ANALOG SPOTLIGHT

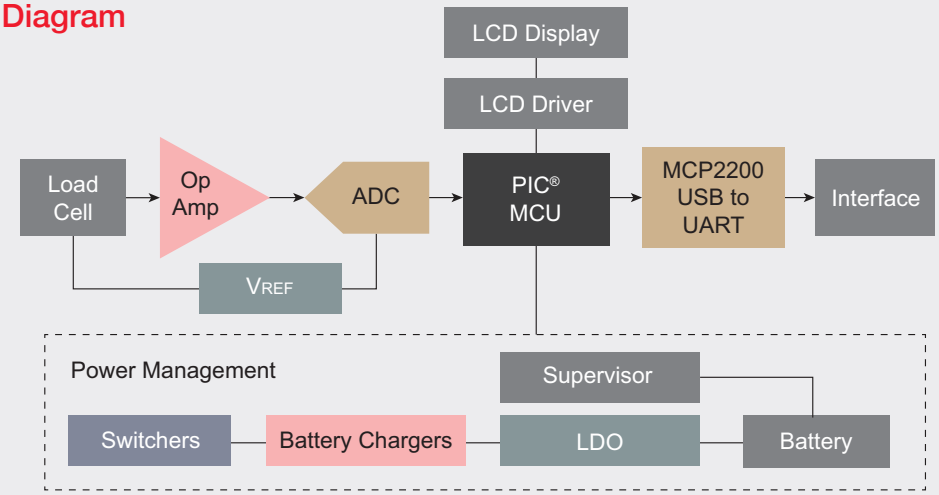
Sensor Interfacing

Load Cell: Weight Scale Application

General Information

The solution represented by the block diagram illustrates the analog signal conditioning, power management, microcontroller and communication functions required for load cell sensing applications. Typical applications can include weight measurement, fatigue testing (stress) and level detection and are used in many industries such as food processing, mining and industrial automation.

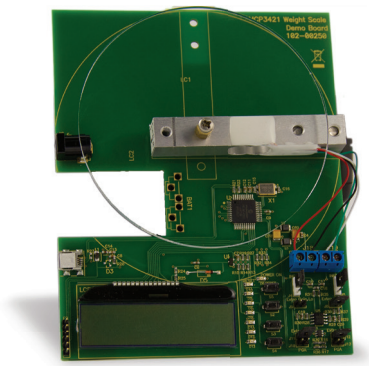
Typical Block Diagram



MCP3421 Weight Scale Reference Design

(MCP3421DM-WS)

An example of a weight measurement solution provided by Microchip is the MCP3421 Weight Scale Reference Design (MCP3421DM-WS). This demo board is designed to evaluate the performance of the MCP3421 low-power consumption 18-bit Delta-Sigma ADC. Also included in the design is the low-noise auto-zero MCP6V07 op amp used for signal conditioning and investigating the impact of added gain before the ADC, the low drop-out linear regulator MCP1701 providing voltage regulation for the system and the PIC18F4550 microcontroller for controlling the LCD display and the USB communication with the PC.



Benefits

- Low power consumption
- Low noise, high accuracy
- Ready-to-use reference design
- Decrease time to market
- Available files:
  - Source code
  - Schematic
  - Gerber files
  - Bill of materials

See alternative products table on next page.

Alternative Products for Typical Block Diagram

Function	Popular Products	Description
Operational Amplifier	MCP603X	Op amps with gain bandwidth of 10 kHz, low typical operating current of 1.35 µA and offset voltage less than 150 µV.
	MCP6V0X Zero-Drift Op Amps	Zero-drift op amp family, Vos drift: ±50 nV/°C, Low initial Vos: ±2 µV, PSRR: 130 dB (min), CMRR: 130 dB (min), wide supply voltage range: 1.8V to 5.5V.
	MCP627X/8X/9X	Op amps with rail-to-rail I/O, 1.8V to 6V operating range, typical GBWP of 2-10 MHz with low quiescent current in small packages.
	MCP60X	Op amps with gain bandwidth product of 2.8 MHz, low typical operating current of 230 µA and an offset voltage less than 2 mV.
Analog-to-Digital Converter	MCP3421	Low noise, high accuracy Delta-Sigma ADC with differential inputs, up to 18 bits of resolution, small 6-pin SOT-23 package, 2.7 to 5.5V operation.
	MCP3551	Low noise, high accuracy Delta-Sigma ADC with differential inputs, up to 22 bits of resolution, 2.7 to 5.5V operation.
Low-Power LDOs	MCP1824/5/6/7	Family of LDOs operated from a single supply, 2.1V to 6.0V and includes the 300 mA MCP1824, 500 mA MCP1825, 1A MCP1826 and 1.5A MCP1827.
	MCP1703A	Input voltage of up to 16V, current consumption of 2 µA and 250 mA output current capability.
Switching Regulator	MCP1601	Synchronous Buck regulator capable of supplying 500 mA output current, output voltages from 0.9V to VIN at efficiency that can exceed 92%.
	MCP16251/2	Compact, high-efficiency, synchronous Boost DC-DC converter, 650 mA peak current (typ.), 0.82V startup voltage.
	MCP1640	Compact, high-efficiency, synchronous Boost DC-DC converter, 800 mA peak current (typ.), 0.65V startup voltage.
Battery Charging	MCP731XX	Linear charge management controllers for Li-Ion or Li-Polymer batteries, providing optimal capacity in the shortest charging time.
	MCP732XX	Lithium Iron Phosphate (LiFePO4) charge management controller, providing optimal capacity in the shortest charging time.
Reset Monitors	MCP13XX	The MCP13XX voltage supervisors provide precision monitoring trip points, watch dog timer, manual reset and a low supply current of 10 µA.
USB to UART Bridge	MCP2200	Provides USB-to-UART bridge function, contains integrated USB termination resistors and has 256 bytes of user EEPROM.
USB to SPI Bridge	MCP2210	Provides USB-to-SPI bridge function, contains integrated USB termination resistors and has 256 bytes of user EEPROM.
Voltage Reference	MCP1525	Provides precision voltage with .08% initial accuracy, 8 voltage options, 1.024V, 1.250V, 1.800V, 2.048V, 2.500V, 3.000V, 3.300V and 4.096V.

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