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Author Wei-Ting Nie
Author's Email Address No Public.
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Abstract
A new methodology to design a real-time fast input signal measurement system for advanced RISC machine (ARM) is proposed in this thesis. This system can convert the input signal frequency into digital signal output with high accuracy and real-time conversion characteristic. The proposed system also includes an interface circuit, control logics, a level shifter, an integrated circuit, one-shot and an A/D converter. A precision reference clock is employed to raise the measurement accuracy. The input signal frequency can be measured within two cycles of the precision reference clock. In this thesis, the circuit timing is analyzed and the theory is derived in detail. The driver and application programs of ARM9 are designed to verify the derived theory. The auto-calibration and table look-up methods are proposed to reduce greatly the error caused by component uncertainty and offset voltage, and overcome the nonlinear problem of frequency-to-voltage conversion. The proposed method and realization can be applied to real-time measurement and control using embedded system.
Advisory Committee
An-Sang Hou - advisor
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