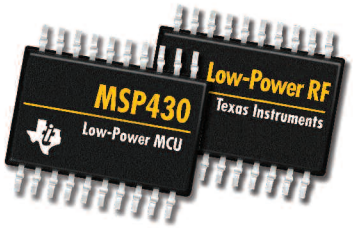
MSP430 Ultra-Low-Power MCU and Low-Power RF Devices



The Texas Instruments portfolio of MSP430 MCUs and low-power RF devices are an ideal fit for low-power wireless networks, including standard-based IEEE 802.15.4 and ZigBee® or other proprietary networks. The MSP430 product line offers the unique combination of ultra low power consumption and power-saving mechanisms, along with a high-performance 16-bit CPU and integrated analog. Together, MSP430 and TI's low-power RF products help wireless designers achieve low power consumption, long range and reliable performance at a competitive price.

Standard-Based Networks

- IEEE 802.15.4: A wireless radio frequency standard for low-power and short-range applications. This standard is ideal for simple point-to-point or point-to-multipoint networks. Systems that start with an 802.15.4-based proprietary network can later be upgraded with new software and evolve to a ZigBee-compliant system.
- ZigBee: A low-power wireless network standard that offers mesh networking as well as interoperability between different vendors' products. ZigBee is a network layer on top of the IEEE 802.15.4 standard (PHY and MAC layers).

Proprietary Networks

- For those wishing to implement their own proprietary network rather than a standard-based network, MSP430 MCU together with TI's proprietary RF devices, are an ideal solution for low-cost, low-power wireless applications. Solutions are available for the sub 1-GHz or 2.4-GHz frequency ranges.

MSP430 and Low-Power RF Selection Table

Communication Method	Point-to-Point	Star Network	Mesh Network
Standard-Based Network	**IEEE 802.15.4** CC2420 MSP430F24xx/ MSP430F161x/, MSP430FG461x*	**IEEE 802.15.4** CC2420 with TIMAC MSP430F24xx/, MSP430F161x/ MSP430FG461x*	**ZigBee®** CC2420Z with TIMAC and Z-Stack™ MSP430F24xx/, MSP430F161x/ MSP430FG461x*
Proprietary Network	**Sub-1 GHz** CC1100/CC1150, CC102x/CC1070, CC1000/CC1050 Any MSP430 Device **2.4 GHz** CC2500/CC2550 Any MSP430 Device		

These are recommended devices. Any MSP430 device can be used.

System-on-Chip Solutions

TI also offers 8051-based system-on-chip (SoC) solutions. For IEEE 802.15.4 and ZigBee networks, use CC2430/2431, for sub 1 GHz use CC1110, and for 2.4 GHz, CC2510/2511 is recommended.

Application-Specific Product Recommendations

Application	MSP430 and RF Solution		8051 System-on-Chip
Alarm and Security (Smoke, Motion, Glass Break Detector)	MSP430F20xx, MSP430F22xx	CC1100/CC1150, CC1020/CC1070, CC1000/CC1050	CC1110, CC2510/CC2511, CC2430/CC2431
Automated Meter Reading (AMR) for Utility Meters	MSP430FE42x, MSP430FW42x, MSP430F41x	CC1100/CC1150, CC1020/CC1070, CC1000/CC1050	CC1110, CC2510/CC2511, CC2430/CC2431
Wireless Sensor Networks (Monitoring, Asset Tracking)	MSP430F20xx, MSP430F41x	CC1100/CC1150, CC2500/CC2550	CC1110, CC2511, CC2431
Building Automation (Light, Temperature, Process Control)	MSP430F20x1, MSP430F21x1, MSP430F41x	CC1100/CC1150, CC2500/CC2550, CC2420	CC1100, CC2510/CC2511, CC2430/CC2431
PC Peripherals	MSP430F22x2, MSP430F21x1	CC2500/CC2550	CC2510/CC2511
Home and Leisure Equipment (Remote, Gaming, Toys, Home Electronics)	MSP430F20xx, MSP430F23/24x, MSP430F41x, MSP430F43x	CC1100/CC1150, CC2500/CC2550	CC1110, CC2510/CC2511
Medical (Non-Implants)	MSP430FG4xxx, MSP430F41x	CC1100/CC1150, CC2500/CC2550	CC1110, CC2510/CC2511

Getting Started with MSP430 and Low-Power RF Devices

Low-power RF ICs receive and transmit data via the SPI protocol. The MSP430 Code Library for TI RF devices makes communicating to an RF product simple through an MSP430 SPI, USART, USI, USCI or even "bit-banged" I/O port.

For starting with MSP430 and low-power RF devices, we recommend the following set-up:

- Two MSP-EXP430FG4618 experimenter boards
- One CC1100 or CC2500 Evaluation Module Kit (EMK) (includes two boards)
- IDE (IAR Workbench or Code Composer Studio™ IDE 2.0 have limited versions for free download)
- MSP-FET430UIF or equivalent MSP430 programming and debugging interface
- MSP430 Code Library for low-power RF devices and other software resources

Hardware and Software Resources

Part Number	Description	Web Link
MSP-EXP430FG4618	The MSP430FG4618/F2013 Experimenter Board, together with low-power RF EMKs, are an ideal platform for beginning development with these devices. The Experimenter Board features selected MSP430 devices, plug-in header for low-power RF evaluation modules and additional hardware components for easy system evaluation and prototyping.	**www.ti.com/msp430wireless**
Low-Power RF EMKs	Low-power RF EMKs are designed to enable the easy evaluation of products, allowing for RF measurements and the development of a prototype.	**www.ti.com/lprf**
MSP430 Code Library for Low-Power RF Devices	Code Library provides functions to facilitate the interfacing of an MSP430 device to CC1100/CC2500 devices.	FREE DOWNLOAD: **www.ti.com/ccmsplib**
TIMAC IEEE 802.15.4 MAC Software	EEE 802.15.4 medium access control (MAC) software stack for CC2420 and MSP430.	FREE DOWNLOAD: **www.ti.com/timac**
Z-Stack ZigBee Protocol Stack	Z-Stack is compliant with the ZigBee 2006 specification and supports multiple platforms including the CC2420 and MSP430 platform and CC2430 system-on-chip. The Z-Stack protocol stack has been awarded the Zigbee Alliance's golden unit status by the ZigBee test house TÜV Rheinland.	FREE DOWNLOAD: **www.ti.com/z-stack**

In addition, TI has partnered with various companies offering a variety of hardware and software tools for developing RF solutions with the MSP430 and low-power RF devices. Please visit www.ti.com/lprfnetwork for a complete listing.

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Logic	logic.ti.com	Military	www.ti.com/military
Power Mgmt	power.ti.com	Optical Networking	www.ti.com/opticalnetwork
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