MICROCHIP

SAM L21

SAM L21 Family Data Sheet

Introduction

Atmel® SMART SAM L21 is a series of ultra low-power microcontrollers using 32-bit Arm® Cortex®-M0+ processor at maximum 48 MHz (2.46 CoreMark®/MHz) and up to 256 KB Flash and 40 KB of SRAM in a 32-pin, 48-pin, and 64-pin package. The sophisticated power management technologies, such as power domain gating, SleepWalking, ultra low-power peripherals allow very low-power consumptions. The highly configurable peripherals include a touch controller supporting capacitive interfaces with proximity sensing.

Features

- Processor
  - Arm Cortex-M0+ CPU running at up to 48 MHz
    - Single-cycle hardware multiplier
    - Micro Trace Buffer
- Memories
  - 32/64/128/256-KB in-system self-programmable Flash
  - 1/2/4/8-KB Flash Read-While-Write section
  - 4/8/16/32-KB SRAM main memory
  - 2/4/8/8-KB SRAM low-power memory
- System
  - Power-on Reset (POR) and Brown-out Detection (BOD)
  - Internal and external clock options
  - External Interrupt Controller (EIC)
  - 16 external interrupts
  - One non-maskable interrupt
  - Two-pin Serial Wire Debug (SWD) programming, testing, and debugging interface
- Low Power
  - Idle, Stand-by, Backup, and Off Sleep modes
  - SleepWalking peripherals
  - Static and Dynamic Power Gating Architecture
  - Battery backup support
  - Two performance levels
  - Embedded Buck/LDO regulator supporting on-the-fly selection
- Peripherals
  - 16-channel Direct Memory Access Controller (DMAC)
  - 12-channel Event System
  - Up to five 16-bit Timer/Counters (TC) including one low-power TC, each configurable as:
    - 16-bit TC with two compare/capture channels
    - 8-bit TC with two compare/capture channels
    - 32-bit TC with two compare/capture channels, by using two TCs

  - Two 24-bit and one 16-bit Timer/Counters for Control (TCC), with extended functions:
    - Up to four compare channels with optional complementary output
    - Generation of synchronized pulse width modulation (PWM) pattern across port pins
    - Deterministic fault protection, fast decay and configurable dead-time between complementary output
    - Dithering that increase resolution with up to 5 bit and reduce quantization error
  - 32-bit Real Time Counter (RTC) with clock/calendar function
  - Watchdog Timer (WDT)
  - CRC-32 generator
  - One full-speed (12 Mbps) Universal Serial Bus (USB) 2.0 interface
    - Embedded host and device function
    - Eight endpoints
  - Up to six Serial Communication Interfaces (SERCOM) including one low-power SERCOM, each configurable to operate as either:
    - USART with full-duplex and single-wire half-duplex configuration
    - I^2C up to 3.4 MHz
    - SPI
    - LIN slave
  - One AES encryption engine
  - One True Random Generator (TRNG)
  - One Configurable Custom Logic (CCL)
  - One 12-bit, 1MSPS Analog-to-Digital Converter (ADC) with up to 20 channels
    - Differential and single-ended input
    - Automatic offset and gain error compensation
    - Oversampling and decimation in hardware to support 13-bit, 14-bit, 15-bit, or 16-bit resolution
  - Two 12-bit, 1 MSPS dual output Digital-to-Analog Converter (DAC)
  - Two Analog Comparators (AC) with window compare function
  - Three Operational Amplifiers (OPAMP)
  - Peripheral Touch Controller (PTC)
    - 169-channel capacitive touch and proximity sensing
    - Wake up on touch in Stand-by mode
- Oscillators
  - 32.768 kHz crystal oscillator (XOSC32K)
  - 0.4-32 MHz crystal oscillator (XOSC)
  - 32.768 kHz internal oscillator (OSC32K)
  - 32.768 kHz ultra low-power internal oscillator (OSCULP32K)
  - 16/12/8/4 MHz high-accuracy internal oscillator (OSC16M)
  - 48 MHz Digital Frequency Locked Loop (DFLL48M)
  - 96 MHz Fractional Digital Phased Locked Loop (FDPLL96M)
- I/O
  - Up to 51 programmable I/O pins
- Easy migration from the SAM D family of devices
- Packages
  - 64-pin TQFP, QFN, WLCSP
  - 48-pin TQFP, QFN
  - 32-pin TQFP, QFN
- Operating voltage
  - 1.62V – 3.63V
- Temperature range
  - -40°C to 85°C