Technical Article

Maximize Your IoT Design with New Dual-mode Bluetooth® + MSP432™ MCU Bundle

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Bluetooth® connectivity, like Wi-Fi® before it, has become table stakes for the smart gadgets and personal devices that most people use daily. We don't just want it, we expect it. And now with the growing adoption of Bluetooth low energy and rising number of Internet of Things (IoT) technologies, we can expect an even more widespread integration of this wireless communications protocol.

Today, most design engineers are facing intense pressure to launch new products in record time and markets are moving faster than ever before. Recognizing these very real challenges, engineers can't afford to have manufacturing timelines hindered by any unfamiliar products they are required to build into a given design. So what is a busy engineer to do when they have little or no knowledge of Bluetooth connectivity, but must quickly incorporate it into a device?

First, don't panic. There are easy and effective alternatives to original radio frequency (RF) design, such as TI's optimal combination of the dual-mode Bluetooth CC2564MODA module and MSP432™ host microcontroller (MCU). The module features a complete Classic Bluetooth and Bluetooth low energy subsystem with an integrated antenna. And the MSP432™ MCU serves as the MCU host that drives the Bluetooth stack, adds analog integration and more functionality for the application. This coupling can serve as the foundation for a number of powerful new devices across a broad range of verticals – all of which can be completed quickly.
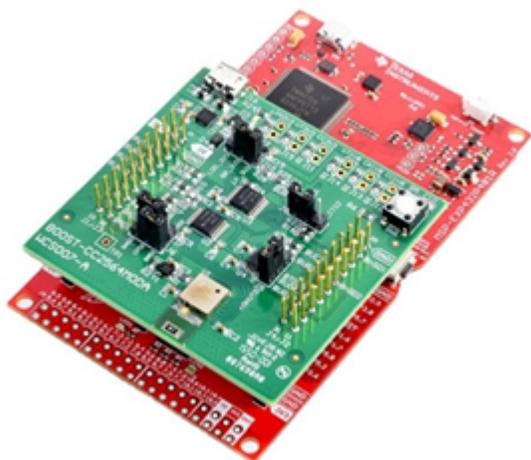
A key advantage of the CC2564MODA module is not only its ability to seamlessly interface with the MSP432 MCU, but it also delivers a turnkey solution out of the box. The module comes fully loaded with royalty-free software stacks that are compatible with the MSP432 MCU, allowing an engineer to easily add Bluetooth connectivity to a device without RF expertise.

The CC2564MODA module further reduces time to market because it ships to customers fully certified by the FCC, IC, CE and Bluetooth SIG right out of the box, eliminating a long and expensive process. Essentially, the module serves as a plug-and-play wireless building block for health and fitness devices, handheld test equipment, industrial automation IoT sensor nodes and even wireless audio equipment.

Why Dual-mode?

Bluetooth connectivity has become a necessity for smart devices and the ability to support dual-mode functionality is a key advantage. Personal health monitors, smartwatches, activity trackers, wireless audio, etc. all leverage both Classic Bluetooth and Bluetooth low energy modes in different ways.

A personal medical device in the home used for monitoring heart rate, body temperature or blood glucose levels may capture data via Bluetooth low energy sensors. But then the device can transmit to a smartphone and upload the larger data set to a medical hub by utilizing Classic Bluetooth's higher throughput and range.

Likewise for industrial automation, as sensors receive control inputs via Bluetooth low energy, they can also connect to a factory's Bluetooth hub via Classic Bluetooth and transmit those data points. Ultimately, this data could then be forwarded to a gateway, programmable logic controller or control center.

High-precision, Measurement and Voice Recognition

The 32-bit, ARM® Cortex®-M4-based MSP432 MCU features several other unique capabilities that allow engineers to leverage the CC2564MODA module in new ways. Capable of one million samples per second (Msps) and 16-bit oversampling, this MCU's integrated 14-bit, 24-channel analog-to-digital converter (ADC) enables fast and accurate measurement for devices like handheld multi-meters, factory sensors or even wearable medical devices. This strength is even enhanced by a floating point and digital signal processing (DSP) instruction set on the chip.

Voice commands are also particularly useful and are becoming more advanced each day. The MSP432 MCU features a robust speech recognition library that works locally and only requires limited MCU resources. This library works in tandem with the integrated ADC to process a set number of key phrases that enable more seamless usability and application efficiency. These voice commands can range from "wake up the system" to "take a measurement" or "download data."

Low Power and Security

Many, if not all, of the applications mentioned above will use battery power for the majority of their life cycle. And while we typically associate battery-power with portability, some of these devices, like factory sensor nodes, are sometimes mounted to inaccessible surfaces, making battery charging or battery replacement very difficult.

Because of this inevitability, it is critical that applications run as efficiently as possible to consume less energy while also delivering powerful performance. The CC2564MODA + MSP432 MCU combination offers low-power in both Bluetooth and standby modes. Not only is the CC2564MODA module a leading low-power solution, but provides excellent range and performance, maintaining reliable connections from up to 100 meters. When the Bluetooth link is not active, the ultra-low-power standby current of the MSP432 MCU of 660nA can help increase the life of the battery-enabled applications of up to 10 years.

Security is another advantage to bundling the CC2564MODA module and MSP432 MCU. Because MCUs typically house intellectual property, securing this component is of the utmost importance to developers. To reduce device vulnerability, the MSP432 MCU incorporates a unique IP protection architecture that helps compartmentalize and secure proprietary and third-party firmware. This is particularly critical for internet-connected devices connected as they can be at a higher risk of exposure.

A Winning Combination

Designing, debugging and certifying a Bluetooth subsystem, along with interfacing with the processor and application software is not always the quickest process. Fortunately, the CC2564MODA module and MSP432 MCU bundle simplifies what may be a daunting task for many engineers. To get started developing your next Bluetooth connected device, order the CC2564MODA + MSP432 MCU bundle from the TI Store.

Additional Resources:

- Interested in learning more about the CC2564MODA module? Read our other blog posts:
  - The dual-mode Bluetooth® module you've been waiting for is here
  - Driving industrial markets with TI's dual-mode Bluetooth® module
  - Want more information about our MSP432 MCUs? Check out these other blogs:
    - The secret of using noise to improve your ADC's performance
    - How to leverage the flexibility of an integrated ADC in an MCU for your design to outshine your competitor – part 1
    - How to leverage the flexibility of an integrated ADC in an MCU for your design to outshine your competitor – part 2
    - Top 12 ways to achieve low power using the features of an integrated ADC
    - Six reasons you shouldn't pick an MCU

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