# FUJITSU

# MB91580 Series 32-bit Motor Control MCU for Electric (EV) and Hybrid Electric Vehicles (HEV)



## Description

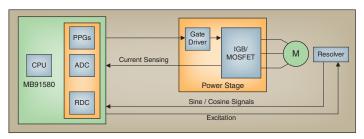
The new MB91580 series, a part of the Fujitsu FR family of 32bit RISC microcontrollers (MCUs), offers 3-phase inverter motor control and an embedded resolver interface for electric (EV) and hybrid electric vehicles (HEV).

The MCU series offer high performance combined with optimized peripherals for electric and hybrid electric vehicles. The MB91580 series was designed to provide special features for efficient loopback control. The device offers a 12-bit Analog to Digital Converter (ADC) and a 12-bit Resolver to Digital Converter (RDC) to detect motor current and position at high speed and with high resolution. The electric angle of the revolver, which is calculated by the RDC, is latched into dedicated registers and synchronized with the three phase current detected by the ADC. Control algorithms will benefit from the floating point Unit (FPU) and will speed up vector conversion and calculations using decimal point numbers by 10-15% compared to standard integer processing.

The MB91580 series feature Fujitsu's advanced Flash memory technology, including dedicated program memory and a separate work Flash for EEPROM emulation storage.

# Applications

- Generic electric motor control
- HEV/EV inverter
- HEV/EV generator control



MB91580 Motor Control: Current, Positioning Detection and Feedback Control

2 x UDC	2 x DAC 8-bit	3 x ADC x 8ch 12-bit	24 x ADC 10-bit	Pin Relocation	CRC	
12 x OCU 16-bit	LVD	8 x IRQ ext.	NMI	8 x DMA	Diagnostic Fuctions	
8 x ICU						
16-bit	Main Oscillator	OCD	FPU	PWR Mgmt	Flash Flash Security	
24 x PPG 16-bit 6 x FRT	Sub-clock Oscillator	FR81S 128MHz 4.5 TO 5.5V		MPU	Work Flash 64kb	
16-bit	PLLs SSCG PLL			ECC Flash & RAM	RAM	
4 x RLI 16-bit	RC Oscillator	-40 to + 125°C 144 pin		Clock Supervisor	Watchdog	
2 X Base Timer						
RTC	TCON Video Input VRAM Graphics Controller LCDC SMC Sound					
Waveform Generator	RS	3 x CA 64msc		Multi Func. Serial	4 x UN USART	
RDC	Media LB	Etherne	et F	lexRay	Ext. BUS VF 22A / 16D	

#### MB91580 Series Block Diagram

### **Key Features**

#### Main processor

- FR81S core
- Single precision FPU
- 128MHz CPU frequency
- 8ch DMA

#### Motor control features

- Integrated RDC
- RDC excitation signal waveform generation
- 12ch motor timing waveform generator
- Quadrature encoder

#### Connectivity

- 3ch CAN / 64Msg buffers
- 5ch multifunctional serial (LIN, SPI, I<sup>2</sup>C, UART)
- FlexRay<sup>™</sup> interface (A+B)

#### Functional safety features

- MPU
- ECC for all memory types
- Watchdog
- Low voltage detector for internal/external power supply
- Clock supervisor
- CPU diagnostic
- Bus diagnostic
- RAM diagnostic
- NMI
- 16/32-bit CRC generator

# Development Tools

Development tools, including debuggers, evaluation boards, starter kits and compilers, are available to support the Fujitsu MB91580 series.

Product	Flash	RAM	Work Flash
MB91F585	576kB	48kB	64kB
MB91F587	108.8kB	96kB	64kB

#### **Product Lineup**



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