

RS6130

Ultra Low Power Single-Chip 60 GHz AiP Radar Sensor

with Wireless Connectivity (BLE5.3/802.15.4/Thread/Matter)

Product Brief Rev. 1.0

Features

- **FMCW mmWave Radar**
 - 58-64 GHz Coverage With 6GHz Sweep Bandwidth
 - 1 Transmit Channel and 3 Receive Channels with AiP Package Antenna for 3D sense
 - Integrated RFPLL, DPLL, Transmitter, Receiver, ADC and Baseband
 - 12.5 dBm Typical TX Output Power
 - 10dB Typical NF per RX
 - -95 dBc/Hz Typical Phase Noise at 1MHz
 - 10/20MHz IF Bandwidth
 - Up to 400MHz/us Ramp Rate
 - HWA for 1D/2D FFT, Static Clutter Remove and CFAR Operations
- **2.4GHz Wireless Connectivity**
 - Protocols: Supports BLE 5.3, BLE Mesh, IEEE 802.15.4, Thread 1.3, Matter 1.1, and 2.4GHz proprietary
 - Bluetooth LE PHY : 1Mbps, 2Mbps, Long Range S2 (500Kbps), S8 (125Kbps)
 - TX Max Output Power: 10dBm@BLE mode
 - RX Sensitivity: -95dBm @BLE 1Mbps
- **Application System**
 - 32-bit RISC-V CPU with FPU (up to 128MHz) and I/D cache for Radar Post-processing, Wireless and Application
 - Security Engine: Secure Boot, Efuse Key Protection, SRAM and XIP Decryption on the fly, TRNG, AES128/SHA/RSA/ECC
- **Internal Memory**
 - On Chip 384KB SRAM
- **Host and Device Interface**
 - x3 UART
 - x2 QSPI with XIP
 - x2 I²C
 - x8 PWM
 - x10 GPADC
- **Clock Source**
 - 32/40MHz Crystal Oscillator for Clock Reference
 - Internal LSI and MSI RC Oscillator
 - Optional 32kHz Crystal for Low Power Operation
- **Power Management**
 - Single Power Supply from 1.7V to 5.5V
 - Built-in LDO Network for Enhanced PSRR
 - BOM-Optimized and Power-Optimized Modes
- **Ultra Low Power Property**
 - Power States: Shutdown, Standby, Idle and Active (Sensing, Processing and Connecting)
 - Fast Wakeup from Standby to Active
 - Motion&Presence Detection: <0.1mW
 - BLE Advertising&Connecting: <0.05mW
- **Package**
 - AiP FCCSP: 8.8 x 5.8 mm² with 56pins
- **Temperature Range**
 - Operating Junction Temperature: -40°C to 105°C

Applications

- Motion/Micro-Motion/Presence detection
- Vital signs/health monitoring
- Gesture recognition
- Video doorbell/IP Camera
- Air conditioner/Refrigerators
- PC/Notebooks/Tablets/Televisions
- Lighting
- Wearable

Description

The RS6130 is a single chip 60GHz 1T3R FMCW AiP radar sensor with multi-protocol wireless connectivity (BLE5.3/802.15.4/Thread/Matter) inside. The device is portioned into four subsystems, shown in Figure below:

- **mmWave Radar Subsystem:** This block includes all high-performance radar RF/analog and baseband. It also includes the chirp generator and tx-to-rx finite state machine. HWA is included in baseband, used to offloading specified radar processing such as 1D/2D FFT and CFAR.
- **2.4GHz Wireless Connectivity Subsystem:** This block contains whole 2.4G multi-protocol wireless RF, Mod/Demod, Baseband Protocol, and the data interacts with application CPU by internal data bus.
- **Application Subsystem:** It mainly includes one 32bit RISC-V CPU with FPU and SRAM memory. CPU connects SRAM, peripheral interface, and other subsystems by AHB and APB bus. RISC-V CPU is used to run radar post-processing algorithm, wireless protocol and other system tasks.
- **Power and Clock Subsystem:** This chip is complex single chip SoC with multiple function systems, we use single power and clock subsystem to do centralized management. It includes several clock sources (including LSI, MSI, DCXO and SPLL), power blocks(LDOs, BG and Clamp) and temperature sensor.

RS6130 is specifically designed to feature the capability of ultra low power radar sensing. It contains four main power modes for low power management: shutdown, standby, idle and active. Our EFSENS™ ultra low power technology enable the sensor to keep active time more than years feed by button battery. Its configuration and data acquisition are enabled with UART/SPI/I2C digital interface with other devices.

Block Diagram

