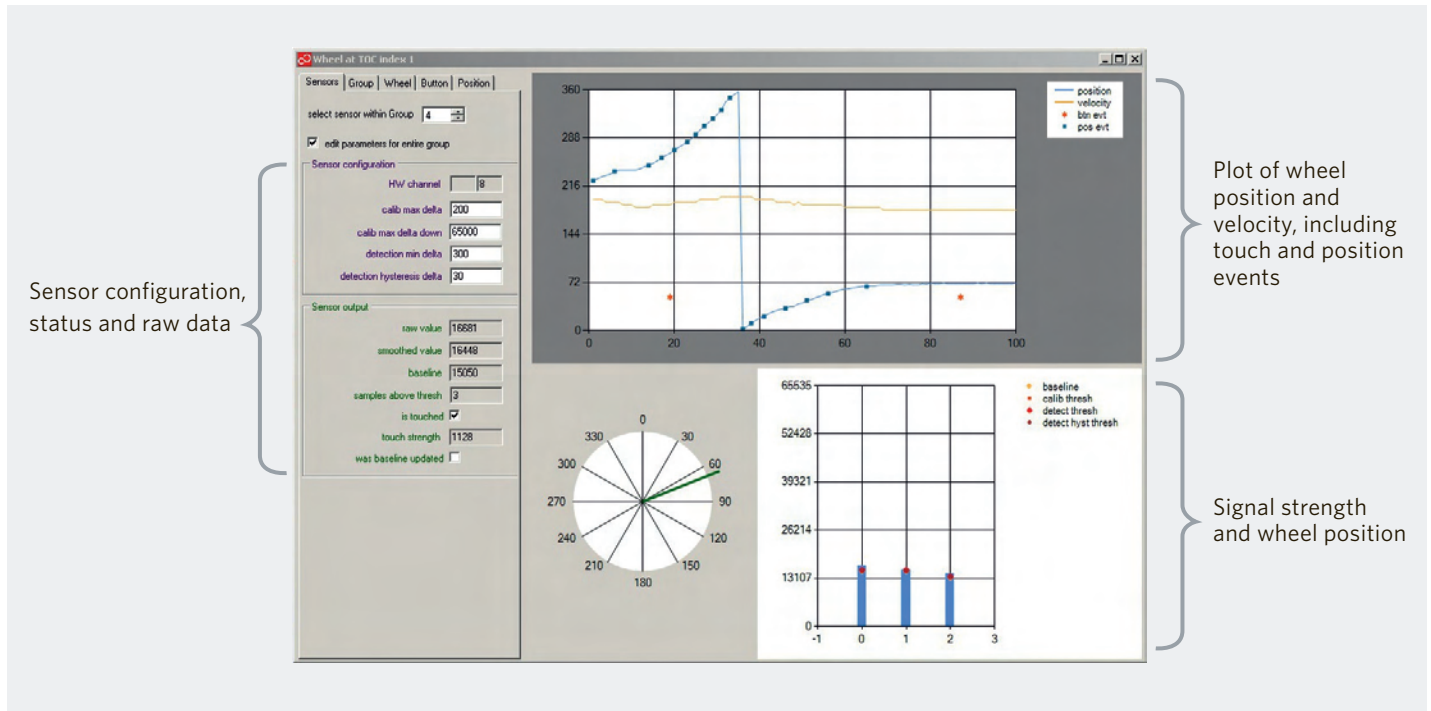
FM Touch	FM Connect USB	FM Connect Ethernet	FM Inverter	FM Safety
<ul style="list-style-type: none"> Capacitive touch sensors Software solution, only one ADC channel per sensor channel Free library available Buttons and complex sensors (sliders, wheels) 	<ul style="list-style-type: none"> USB host and device Low level drivers Various USB class implementations Mass storage class, virtual COM port, HID mouse, HID keyboard, LibUSB Covers embedded as well as PC side 	<ul style="list-style-type: none"> 10/100Mbps IEEE802.3 Ethernet Low-level drive Free TOP/IP stack implementations twIP, uP Application layer, HTTP server, DHCP, SMTP, etc. 	<ul style="list-style-type: none"> Dedicated application library available Various software examples Various motor types supported 	<ul style="list-style-type: none"> IEC6070 class 8 IEC61508S1L2 Self test libraries (STL) available Covers CPU, clock, interrupts, RAM, ROM, IO, ADC
<ul style="list-style-type: none"> MCUs: All FM family members Starter kits available 	<ul style="list-style-type: none"> MCUs: Large selection of FM3 and FM4 devices Several evaluation boards available 	<ul style="list-style-type: none"> MCUs: Various FM3 high-performance group devices TwinMAC derivatives available (2 Ethernet MAC on chip) Starter kit available 	<ul style="list-style-type: none"> MCUs: All FM3/4 high-performance devices Up to 3 MFTs, QDU- quadrature decoder unit Starter kits and power stage 	<ul style="list-style-type: none"> MCUs: All FM family members Various IW features implemented on FM family MCUs CRC, watchdog, LVD, clock supervisor, etc.
FM Color	FM Connect Fieldbus			
<ul style="list-style-type: none"> Low-cost TFT direct drive Drives QVGA without external RAM Frame buffer concept for 'quasi-static' content TFT Wizard - code generator 	<ul style="list-style-type: none"> Sample implementation for fieldbus protocol slave supports: <ul style="list-style-type: none"> Modbus TCP Powerlink EtherCAT Profinet RT Open Source stack implementations plus third-party offerings EtherCAT with ASIC ET1100 Switch/hub onboard 			
<ul style="list-style-type: none"> MCUs: FM3 High-performance Group, FM4 Dedicated evaluation boards available: SK-FM3-176PMC-TFT SK-FM4-120PMC-TFT 	<ul style="list-style-type: none"> MCUs: FM4, FM3 MB9BD10S/T, MB9B210S/T, MB9B610S/T series Dedicated evaluation board available: SK-FM3-176PMC-FA 			

Spanion FM Touch

FM Touch is a solutions package for capacitive touch applications based on any member of the FM0+, FM3 and FM4 families. FM Touch consists of a dedicated firmware library as well as a development GUI that runs on a Windows PC. Documentation including application notes is available, as is sample software. Dedicated starter kits including initial hardware enable rapid project ramp-up.

Selected features support for capacitive touch buttons, sliders, scroll wheels, x/y matrix and proximity sensing

- Uses one ADC input pin per touch channel, no additional hardware required
- High sensitivity ($\ll 10\text{fF}$), high dynamic range and SNR (signal to noise ratio)
- Solid front panels or a multi-layer front panel possible
- Automatic offset calibration and crosstalk suppression
- Optimized RAM/ROM footprint for embedded applications

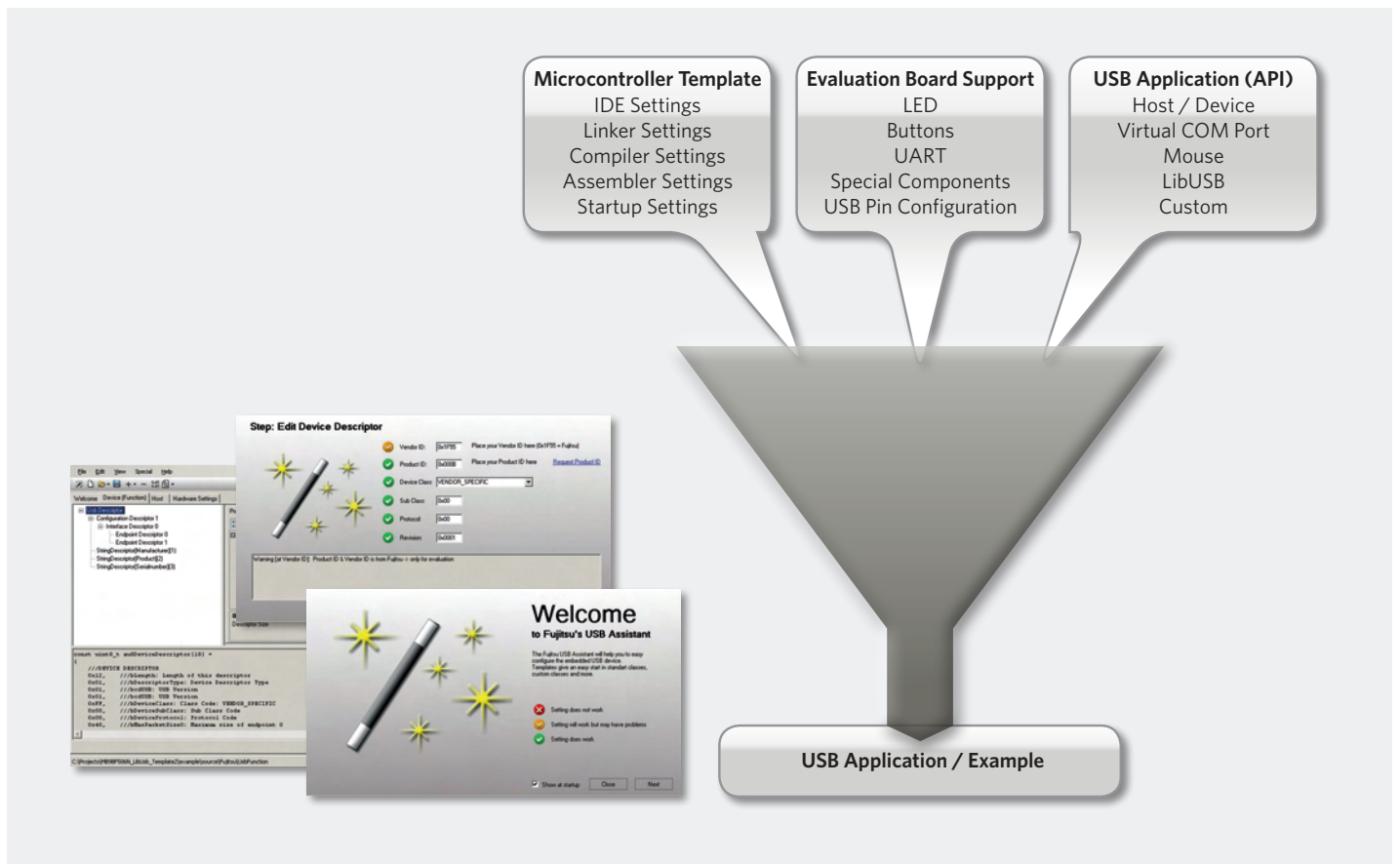


Spanion FM Connect USB

The FM Connect USB platform is a set of hardware and software components, tools and documentation. The package supports multiple, out-of-the-box, embedded USB solutions and both HOST and DEVICE use cases.

Selected FM Connect USB features

- Support for up to two USB interfaces per MCU
- Support for USB host/function or dual role
- USB Wizard, as code generator for USB firmware
- USB device functions, virtual COM, HID mouse/joystick/data communication, Lib USB COM
- USB host functions, HID mouse/keyboard, USB mass storage
- PC drivers: LibUSB and Windows native driver support
- Can be used with all FM family microcontrollers with on-chip USB hardware

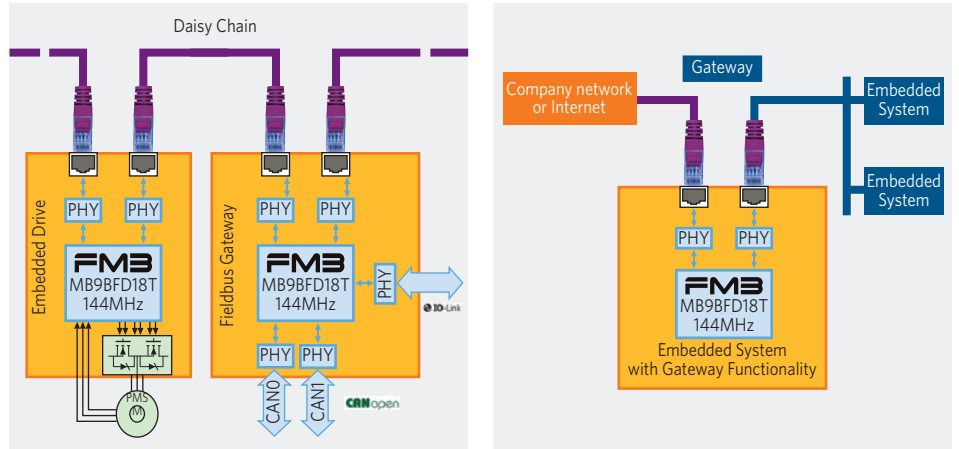


Spanion FM Connect Ethernet

The FM Connect Ethernet package utilizes proven open source components such as the lwIP TCP/IP stack and internal developments such as the L3 FM low-level library. This enables the rapid implementation of solutions such as web-based diagnostic systems or maintenance interfaces for industrial devices.

Selected FM Connect Ethernet features

- Up to 2-channel Ethernet
- Software switch module
- Low-level driver, TCP/IP stacks
- Sample software, web server, etc.
- Commercial products from partners (e.g., Sevenstax)

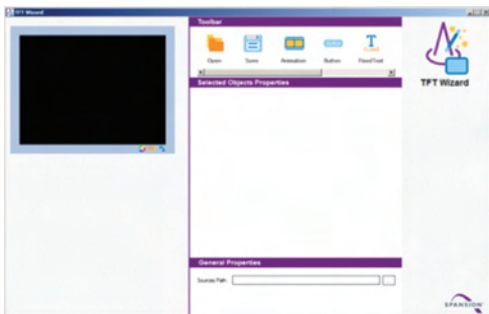
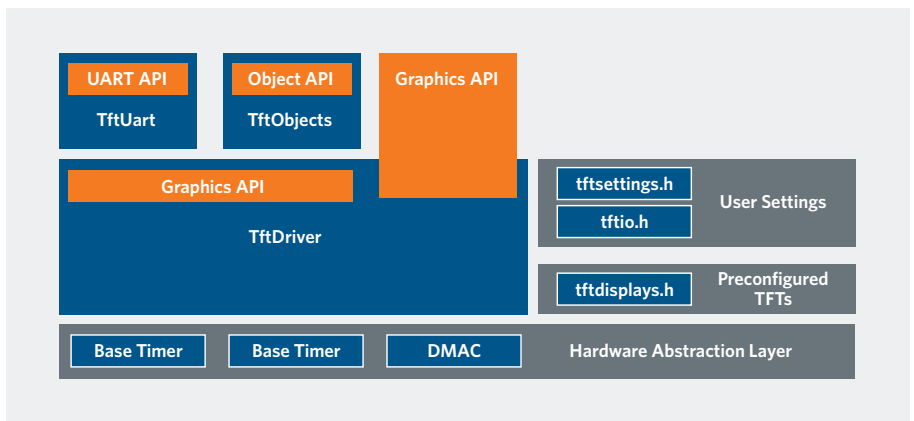
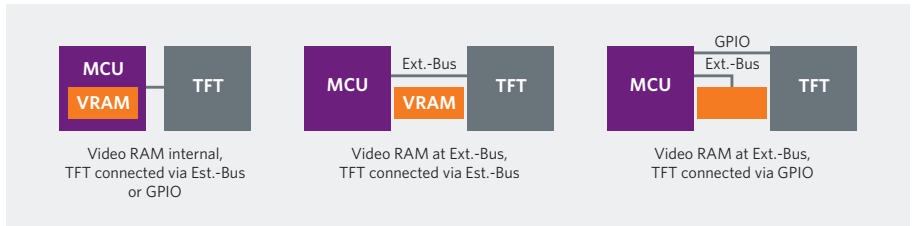


Spanion FM Color

FM Color, a solution for simple and cost-efficient, full-color HMIs, enables designers to add colored HMI functionality/TFT display control to designs without needing additional hardware. An FM3 or FM4 MCU controls both the application and the TFT display; no dedicated graphic controller is needed. The TFT display can be directly connected to FM3/FM4 MCUs.

Selected FM Color features

- Up to 320x240 pixel, 8-bit color depth with internal RAM
- Up to 480x272, 16-bit color with external SRAM (8-bit or 16-bit external bus)
- Firmware module Tft driver to generate the timing signals to control the TFT display, handle the data flow from RAM to TFT, and synchronize the update of the TFT content with the display timing
- Predefined HMI objects: e.g., simple buttons, checkboxes, text, and progress bars
- Control routines for user interaction via buttons, a USB mouse, keyboard or touchscreen
- PC-based, simple scene generator "TFT wizard"

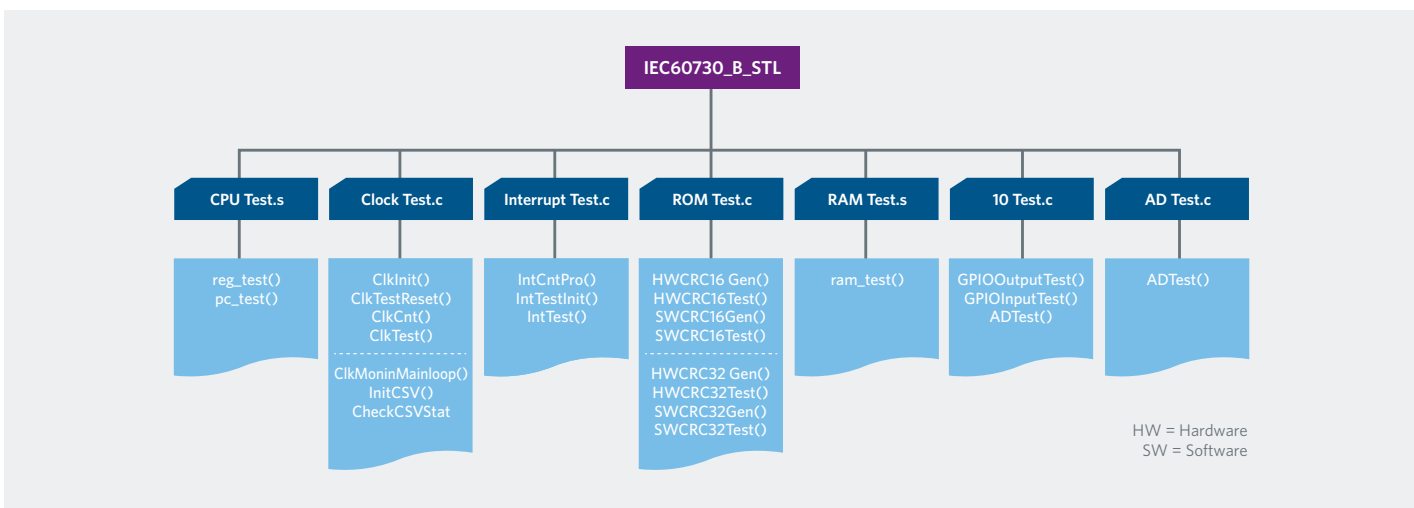


Spanion FM Safety

To help customers obtain relevant safety certifications, Spanion embeds specific hardware components into its FM family of MCUs. Self-test libraries for IEC61508 and IEC60730 standards.

Software packages: Self-Test Libraries (STL)

- Addresses IEC60730 class B and IEC61508 requirements
- Pre-Operation Self-Test (POST): system startup
- Built-In Self-Test (BIST): run periodically
- APIs include CPU, Clock, RAM, Flash, Interrupt, ADC, GPIO test routines
- Utilizes the functional safety hardware features
- IEC6070 STL memory footprint: approximately 4.6KB Flash (max.), 80-Bytes RAM usage
- ICE61508 (SIL2) version available on request

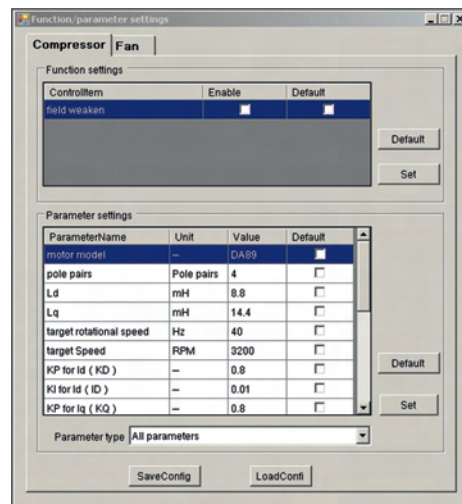


Spanion FM Inverter

FM Inverter is a solution to drive three-phase motors such as PMSM with the FM family. The package consists of firmware for different motor and control types, a GUI for parameterization, documentation, software examples, dedicated starter kits and support.

Selected FM Inverter features

- Up to 3-channel, flexible 3-phase motor timers on 144MHz FM3 MCUs
- Automatic dead-time insertion, freely programmable ADC trigger
- Up to three independent 12-bit 1Msps ADC units, with up to 32 ADC inputs
- Up to 3-channel ABZ quadrature decoder units
- DTTI input for emergency motor stop
- 3.3V and true 5V single-supply operation
- Dedicated starter kit and power stage extension board available
- Ready-to-run sample software for different motor types
- GUI for PC-based parameterization
- Can be used with all FM3 microcontrollers except the low-power group



Other Solutions

- Inverter motor control solution for consumer electronics such as air conditioners, refrigerators and washing machines
- RF solution for RF control, sensor control and NFC
- ESL (virtual simulation) to identify fatal errors, and to shorten the debugging and development time
- Audio/video solutions

Check Spansion's seminar page in the news section of our website for workshops and other application-development support.

White Goods

- Products: washing machines, dishwashers, air conditioners
- MCUs: FM0+ and FM3 basic group
 - Cost-optimized products
 - Reliable Flash for EEPROM emulation
 - On-chip RC oscillator: = -2%
 - Hardware motor control support
 - 2 or 3 fast, independent, 12-bit ADCs
 - Wide supply voltage range: 2.7-5.5V
 - Operating temperature range between -40°C and +105°C

Factory Automation

- Products: PLCs, motor control, sensors
- MCUs: FM3 high-performance and basic groups, and FM4
 - High performance
 - Up to 200MHz CPU clock
 - DSP functionality on FM4
 - FPU on FM4
 - Faster Flash in group: 14ns access + code pre-fetch = OWS at 144MHz
 - Up to 1.5MB Flash
 - Wide supply voltage range: 2.7-5.5V
 - Hardware motor control support, up to three motors, including software package
 - Three independent, fast, 12-bit ADCs
 - Many safety features (e.g., MPU, CRC, two-stage LVD)
 - Twin AMC - dual-Ethernet device
 - Scalable lineup, pin compatibility between high-performance and basic groups MCUs to cover a wide range of applications
 - Many devices suitable for extended temperature ranges between -40°C and +105°C

Medical and Handheld Devices

- MCUs: FM0+ and FM3 low-power and ultra-low-leakage groups
 - Ideal feature mix for HMI (human machine interface)
 - LCD segment controller
 - High-performance, capacitive touch software library
 - USB host and function (OTG functionality), including corresponding software packages
 - Two independent, fast, 12-bit ADCs
 - Low-voltage supply: 1.65-3.6V
 - Low-current consumption and deep standby modes

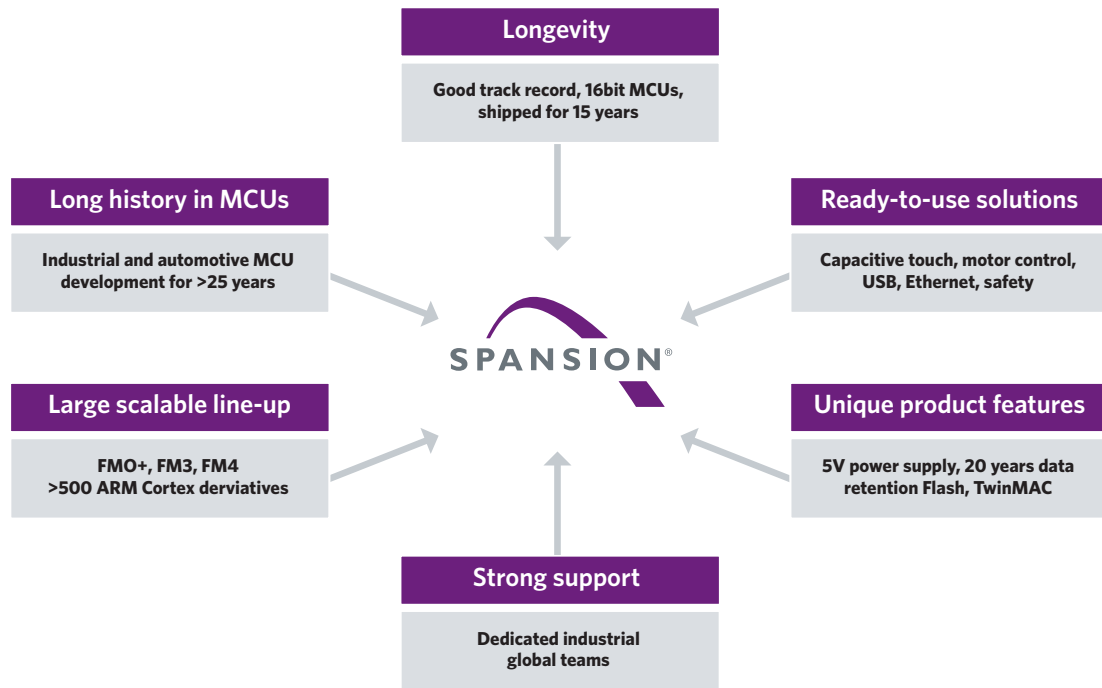
Motor/Inverter Control

- MCUs: FM4 family
 - High-spec vector arithmetic
 - Single-cycle instruction by DSP
 - Enhanced motor control timer
 - Enhanced A/D convertor
 - High-speed sampling (conversion speed: 2Msps)
 - Window comparator

Networking

- MCUs: FM4 and FM3 high-performance families
 - Enriched communication function
 - SD card I/F (SDIO)
 - Ethernet, CAN
 - High-speed 12C fast mode (~1Mbps)
 - High-speed SPI (~20Mbps)
 - Large memory
 - SDRAM I/F
 - DSTC (Descriptor System data Transfer Controller, maximum: 1,024ch)

Why Spansion?





ABOUT SPANSION

Spanion's (NYSE: CODE) technology is at the heart of electronics systems, powering everything from the internet of today to the smart grid of tomorrow, positively impacting people's daily lives at work and play. Spanion's broad Flash memory product portfolio, smart innovation and industry leading service and support are enabling customers to achieve greater efficiency and success in their target markets. For more information, visit <http://www.spansion.com>.

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