

UT80CXX196KD (JD02X) HSO Timer2 Reset Interrupt Anomaly

Anomaly:

There exists an anomaly with the “A,” “B,” and “C” revisions of the JD02 die (UT80CXX196KD) where the Timer2 Reset command used by the High Speed Output (HSO) unit does not disable the Software Timer Interrupt (INT05) when the command is executed. Under correct operation, the Timer2 Reset command used by the HSO unit allows the user to enable or disable the interrupt by setting a bit in the Timer2 Reset command register. If the Software Timer Interrupt is not used, then the user can exercise the Timer2 Reset command while masking the Software Timer Interrupt (INT_MASK.5).

Background:

The HSO module on the UT80CXX196KD is very helpful in performing autonomous control and software timing. There are a total of eight possible events that can be programmed into the HSO module at any given time. Because Timer2 is often used as the time base for many of the events loaded into the HSO module, users may be inclined to use the Timer2 Reset command (command tag => 0Eh) to control the frequency in which events are executed. However, the Timer2 Reset command exposes an anomaly when used in conjunction with HSO Software Timer commands that use interrupts. The Software Timer Interrupt (INT05) source is shared by the Timer2 Reset command and the Software Timer command used in the HSO. Because the Timer2 Reset command inadvertently does not evaluate the HSO Interrupt Enable (HSOINT_EN) bit in the Timer2 Reset command, the Software Timer Interrupt (INT05), if not masked, will trigger every time the Timer2 Reset HSO command is executed. This interrupt affects the flow of interrupts caused by the software timer commands, resulting in poor operation of the user’s application. To help satisfy user requirements, UTMC has identified several software and hardware work arounds.

Anomaly Solutions:

UTMC redesigned the UT80CXX196KD to correct the HSO Timer2 Reset command interrupt functionality allowing the user to disable interrupts caused by the execution of the Timer2 Reset command execution. The JD02D revision of the UT80CXX196KD will be available in the 3rd quarter of 2000. If you are using the JD02A, JD02B, or JD02C versions of the UT80CXX196KD you should consider using one of the following work arounds.

Solution #1:

The first and easiest solution to the anomaly is to allow the Timer2 Reset command to force a Software Timer Interrupt (INT05) and return from the interrupt service routine as soon as possible. This option may not be possible if you are using the Software Timer HSO commands and use the Software Timer Interrupt to perform specific actions based on the Software Timer command that is executed.

Solution #2:

The second solution is to disable the Software Timer Interrupt by clearing bit 5 of the interrupt mask Special Function Register (SFR). This allows you to lock the Timer2 Reset function in the HSO CAM, enabling the user’s ability to perform defined HSO events at a specific frequency. This solution, however, does not allow you to use the Software Timer commands with the HSO module because they will not be able to cause a Software Timer Interrupt (INT05). If you chose to use this option and still need a method to use Software Timer functionality, use HSO events that cause a change to the HSO pins and enable the HSO interrupt (INT03). When an event occurs on the HSO pins, the HSO interrupt will trigger. In the HSO interrupt service routine, you may include the application software used by the Software Timer Interrupt service routine. Alternatively, you can initialize hardware Timer1 and allow it to generate the Timer Overflow interrupt (INT00) at the “Software Timer” interval.

UTMC Errata Sheet

Solution #3:

The final solution is to avoid using the Timer2 Reset HSO command and use an external Timer2 Reset pin to clear Timer2. This option allows you to utilize the HSO Software Timer commands in conjunction with the Software Timer Interrupt. You can also use the HSO to control the external Timer2 Reset pin as-long-as you have two HSO CAM entries, one HSO pin, and one external Timer2 Reset pin available. Assuming you have the resources available, load the HSO CAM with a Set HSO Pin command followed by a Clear HSO pin command (at Timer2 count = 0) to pulse the HSO pin. The timing for these events are set based on the reset period for the Timer2 counter. Once the CAM entries are loaded, the HSO pin (tied to the external Timer2 Reset pin) will pulse and force the Timer2 counter to reset. **Note:** you need to have a minimum pulse width for the HSO pin because the external Timer2 Reset signal is level sensitive in the JD02C and earlier revisions of the UT80CXX196KD. Therefore, the Timer2 counter remains cleared until the external Timer2 Reset signal is low.