



# NeoMote

Programmable System on Chip,  
Wireless Sensor Network

[www.metronomesystems.com](http://www.metronomesystems.com)

## General Description

**Metronome Systems provides wireless** - We build the cyber-physical backbone for hardened wireless sensor networks designed for field deployments - ultra-low power, highly reliable, true systems-level solutions for a broad suite of real-time sensing and control applications. Our advanced design incorporates a highly-configurable system-on-chip (32-bit ARM® Cortex™-M3 microprocessor unit, memory, analog, and digital peripheral) with industry-leading, ultra reliable, IPv6-based, low-power true-mesh wireless sensor network (WSN) technology. A unique array of configurable system blocks features modern control of all modalities of signal acquisition and signal processing, enabling monitoring and control with high accuracy, high bandwidth, and high flexibility. The system features a fully configurable digital system able to dynamically configure up to 60 GPIOs with interfaces such as USB, SPI, UART and I<sup>2</sup>C. Innovative IEEE802.15.4-compliant radio design by *Dust Networks* enables multi-year long battery life on a pair of AA batteries. The system logs all data to an industrial SD card. Every system component is rated for industrial applications (-40°C to +85°C), enabling use of the entire system in extreme environments.

## System design

- Ultra-low power consumption
  - 30  $\mu$ A average (60  $\mu$ A with high-precision analog enabled)
- Ultra-low noise (0.5%) 1.25V voltage reference
- Real-time clock with backup battery source
- Variable power input (3V-25V)
- Multiple power regulator output for a suite of applications
  - 3.3-5V low-power switching supply (750mA)
  - 3.3-5V low-noise linear supply (500mA)
- Real-time operating system (RTOS) support
- Full-speed USB interface and mini-USB port
- Over The Air (OTA) updating
- 32KHz and 20MHz external crystal sources
- SD-card interface for local storage
- Easy to use API to enable rapid prototyping

## Programmable system on chip

- Cypress PSoC®5: CY8C55 family
- 256 KB flash memory, 64KB SRAM
- CAN 2.0b compliant
- Programming through JTAG debug interface
- Programmable counter, timer, PWM, comparator blocks
- 46 to 70 digital I/Os (60 GPIOs, 8 SIOs, 2 USBIOs)
- 67 MHz, 24-bit fixed point digital filter block (DFB) to implement finite impulse response (FIR) and infinite impulse response (IIR) filters
- Configurable delta-sigma ADC with 8- to 20-bit resolution (18.5 ENOB when analog regulator enabled)
- Two SAR ADCs, each 12-bit at 700 ksp/s
- Four configurable multifunction analog blocks. Example configurations are programmable gain amplifier (PGA) and analog filtering, trans-impedance amplifier (TIA)
- Four 8-bit IDACs or VDACs
- Four uncommitted opamps with 25-mA drive capability

## Wireless Sensor Networks

- *Dust Networks' Eterna™* SoC WSN technology
- 2.4 GHz network operations
- Automatic network formation
- Full-mesh networking that can easily scale to tens of thousands of nodes per square kilometer
- Time-synchronized communication across 15 frequency channels eliminates in-network collisions and multipath fading effects
- Greater than 99.99% network reliability even in the most challenging environments
- Fully engineered RF transceiver, with power amplifier (at +8dBm)
- Unprecedented low power consumption with an RX current of less than 5 mA and a TX current of less than 10 mA at +8dBm (< 6 mA at 0 dBm)
- AES-128 bit encryption
- Compliant with IETF 6LoWPAN and IEEE 802.15.4e
- IPv6 Internet of Things compliant, enabling each node with a unique Internet-ready IP address

