ADS7843 PEN INTERRUPT

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The ADS7843 is a 12-bit sampling analog-to-digital converter (ADC) used to drive 4-wire touch-screens to serial interfaces by ratiometrically converting two differential input signals. The ADS7843 also produces an accurate output with the first conversion cycle once powered up. Because of this feature, the ADC can be powered up and down continuously, thus, enabling designers to conserve energy in low power applications such as Personal Digital Assistants (PDA), where the number of conversions is limited but a fast and accurate response is required on the first conversion. To maximize energy conservation, the ADS7843 incorporates a Pen Interrupt Request feature (PENIRQ), which enables designers to fully control the power-down operation when interfacing with Micoprocessors (MPU). Figure 1 is a simplified flow diagram for a PDA showing how PENIRQ is used to assist in controlling power-down operations.
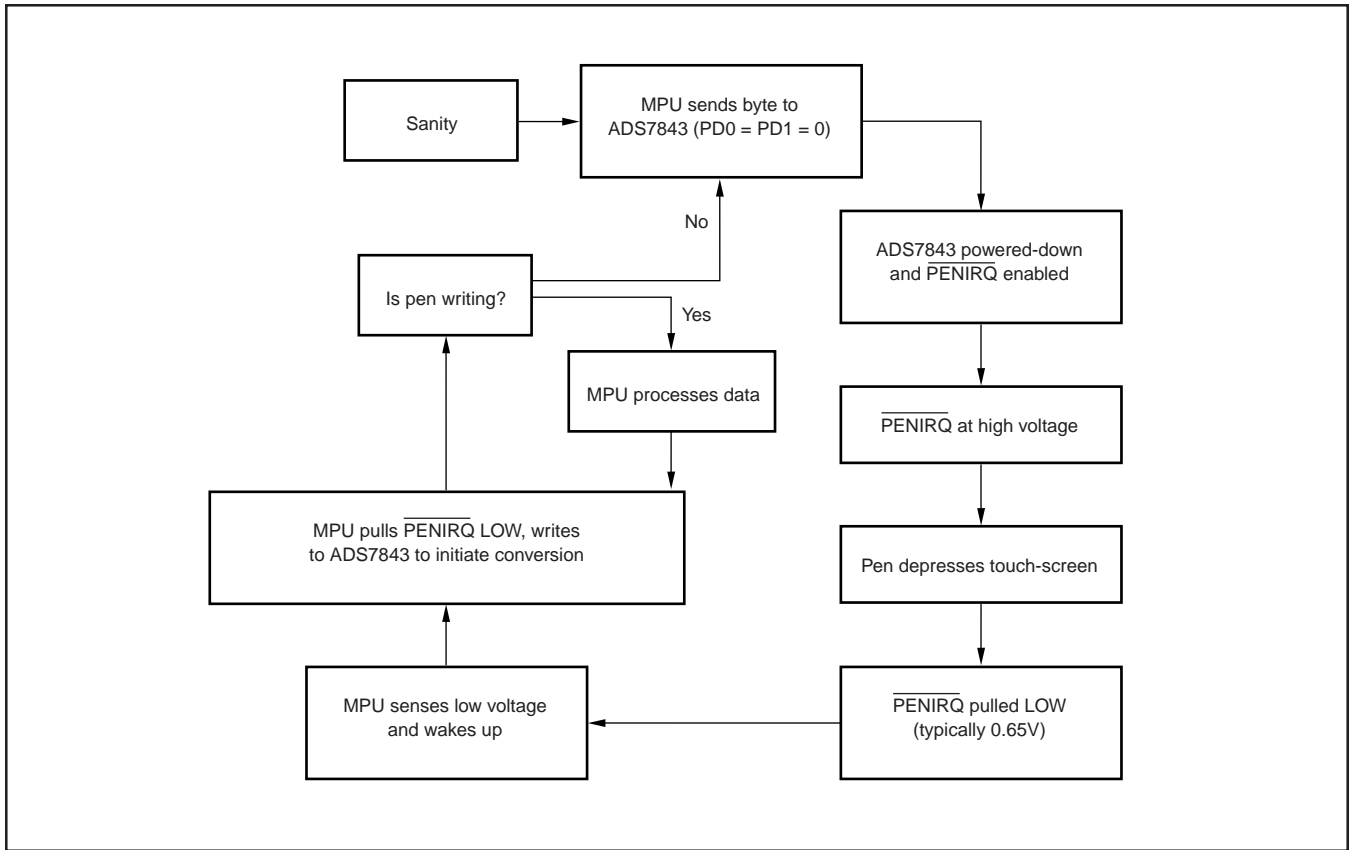

FIGURE 1. Simplified Flow Diagram for PDA.

Figure 2 shows a simplified schematic of the ADS7843 front end while using the $\overline{\text{PENIRQ}}$. The resistive touch-screen is represented with the row and column of series resistors between the X and Y inputs. The switch, S1, models a dynamic short that moves across the X and Y resistive touch-screen axes like the tip of a PDA pen. S1 also models where the tip of the PDA pen initially shorts the two resistive layers together. I/O1 and I/O2 are general purpose input/output ports from the MPU. I/O2 must be able to sense a change in potential when powered down.

Be sure to note that the ADC will not start in the power-down mode when power is applied to the system. Instead, the MPU must write zeros into PD0 and PD1—two bits of the Control Byte register. After the ADS7843 enters the power-down mode, the Y-MOSFET provides a path for current flow when the touch-screen is depressed. The other three MOSFETs for X+, X–, and Y+ are in a high impedance state during the power-down mode. When the PDA pen depresses the touch-screen, current flows through the 100kΩ resistor and the interrupt diode. Once $\overline{\text{PENIRQ}}$ is pulled LOW, a voltage typically not exceeding 0.65V is sensed at I/O2. At that time, the MPU should wake up, pull I/O1 and I/O2 LOW, then write a byte to the ADS7843 Control Byte register to initiate a conversion. The MPU must drive I/O1 and I/O2 LOW in order to reverse bias the $\overline{\text{PENIRQ}}$ diode. Otherwise, if the diode is forward-biased during a conversion, the additional current will cause the input data to be inaccurate. To complete the control cycle, the MPU writes the corresponding power-down bits to the ADS7843 Control Byte after the PDA has no inputs for a minute or two, depending on the time allotted prior to the power-down operation.
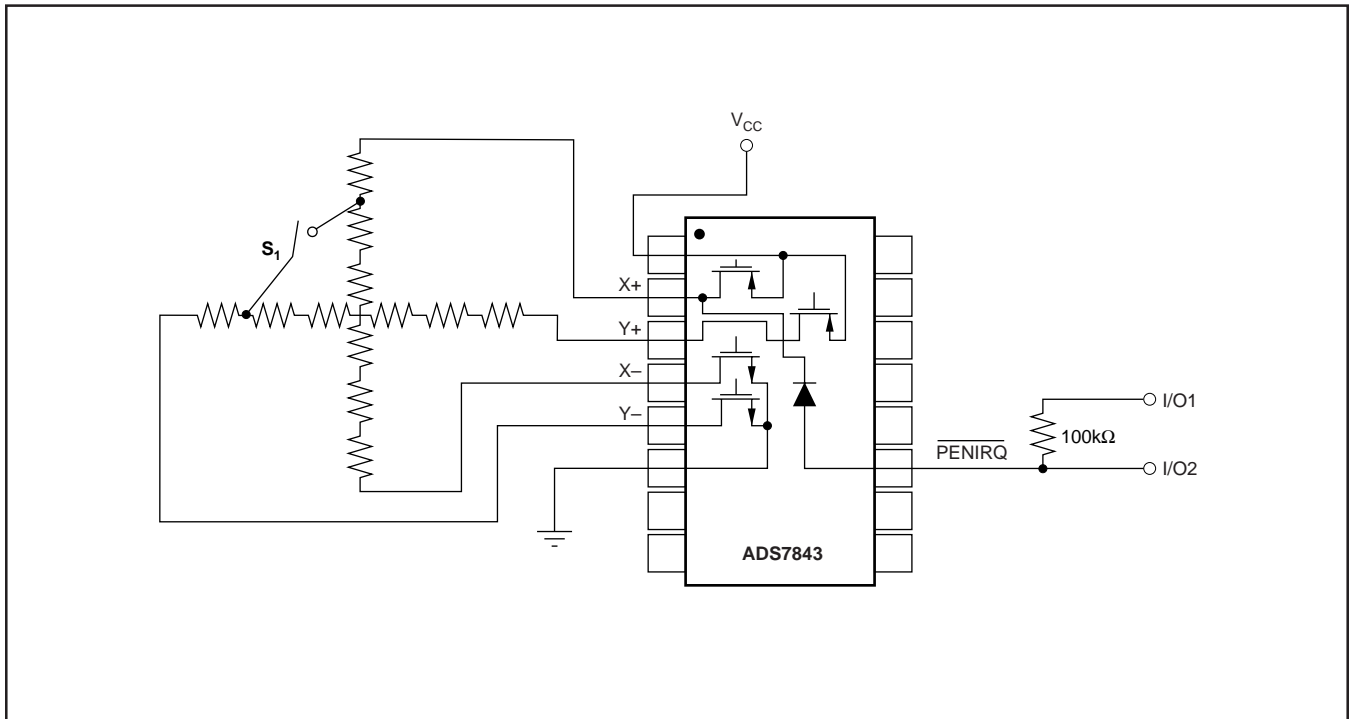

FIGURE 2. Simplified $\overline{\text{PENIRQ}}$ Architecture.

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