Ultra Low Power 8 bit Flash µController:
0.9V supply, DC-DC Converter, ADC, OpAmp, EEPROM, 8 to 32 leads

Features

- **Low Power:**
  - 140µA @ 3V, Active Mode, CPU: RC_2MHz (1 MIPS)
  - 14 µA @ 3V, Standby mode CPU: RC_2MHz
  - 2.3 µA @ 3V, Standby mode at 32kHz XTAL
  - 1.9 µA @3V, Sleep mode (No clock)
  - 0.4 µA @3V, power down mode (Reset state)

- **Voltage range:**
  - 0.9V to 3.6V, internal voltage regulator

- **DC-DC Converter**
  - Built-IN DC-DC Converter for min 40mA load from VBAT=0.9V

- **Internal RC Oscillator**
  - 2MHz and 15MHz, factory pre-trimmed

- **External Oscillator**
  - 32'768 Hz watch type crystal or typ 4MHz Resonator

- **CPU 8 bit**
  - CR816 Harvard RISC Architecture, 16 Registers, HW multiplier

- **RAM**
  - fully static SRAM, 512 Bytes

- **Flash/EEPROM**
  - 16.9kByte Flash memory, shared between
    - max 6k Instructions program memory (16.9kByte)
    - max 12k Byte non volatile data memory

- **Doc**
  - Debug on chip DoC including In-System Programming

- **In/Out**
  - 24 multipurpose I/O’s, shared with: SPI, DoC, ADC channels, OpAmp, Vref, Xtal

- **Timer**
  - 4 x 8-bit timers (or 2 x 16-bit), 4 x PWM, Freq gen, Capture, Compare

- **Sleep Counter Reset**
  - automatic wake-up from sleep mode (EM patent)

- **Prescaler**
  - 2 clock prescalers for the peripheral clock generation

- **IRQ/Events**
  - on PortA/PortC inputs, Prescaler, Timer, ADC, SPI, Comp

- **Watchdog**
  - logic watchdog with dedicated low freq oscillator

- **VLD**
  - Voltage Level Detector on Supply and input pin (32 levels)

- **Brown Out**
  - Brownout Detection & Start-Up Power check

- **ADC**
  - 8 channels 10bits ADC – up to 100kbps

- **Reference**
  - pre-trimmed voltage reference output available

- **Operational Amplifier**
  - 3 terminal standalone Operational Amplifier or Comparator

- **Temp. Sensor**
  - fully internal temperature Sensor

- **Package**
  - SOP8, TSSOP16/20/24/28, QFN20/32 (ask for availability)
Power supply
- Low power architecture
- Voltage regulator for internal logic supply
- External regulator capacitor
- Voltage mult: gives internal multiplied voltage to allow 0.9V start-up (Padring remains on low-volt)
- DC-DC Converter: with ext Coil and Cap. Increases the VBAT for the whole circuit I.e to 3.3V.

CPU
- 8-bit CoolRisc 816L Core
- 16 internal registers
- 4 hardware subroutine stacks
- 8-bit hardware multiplier
- refer also to the CR816L reference manual

Flash/EEPROM
- 16.9k Byte shared General Purpose Non Volatile Flash memory
- max 6k Instructions program memory
- max 12 kByte non volatile data memory

RAM
- 512 x 8-bit static SRAM
- 48 byte of Ram-Cash for EEPROM modification support

Operating modes
- Active mode: CPU and peripherals are running
- Standby mode: CPU halted, peripherals on
- Sleep mode: no clocks, data retained
- Power down mode, Reset state
  Wake Up Event from PortA inputs

Resets
- Power On Reset
- Reset from logic watchdog
- Brown out (as voltage supervisory function)
- Reset with Port A selection
- Flags to identify the reset source

Watchdog timer
- generation of watchdog reset after time out
- independent low frequency watchdog oscillator

Oscillator RC
- internal RC oscillator, 2MHz and 15MHz pre-trimmed
- < 1% frequency deviation over temperature range

External Oscillator
- 32 kHz watch type Crystal or 4MHz Resonator

Prescaler’s
- Pre-division factors for system clocks of 1, 2, 4 or 8x are available, for CPU and prescaler’s
- Two clock prescalers (dividers) for the peripheral clock generation:
  - Prescaler 1 is a 15-stage divider
  - Prescaler 2 is a 10-stage divider
- input clock software selectable
- fix interval IRQ’s

Interrupt
- external IRQ’s from Port A, VLD, Comparator
- internal IRQ’s from Timer, Prescaler, ADC, SPI
- Event from SPI/ADC and DoC

Parallel In/Output Port A, Port C
- 8-bit wide direct input read
- all functions bit-wise configurable
  - Input , output
  - Debouncer, IRQ on pos. or neg. edge
  - Input combination reset
  - Pullup, pulldown or nopull selectable
  - Freq. Input for timer
  - Analog In/Out

Parallel In/Output Port B
- 8 multipurpose I/O’s
- 8-bit wide direct input read
- CMOS or Nch. Open Drain outputs
- all functions bit-wise configurable
  - Input , output
  - Pullup, pulldown or nopull selectable
  - CMOS or Nch. Open Drain outputs

Serial Port Interface SPI
- 3 wire serial Interface, Sclk, Sin, Sout
- master and Slave mode
- Serial datastream output
- Event / IRQ
- Mapped on port outputs

Timer (4 x 8-bit, or 2 x 16-bit)
- 8 (16) bit wide, Zero Stop and Auto Reload mode
- External signal pulse width measurement
- PWM generation, IRQ
- Event Counter
- Input capture
- Output compare

Sleep Counter Reset (SCWUP)
- Automatically wakes up the circuit from sleep mode
- Enable/disable by register

VLD
- Detection of 32 voltage levels (0.8V to 3.0V)
- Source from VSUP, input Pin or Op.Amp output

Op. Amplifier / Comparator
- All 3 terminals mapped on PortA/PortC
- Output routed to internal VLD cell
- Amplifier or Comparator output

Temp. Sensor
- Fully internal temperature sensor
- Multiplexed input to ADC

Brown Out
- On-chip Brown-Out detection, reset state
- Power check at Startup

ADC
- 10-bit, 8 channels ADC, up to 100kbps conversion time
- Single or Continuous mode
- Successive approximation register
- External/internal reference voltage available on a pad
- Event / IRQ

DoC (Debug on Chip)
- 2 wire serial interface debug and programming interface
- Flash programming
- Event / IRQ