

M31 Low Power Solution for IoT Applications

Overview

Low power designs are very critical to mobile and IoT applications. M31 low power solution is comprehensive for low power designs. It includes the green memory, low $V_{CC_{MIN}}$ memory, low power cell library, low $V_{CC_{MIN}}$ PLL and low power interface IP like USB 2.0 and USB 1.1. M31 green memory provides low power modes including standby, nap, retention, and power shutdown modes. The dual rail architecture is also built in the green memory for dynamic frequency and voltage scaling. M31 low $V_{CC_{MIN}}$ memory supports low voltage operation to reduce leakage and dynamic power directly. To achieve low power SoC design, M31 low power cell library is the critical component. Not only low power optimized cells but also power management kit are included.

M31 low $V_{CC_{MIN}}$ PLL can operate at very low voltage (0.7V) and provide a reliable clocking source for SoC. M31 low power USB 2.0 and USB 1.1 IP are optimized for IoT applications and can save more than 30% operating current and 70% stand-by current.

Green Memory Compiler Features

- **Tiny architecture**
 - Ultra-high density structure to save area
- **Dual rail**
 - Separate the logic power and core power with embedded level shifter (Save dynamic power and leakage power)
- **Green power management**
 - Standby, nap, retention, shutdown

Low Power Cell Library Features

- **Power management kit**
 - Power gating cells
 - Level shifters
 - Isolation cells
 - Retention flip-flops
- **Low leakage**
 - Multiple threshold voltage and multiple channel length for low power design
- **Low dynamic power**
 - Shorter routing trace and less parasitic capacitance than conventional high density library
 - Less internal power than conventional high density library

Low $V_{CC_{MIN}}$ PLL Features

- **Low operating voltage**
- **Tiny architecture**

Low Power Interface IP Features

- **Core voltage of USB 2.0/USB 1.1 IP is as low as 0.9V (55nm)**
- **Ultra-low current consumption at both operating and stand-by modes**

Low $V_{CC_{MIN}}$ Memory Compiler Features

- **Dynamic voltage and frequency scaling**
 - Provide wide range speed and power optimization
- **Low voltage**
 - Under drive operation

