EP93xx RTC Oscillator Circuit

Note: This application note is applicable to all revisions of the EP93xx device.

1. BACKGROUND

Cirrus Logic has found that the Real Time Clock (RTC) circuit in the current EP93xx devices is susceptible to on-chip noise, which can generate an inaccurate clock count and possibly cause the IC to boot into an improper state during power-up.

To correct this issue, customers need to provide a clean square wave input to the RTCXTALI pin. This may be accomplished several ways, such as by using an external clock oscillator or a dedicated RTC chip like the DS1337. This application note, however, shows the use of an external Pierce oscillator circuit to replace the existing internal RTC circuit.

Please note that an external RTC oscillator circuit is required for the EP93xx family on both existing and future revision parts.

2. IMPLEMENTATION

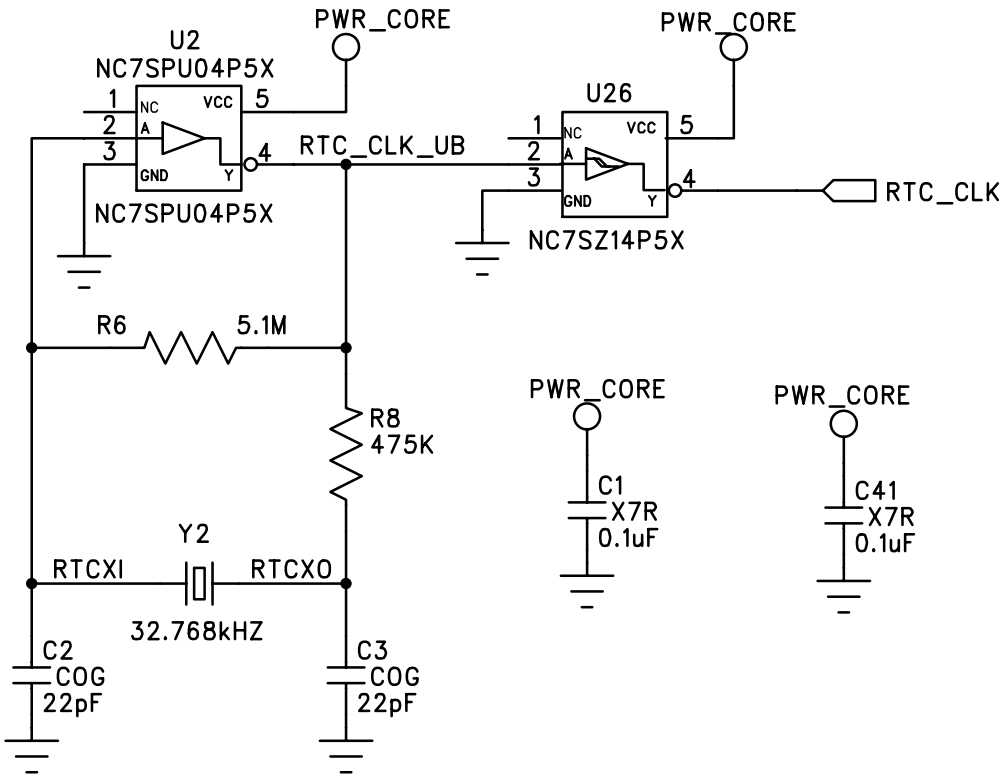

Figure 1. Implementation Using a Pierce Oscillator Circuit and Schmitt-trigger Inverter

The NC7SPU04 is an unbuffered inverter that is powered from the 1.8 VDC rail. The output of the NC7SPU04 connects to the RTCXTALI input on the EP93xx device. The RTCXTALO pin is left open. The exact value of the capacitors may need to be adjusted based on the actual crystal used and the layout and routing of the circuit. Care should be taken to minimize the trace lengths and to avoid high-speed signals near the oscillator input. The 475 kΩ resistor (R2) ensures that the crystal is not overdriven. Overdriving the crystal can lead to premature aging and failure of the crystal. The RTC clock is vital to booting up the EP93xx devices. Without an RTC clock, the EP93xx processor will not boot.

A Schmitt-trigger inverter has been added to the output of the oscillator circuit. The new inverter is also powered off the 1.8 VCD rail, referred to as *PWR_CORE* in Figure 1. The Schmitt-trigger inverter has been added so that the EP93xx device will only receive a full-scale RTC clock. The Schmitt-trigger inverter will not produce a clock output until the RTC oscillator has produced levels that meet the minimum input threshold level of the Schmitt-trigger inverter. Figure 2 shows the output from the new circuit, *RTC_CLK* is on channel 1 and *RTC_CLK_UB* is on channel 2 in Figure 2.

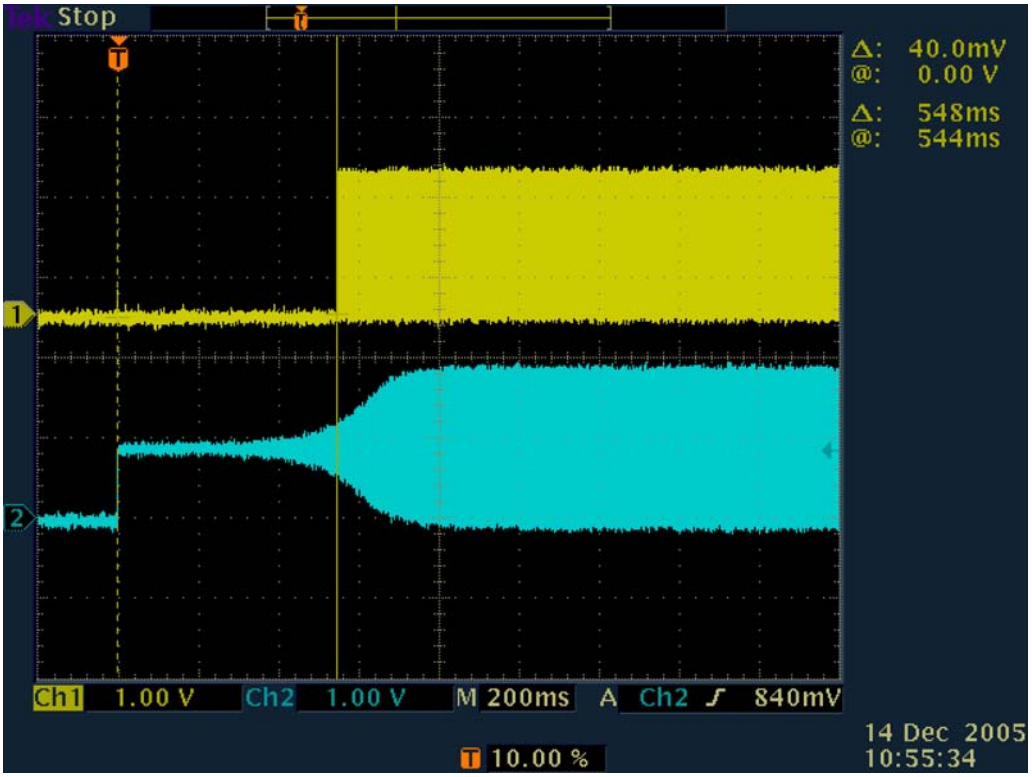

Figure 2. Buffered and Unbuffered RTC Oscillator Output.

3. Determining the Silicon Revision of the Integrated Circuit

On the front of the integrated circuit, directly under the part number, is an alphanumeric line. Characters 5 and 6 in this line represent the silicon revision of the chip. For example, this line indicates that the chip is a “E0” revision chip:

EFWA**E0**AM0340

Table 1: Revision History

Version	Date	Changes
REV1	NOV 2004	Initial release.
REV2	DEC 2005	Added Schmitt-trigger inverter.