Miscellany

Unexplored MSP430 Peripherals

Some unexplored peripherals

- Comp : Comparators
- WDT : Watch Dog Timer
- RTC : Real Time Clock
- Flash Memory
- DMA : Direct Memory Access
- SIF : Scan Interface
- SVS : Supply Voltage Supervisor
- USB
- ESP430 : Energy Metering
- BOR : Brown-Out Reset
- PMM : Power Management Module
- EDI : Enhanced Data Integrity
- RF Front End
- Advance Encryption Standard
Comp : Comparators

- Input multiplexer
- Selectable RC-filter on output.
- Output to Timer_A capture input
- Interrupt capability
- Selectable reference voltage (Including a constant Vthresh of NMOS transistor)
- Sample and hold w/ CASHORT
- Comparator can be powered down

WDT : Watch Dog Timer

- Selectable clock source
- Four software-selectable time intervals
- Watchdog mode
- Interval mode
- Access to WDT control register is password protected
- Control of RST/NMI pin function
- Can be stopped to conserve power
RTC: Real Time Clock

- Calender and clock mode
- 32-bit counter mode with selectable clock sources
- Automatic counting of seconds, minutes, hours, day of week, day of month, month and year in calender mode.
- Interrupt capability
- Selectable BCD format

Flash Memory

- Internal programming voltage generation
- Bit, byte, or word programmable
- Segment erase and mass erase
- Timing requirements must be met
- Some operations must be done from RAM (and some are faster)
DMA: Direct Memory Access

- Read/Write x3
- w/o CPU
- Can read/write from FLASH
- Up to three independent transfer channels
- Requires only two MCLK clock cycles per transfer
- Block sizes up to 65535 bytes or words
- Configurable transfer trigger selections
- Can use Interrupts to signal completion

SIF: Scan Interface

- Allows background processing of outputs from analog and digital sensors through Programmable State Machines
- Support for different types of LC sensors (Measurement of sensor signal envelope and oscillation amplitude)
- Support for resistive sensors
- Direct analog input for A/D conversion
- Direct digital input for sensors such as optical decoders
- Support for quadrature decoding – e.g., rotation encoders
- Example – interrupt on A/D input w/ hysteresis
BOR : Brown-Out Reset

SVS : Supply Voltage Supervisor

- AV_{CC} monitoring
- Selectable generation of POR
- Output of SVS comparator accessible by software
- Low-voltage condition latched and accessible by software
- 14 selectable threshold levels
- External channel to monitor external voltage
PMM : Power Management Module

- Wide supply voltage (DVCC) range: 1.8 V to 3.6 V
- Generation of voltage for the device core (VCORE) with up to four programmable levels
- Supply voltage supervisor (SVS) for DVCC and VCORE with programmable threshold levels
- Brownout reset (BOR)
- Software accessible power-fail indicators

USB

- Fully compliant with USB 2.0 Full-speed specification
- A power supply system independent from the PMM system
- Internal 48-MHz USB clock
- When USB is disabled Buffer space is mapped into general RAM, providing additional 2 KB Memory
ESP430: Energy Metering

- Complete analog and digital functionality for single-phase metering
- Tamper detection functionality
- Built-in calibration features
- Integrated analog front end (AFE) for voltage and current sampling
- Integrated processing for metering calculations including active, apparent and reactive energies, power factor, line frequency, etc.

EDI: Enhanced Data Integrity

- The EDI provides additional functionality over normal flash memory controllers (valuable in harsh environments and application areas requiring data integrity, e.g. medical applications).
- The additional level of security is reached by calculating more dimensional checksums.

RF Front End

- A flexible radio transceiver.

Advanced Encryption Standard

- The AES accelerator (CC430 devices) module performs encryption and decryption of 128-bit data with 128-bit keys according to the advanced encryption standard in hardware, and can be configured with user software.
References

- Peripherals listing  [http://focus.ti.com/lit/sl/pb034s/sl/pb034s.pdf](http://focus.ti.com/lit/sl/pb034s/sl/pb034s.pdf)
- MSP430x5xx/MSP430x6xx Family User’s Guide (USB, PMM)  [http://focus.ti.com/lit/ug/slau208g/slau208g.pdf](http://focus.ti.com/lit/ug/slau208g/slau208g.pdf)