Technical Description:

The Equipment Under Test (EUT) is a 2.4GHz Bluetooth 4.0 BLE Proximity based locking device for the PC or Mac. The Bluetooth portion is operating between 2402MHz and 2480MHz (40 channels with 2MHz channel spacing). The EUT is powered by 3.0VDC (1 x 3.0V "CR2032" battery).

After pairing, the EUT can automatically to lock the screen of PC/Mac when the user move away from their PC/Mac. When the user come back, EUT will automatically unlock the screen.

2.4GHz Bluetooth Module:
Modulation Type: GFSK
Frequency Range: 2402MHz - 2480MHz, 2MHz channel spacing, 40 channels
Antenna Type: Integral, Internal (Chip Antenna)
Antenna Gain: 0dBi
Nominal rated field strength: 93.5BµV/m at 3m
Maximum allowed field strength of production tolerance: - 5dB~+3dB

1. Bluetooth module CC2541:
a. CC2541 (U1) acts as the Bluetooth transceiver.
b. The 32MHz crystal (X1) and 32.768kHz (Y1) act as crystal oscillator

2. Accelerometer
MCU (U2) acts as Accelerometer

3. Antenna Matching Network:
C15-C18, L2-L3 act as Antenna Matching Network.

2.4-GHz *Bluetooth*™ low energy and Proprietary System-on-Chip

Check for Samples: CC2541

FEATURES

- **RF**
  - **2.4-GHz *Bluetooth* low energy Compliant and Proprietary RF System-on-Chip**
  - **Supports 250-kbps, 500-kbps, 1-Mbps, 2-Mbps Data Rates**
  - **Excellent Link Budget, Enabling Long-Range Applications Without External Front End**
  - **Programmable Output Power up to 0 dBm**
  - **Excellent Receiver Sensitivity (–94 dBm at 1 Mbps), Selectivity, and Blocking Performance**
  - **Suitable for Systems Targeting Compliance With Worldwide Radio Frequency Regulations: ETSI EN 300 328 and EN 300 440 Class 2 (Europe), FCC CFR47 Part 15 (US), and ARIB STD-T66 (Japan)**
- **Layout**
  - **Few External Components**
  - **Reference Design Provided**
  - **6-mm × 6-mm QFN-40 Package**
  - **Pin-Compatible With CC2540 (When Not Using USB or I^2C)**
- **Low Power**
  - **Active-Mode RX Down to: 17.9 mA**
  - **Active-Mode TX (0 dBm): 18.2 mA**
  - **Power Mode 1 (4-µs Wake-Up): 270 µA**
  - **Power Mode 2 (Sleep Timer On): 1 µA**
  - **Power Mode 3 (External Interrupts): 0.5 µA**
  - **Wide Supply-Voltage Range (2 V–3.6 V)**
- **TPS62730 Compatible Low Power in Active Mode**
  - **RX Down to: 14.7 mA (3-V supply)**
  - **TX (0 dBm): 14.3 mA (3-V supply)**
- **Microcontroller**
  - **High-Performance and Low-Power 8051 Microcontroller Core With Code Prefetch**
  - **In-System-Programmable Flash, 128- or 256-KB**
  - **8-KB RAM With Retention in All Power Modes**
  - **Hardware Debug Support**
  - **Extensive Baseband Automation, Including Auto-Acknowledgment and Address Decoding**
  - **Retention of All Relevant Registers in All Power Modes**
- **Peripherals**
  - **Powerful Five-Channel DMA**
  - **General-Purpose Timers (One 16-Bit, Two 8-Bit)**
  - **IR Generation Circuitry**
  - **32-kHz Sleep Timer With Capture**
  - **Accurate Digital RSSI Support**
  - **Battery Monitor and Temperature Sensor**
  - **12-Bit ADC With Eight Channels and Configurable Resolution**
  - **AES Security Coprocessor**
  - **Two Powerful USARTs With Support for Several Serial Protocols**
  - **23 General-Purpose I/O Pins (21 × 4 mA, 2 × 20 mA)**
  - **I^2C interface**
  - **2 I/O Pins Have LED Driving Capabilities**
  - **Watchdog Timer**
  - **Integrated High-Performance Comparator**
- **Development Tools**
  - **CC2541 Evaluation Module Kit (CC2541EMK)**
  - **CC2541 Mini Development Kit (CC2541DK-MINI)**
  - **SmartRF™ Software**
  - **IAR Embedded Workbench™ Available**

SOFTWARE FEATURES

- ***Bluetooth*** **v4.0 Compliant Protocol Stack for Single-Mode BLE Solution**
  - **Complete Power-Optimized Stack, Including Controller and Host**
    - **GAP – Central, Peripheral, Observer, or Broadcaster (Including Combination Roles)**
    - **ATT / GATT – Client and Server**
    - **SMP – AES-128 Encryption and Decryption**
    - **L2CAP**
  - **Sample Applications and Profiles**
    - **Generic Applications for GAP Central and Peripheral Roles**
    - **Proximity, Accelerometer, Simple Keys, and Battery GATT Services**
    - **More Applications Supported in BLE Software Stack**
  - **Multiple Configuration Options**
    - **Single-Chip Configuration, Allowing Applications to Run on CC2541**
    - **Network Processor Interface for Applications Running on an External Microcontroller**
  - **BTool – Windows PC Application for Evaluation, Development, and Test**

APPLICATIONS

- **2.4-GHz** ***Bluetooth*** **low energy Systems**
- **Proprietary 2.4-GHz Systems**
- **Human-Interface Devices (Keyboard, Mouse, Remote Control)**
- **Sports and Leisure Equipment**
- **Mobile Phone Accessories**
- **Consumer Electronics**

CC2541 WITH TPS62730

- **TPS62730 is a 2-MHz Step-Down Converter With Bypass Mode**
- **Extends Battery Lifetime by up to 20%**
- **Reduced Current in All Active Modes**
- **30-nA Bypass Mode Current to Support Low-Power Modes**
- **RF Performance Unchanged**
- **Small Package Allows for Small Solution Size**
- **CC2541 Controllable**

DESCRIPTION

The CC2541 is a power-optimized true system-on-chip (SoC) solution for both *Bluetooth* low energy and proprietary 2.4-GHz applications. It enables robust network nodes to be built with low total bill-of-material costs. The CC2541 combines the excellent performance of a leading RF transceiver with an industry-standard enhanced 8051 MCU, in-system programmable flash memory, 8-KB RAM, and many other powerful supporting features and peripherals. The CC2541 is highly suited for systems where ultralow power consumption is required. This is specified by various operating modes. Short transition times between operating modes further enable low power consumption.

The CC2541 is pin-compatible with the CC2540 in the 6-mm × 6-mm QFN40 package, if the USB is not used on the CC2540 and the I^2C/extra I/O is not used on the CC2541. Compared to the CC2540, the CC2541 provides lower RF current consumption. The CC2541 does not have the USB interface of the CC2540, and provides lower maximum output power in TX mode. The CC2541 also adds a HW I^2C interface.

The CC2541 is pin-compatible with the CC2533 RF4CE-optimized IEEE 802.15.4 SoC.

The CC2541 comes in two different versions: CC2541F128/F256, with 128 KB and 256 KB of flash memory, respectively.

For the CC2541 block diagram, see Figure 1.

This integrated circuit can be damaged by ESD. Texas Instruments recommends that all integrated circuits be handled with appropriate precautions. Failure to observe proper handling and installation procedures can cause damage.

ESD damage can range from subtle performance degradation to complete device failure. Precision integrated circuits may be more susceptible to damage because very small parametric changes could cause the device not to meet its published specifications.

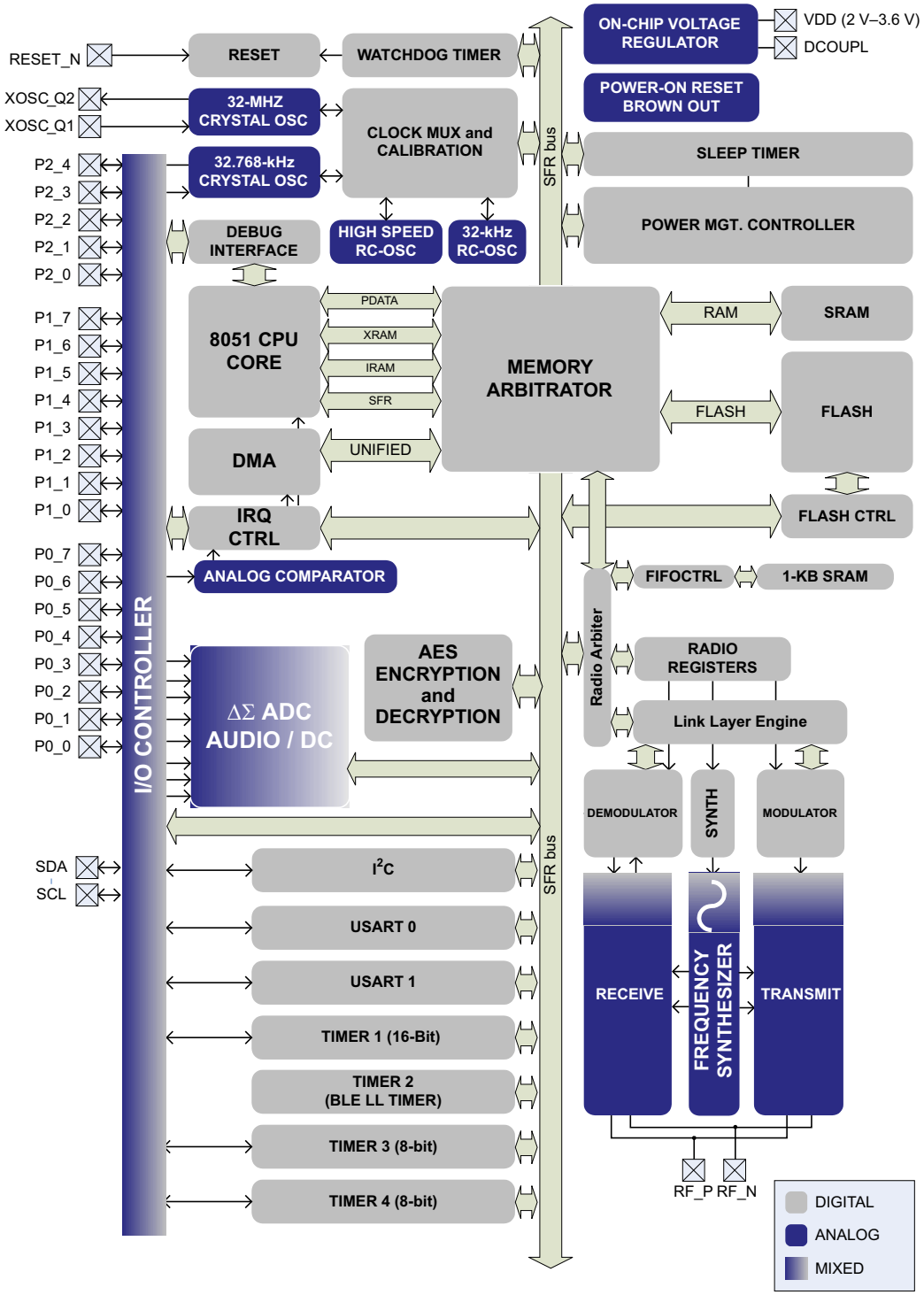

Figure 1. Block Diagram