Ultra-low-power consumption with the MSP430FR57xx family featuring FRAM

TEXAS INSTRUMENTS

MSP430™ MCUs with Ferroelectric Random Access Memory (FRAM) offer even lower power consumption. With an active power mode of 100µA/MHz, these microcontrollers are truly industry leading. For applications that require continuous data logging, the low power consumption of these devices is unbeatable at 200 to 250 times less than typical flash memory based microcontrollers. While writing to memory, the MSP430FR57xx only needs 2.0V of current with no charge pump or boost whereas most Flash memory MCUs will need 12V to 15V of current to write.

FRAM microcontrollers

Performance and capabilities of today's embedded controllers are limited by the type of memory technology used. The MSP430FR57xx family with FRAM introduces the market to a new generation of superior non-volatile memory devices. This unified memory makes the MSP430FR57xx microcontroller very flexible. For example, you can dynamically partition the device memory into code space or data space, as needed. Again, this brings incredible flexibility to software designers, product manufacturers and others offering a lower cost of ownership. FRAM is at the forefront of these *'next generation'* memory technologies; it is the most proven and mature, having been used for the past several years in diverse applications from EEPROM or battery backed SRAM replacement devices to automotive applications. Texas Instruments is continuing our tradition of innovation by delivering embedded FRAM products that bring real, tangible value to our customers and partners.

Key features

- Non-volatile memory — data state is retained even when power is turned off
- Fast write speeds – current implementations are at less than 50ns – up to 100x faster than Flash or EEPROM technologies
- High endurance – over 100 trillion write cycles
- Very low memory access power requirements – 2.0v read/write compared to >10-14v write for Flash and EEPROM
- Enhanced data reliability – inherent write guarantee during a write cycle even in case of power loss
- Resistant to gamma radiation

MSP430FR57xx Microcontroller Comparison

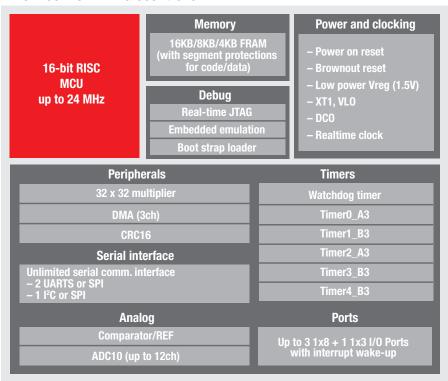|	MSP430FR57xx	Flash microcontroller
Max. data write throughput (kBps)	1,400	13
Power consumption at max. throughput (µA)	720	2,200
Power consumption at 13 kBps throughput (µA)	9	2,200
Write endurance cycles	>100 trillion	100 to 100,000

For more information, visit ti.com/fram

Device	FRAM (KB)	SRAM (KB)	System Clock (MHz)	ADC10_B	Comp_D	Timer_A (1)	Timer_B (2)	eUSCI Channel A: UART/IrDA/SP	eUSCI Channel B: SPI/ I²C	Package Type 24 QFN	Package Type 38 TSSOP	Package Type 40 QFN	Package Type 28 TSSOP
MSP430FR5739	16	1	24	y	16 ch.	3, 3	3, 3, 3	2	1		DA	RHA	
MSP430FR5738	16	1	24	y	10 ch.	3, 3	3	1	1	RGE			PW
MSP430FR5737	16	1	24	-	16 ch.	3, 3	3, 3, 3	2	1		DA	RHA	
MSP430FR5736	16	1	24	-	10 ch.	3, 3	3	1	1	RGE			PW
MSP430FR5735	8	1	24	y	16 ch.	3, 3	3, 3, 3	2	1		DA	RHA	
MSP430FR5734	8	1	24	y	10 ch.	3, 3	3	1	1	RGE			PW
MSP430FR5733	8	1	24	-	16 ch.	3, 3	3, 3, 3	2	1		DA	RHA	
MSP430FR5732	8	1	24	-	10 ch.	3, 3	3	1	1	RGE			PW
MSP430FR5731	4	0.512	24	y	16 ch.	3, 3	3, 3, 3	2	1		DA	RHA	
MSP430FR5730	4	0.512	24	y	10 ch.	3, 3	3	1	1	RGE			PW
MSP430FR5729	16	1	8	y	16 ch.	3, 3	3, 3, 3	2	1		DA	RHA	
MSP430FR5728	16	1	8	y	10 ch.	3, 3	3	1	1	RGE			PW
MSP430FR5727	16	1	8	-	16 ch.	3, 3	3, 3, 3	2	1		DA	RHA	
MSP430FR5726	16	1	8	-	10 ch.	3, 3	3	1	1	RGE			PW
MSP430FR5725	8	1	8	y	16 ch.	3, 3	3, 3, 3	2	1		DA	RHA	
MSP430FR5724	8	1	8	y	10 ch.	3, 3	3	1	1	RGE			PW
MSP430FR5723	8	1	8	-	16 ch.	3, 3	3, 3, 3	2	1		DA	RHA	
MSP430FR5722	8	1	8	-	10 ch.	3, 3	3	1	1	RGE			PW
MSP430FR5721	4	0.512	8	y	16 ch.	3, 3	3, 3, 3	2	1		DA	RHA	
MSP430FR5720	4	0.512	8	y	10 ch.	3, 3	3	1	1	RGE			PW

MSP430FR57xx Microcontroller

16-bit RISC MCU up to 24 MHz

Memory
16KB/8KB/4KB FRAM (with segment protections for code/data)

Debug
Real-time JTAG
Embedded emulation
Boot strap loader

Power and clocking
– Power on reset
– Brownout reset
– Low power Vreg (1.5V)
– XT1, VLO
– DCO
– Realtime clock

Peripherals
32 x 32 multiplier
DMA (3ch)
CRC16

Serial interface
Unlimited serial comm. interface
– 2 UARTS or SPI
– 1 I²C or SPI

Analog
Comparator/REF
ADC10 (up to 12ch)

Timers
Watchdog timer
Timer0_A3
Timer1_B3
Timer2_A3
Timer3_B3
Timer4_B3

Ports
Up to 3 1x8 + 1 1x3 I/O Ports with interrupt wake-up

Tools and support

Get started enjoying the benefits of the new MSP430FR57xx microcontrollers with these easy to use tools:

Software:
CCS v4.2.3
IAR-EW430 v5.20.x

Hardware:
MSP-EXP430FR5739 experimenters board
MSP-TS430RHA40A socketed target board

www.ti.com/fram

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