CMOS RFIC Design Portfolio

CMOS RFIC Expertise in Wireless Communication

RFIC Solutions Inc. delivers advanced RFIC and mixed-signal semiconductor solutions for wireless communication applications. Leveraging extensive expertise in CMOS and CMOS SOI technologies, our team has successfully developed highly integrated Sub-GHz transceiver solutions for IoT and industrial wireless networks.

Our proven development includes:

- Fully Integrated 900 MHz ZigBee Transceiver SoC
- 915 MHz IEEE 802.15.4g CMOS Transceiver
- Advanced PLL Frequency Synthesizer and RF Subsystems

From architecture and circuit design to silicon validation, we provide complete semiconductor development services focused on high performance, low power consumption, compact integration, and reliable wireless connectivity for IoT, Smart Metering, and Industrial Automation applications.

CMOS RFIC Design Portfolio

Legacy 900 MHz Fully Integrated ZigBee Transceiver SoC

Over a decade ago (approximately 2012–2014), the core engineering team associated with our sister concern companies successfully executed a highly complex RFIC development program for a prominent Japanese customer operating in the IoT and Industrial Automation sector. The project involved the design and implementation of a fully integrated 900 MHz ZigBee Transceiver System-on-Chip (SoC), which subsequently became the foundational intellectual property (IP) for our current wideband frequency synthesizer architecture.

This project demonstrated our team's capability to develop complete wireless communication solutions from concept to silicon validation, combining advanced RF, analog, mixed-signal, and digital design expertise within a single integrated circuit.

Key Project Highlights

Target Application

- Low-power ZigBee (IEEE 802.15.4) communication systems
- Industrial sensor networks
- Wireless monitoring and control systems
- Industrial automation and IoT applications

Advanced Frequency Synthesizer Architecture

At the heart of the transceiver was a fully integrated Phase-Locked Loop (PLL) Frequency Synthesizer designed to provide exceptional frequency stability, low phase noise, and rapid lock times. The synthesizer architecture supported reliable frequency-hopping spread spectrum (FHSS) operation, ensuring robust wireless communication in demanding industrial environments.

High Level of Integration

The transceiver integrated all critical RF building blocks onto a single monolithic die, including:

- PLL Frequency Synthesizer
- Low Noise Amplifier (LNA)
- RF Mixer
- Power Amplifier (PA)
- Supporting RF and Analog Circuits

This high level of integration significantly reduced the external Bill of Materials (BOM), minimized system cost, and simplified product deployment.

Silicon Validation

The chip was successfully fabricated, taped out, and validated. Comprehensive testing confirmed compliance with the stringent performance, sensitivity, reliability, and power-efficiency requirements expected by the Japanese industrial market.

CMOS RFIC Design Portfolio

Technical Significance

The successful execution of this project established a strong foundation for future RFIC developments and directly contributed to the evolution of our current synthesizer technologies. The architecture and design methodologies developed during this program continue to influence our present-day wireless semiconductor solutions.

802.15.4g CMOS 915 MHz Transceiver Developed by RFIC Solutions

Building upon more than a decade of RFIC design experience, RFIC Solutions Inc. successfully developed a state-of-the-art 915 MHz CMOS transceiver designed for ZigBee and IEEE 802.15.4g wireless communication applications. The development of this advanced transceiver required nearly two years of dedicated engineering effort and represents a significant milestone in our wireless semiconductor portfolio.

This achievement further strengthens the position of our engineering team at Millimeterchips as a trusted provider of advanced RFIC and mixed-signal semiconductor solutions.

The transceiver was specifically designed to address the growing demand for highly integrated, low-power wireless communication systems used in smart infrastructure, industrial automation, and next-generation IoT deployments.

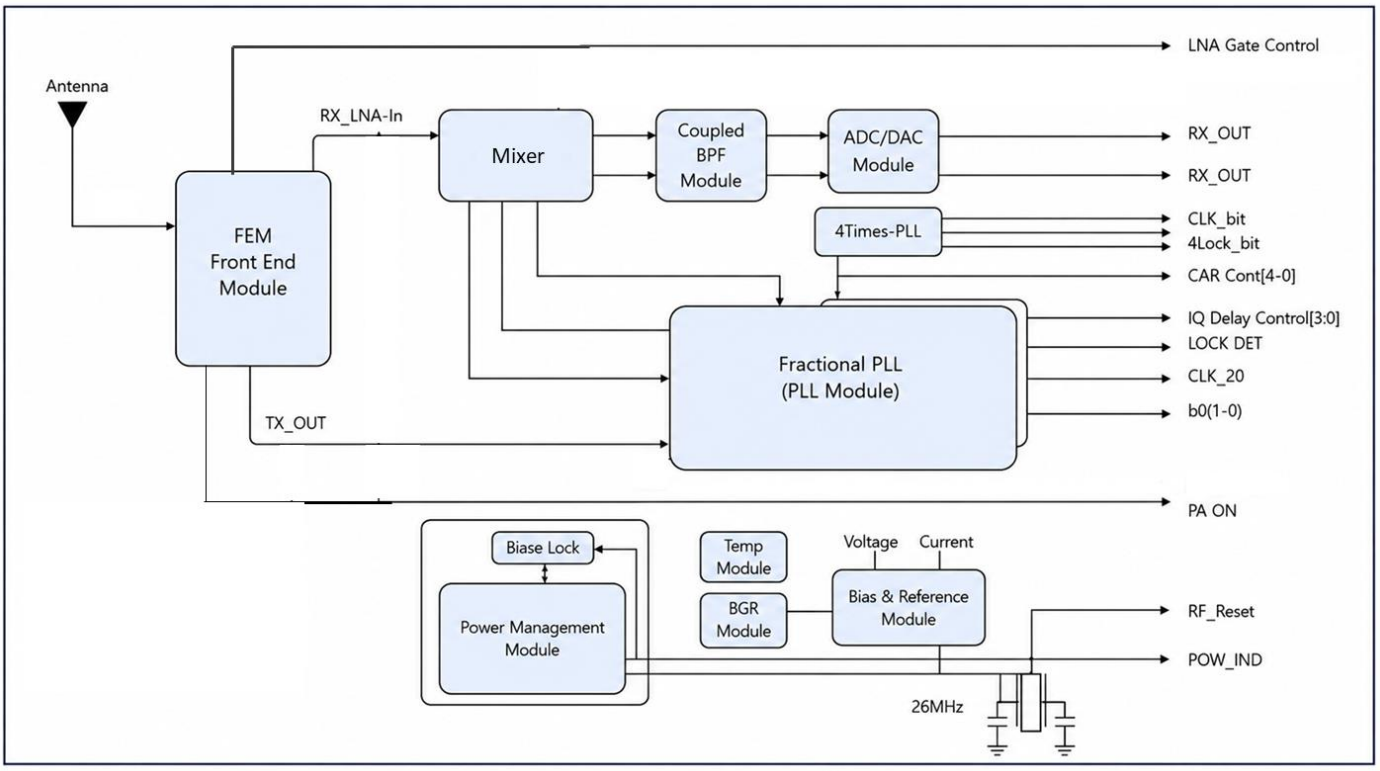

Figure 1: Transceiver Functional Diagram CMOS 915 MHz

CMOS RFIC Design Portfolio

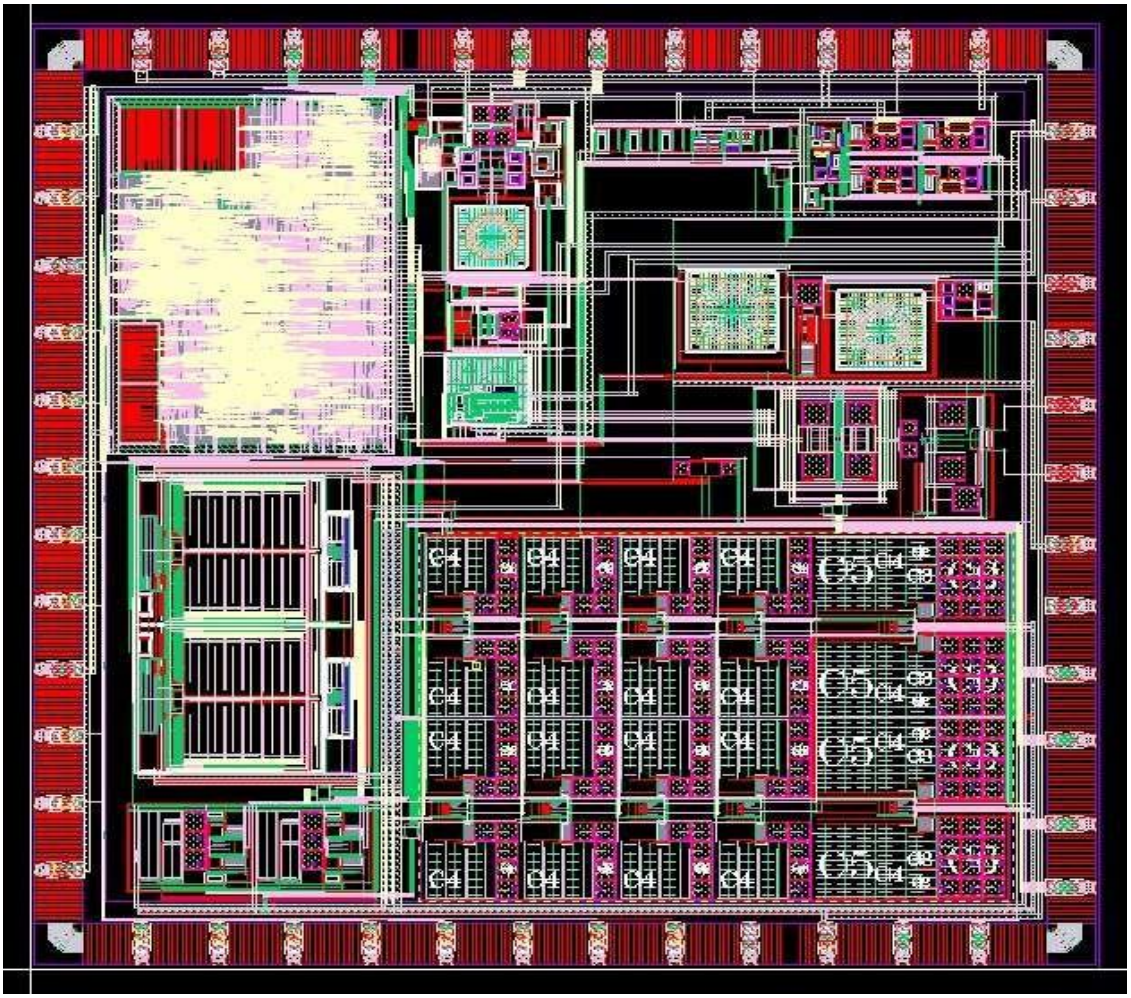

Figure 2: Layout of 802.15.4g CMOS 915MHz Transceiver

Application Areas

- Smart Home Devices
- Industrial Automation Systems
- Wireless Sensor Networks
- Internet of Things (IoT) Platforms
- Remote Monitoring Systems
- Low-Power Wireless Communication Equipment

The accompanying image illustrates the complete transceiver chip integrating both RF and baseband functionality.

Development Approach

Throughout the development cycle, close collaboration with the customer remained a key priority. This customer-focused approach ensured that all application-specific requirements were carefully addressed during the architecture, design, verification, and silicon validation phases.

CMOS RFIC Design Portfolio

By leveraging extensive expertise in CMOS RFIC development, mixed-signal integration, and wireless communication system design, the engineering team delivered a robust, reliable, and production-ready solution that exceeded industry expectations.

Key Features

- 130 nm CMOS Technology Node
- Complete RF and Baseband Integration
- RF Circuits and Selected Digital Blocks Developed by RFIC Solutions
- Compact Die Size: 4.3 mm × 4.3 mm
- Optimized for Low Power Consumption
- Low Manufacturing Cost
- High Integration Level for Reduced System Complexity

Performance Highlights

- Receiver Current Consumption: 15 mA (including Baseband)
- Transmitter Current Consumption: 17 mA (including Baseband)
- Low-Power Architecture for Battery-Operated Applications
- Optimized for Cost-Sensitive Wireless Products
- Designed for High Reliability and Robust Wireless Connectivity

Project Impact

The successful development of the 915 MHz IEEE 802.15.4g transceiver demonstrates our capability to deliver complete RFIC solutions spanning architecture definition, circuit design, layout implementation, verification, fabrication support, and silicon validation.

This project not only reinforces our reputation for technical excellence in wireless semiconductor development but also establishes a strong platform for future innovations in low-power wireless communication technologies. Through continuous investment in RFIC research and development, we remain committed to delivering advanced semiconductor solutions that enable the next generation of connected devices and intelligent systems.