



# IN120 Datasheet

# IN120

## Ultra-Low Power Bluetooth Beacon SoC

### Key Features

- **Bluetooth Low Energy 5.3 Compliant**

- Enhanced privacy mode support

- **Beacon Modes**

- Proprietary
- Bluetooth SIG compliant

- **Ease of Use**

- Config and use
- No software programming required

- **Memory**

- 4Kb eFuse memory
  - Advertising payload storage
- 4KB SRAM
  - Dynamic payload storage
  - Data log storage

- **Low Power Mode Advertising**

- Continuous advertising
- Event-triggered advertising

- **RF Radio**

- 2.4GHz frequency band RF transmitter
- MedRadio band support
- Programmable TX output power, up to +5dBm

- **Integrated temperature sensor**

- +/-1°C accuracy in range -20°C to 25°C

- **System Power Consumption**

- Sub-uW power consumption for multi-year operation on a tiny battery
- Sleep mode < 650nA with 32kHz RC ON

- **Peripheral**

- 1 UART
- 1 I2C
- Sense ADC, 11bit
  - Chip temperature measurement
  - VCC voltage measurement
  - 4 channels for customer use

- **Clock Sources**

- 32MHz XO crystal

- **Security and Privacy**

- AES-EAX based encryption and authentication
- Privacy protection: resolvable private address
- Anti-Cloning: time-varying payload in the beacon

- **Power Supply**

- Integrated low leakage LDO
- 1.1 – 3.6V input
- Single cell 1.5V battery support

- **Operating temperature**

- 40°C ~ +85°C (industrial, see ordering info)

- **Packaging**

- Bumped die

- **Typical Applications**

- Standalone retail beacon
- Wireless sensor
- Asset tracking
- Beacon tag for RTLS (Real Time Location System)
- Active RFID
- Low power alarm system
- Wireless ID tag for healthcare
- Wireless industrial application
- Fitness and wellness

## 1 Product Overview

**IN120** is a member of InPlay's NanoBeacon™ SoC product family, supporting Bluetooth® Low Energy beacons in the 2.4GHz ISM band as well as a proprietary beacon mode operating in either the 2.4GHz ISM band or the MedRadio frequency bands. This SoC features an efficient and configurable state machine, non-volatile memory for user-defined advertising payloads, and on-chip SRAM for dynamic data storage and data logging. The device integrates an analog-to-digital converter (ADC), a hardware security engine, and power management. With very low power consumption and minimal BOM requirements, IN120 is ideal for coin-cell or single 1.4V/1.5V battery-powered applications such as disposable beacon tags and wireless smart sensors.

**Software-Programming-Free Bluetooth® Operation:** The device is designed for maximum ease of use and requires no Bluetooth-related firmware or protocol stack development. Once properly configured, it automatically transmits Bluetooth Low Energy advertising packets or proprietary-format advertising packets. The advertising payload may consist of predefined user data stored in on-chip memory, or dynamic data collected from on-chip sensors, external sensors, or a companion microcontroller. Configuration of advertising modes and data payloads is accomplished through InPlay's PC GUI tool: NanoBeacon™ ConfigTool, enabling simple and efficient device setup without software development.

**Single-Cell (Sub-1.5V) Battery Operation with Nanowatt Power Consumption:** The device operates over a wide supply range down to 1.1V, enabling direct operation from a standard 1.5V single-cell battery. In sleep mode, current consumption is less than 650nA, making it well suited for ultra-low-power, long-lifetime battery applications.

**Flexible Integration with MCU and Sensors:** In addition to standalone beacon operation, the device can interface with a companion microcontroller and external sensors. When paired with an MCU, the advertising payload and control settings can be updated dynamically through the UART interface. The device supports sensors with either analog or digital outputs and provides multiple 11-bit ADC input channels for signal acquisition. A built-in linear scaling post-processing unit enables conversion of raw sensor readings into application-specific units prior to wireless transmission. In addition, the IN120 includes a load switch that can selectively power external circuitry, including sensor devices, to help optimize overall system power consumption.

**Simplified System BOM:** The device integrates an on-chip RF matching network, eliminating the need for external RF matching components when interfacing to a 50Ω system. A 32MHz crystal is required for accurate local oscillator generation. The crystal interface includes programmable on-chip load capacitors, which remove the need for external load capacitors for most crystal specifications, further reducing overall BOM count.

**Security Engine:** The device integrates a hardware-based security engine supporting AES-128 encryption and AES-EAX mode with optional authentication. A built-in True Random Number Generator (TRNG) provides high-quality random values for encryption, authentication, and secure communication. The device also supports privacy features including private advertising addresses, as well as enhanced protection of user data through the integrated hardware security engine.

**Memory:** The device has two types of memory built in.

- 4Kb OTP memory (eFuse): To store the user advertising data payload, security key and predefined register settings with one-time programming prior to usage.
- 4KB SRAM: For dynamic advertising data storage and data logging. Data in SRAM can be retained in memory during sleep mode when only the always-on (AON) domain is active.

**Advertising Data and Modes:** The device supports non-connected advertising using either predefined data or real-time measurement data. Predefined data can be stored in eFuse OTP memory or on-chip SRAM, while real-time data can be obtained from internal sensors or external sensors with analog or digital outputs connected to the device. The device supports both continuous and event-driven advertising, with optional data encryption and authentication. In continuous advertising mode, an advertising beacon is transmitted at every configurable advertising interval after chip enable. In event-driven advertising mode, an advertising beacon is transmitted only when triggered by an external event, such as when a sensor ADC measurement exceeds or falls below a predefined threshold, or when a GPIO input state changes.

## Revision History

| Revision | Description     | Date       | Drafted by |
|----------|-----------------|------------|------------|
| V1.0     | Initial version | 03/20/2026 |            |

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