
TN8000.10

Technical Note

***XE8000 Series:
Guidelines on utilization, troubleshooting
and bug list***

Introduction

Semtech is committed to making the best possible devices for its customers. You can help us to improve our devices by providing us with your detailed and constructive comments. If you detect unexpected behavior on our devices, or if you would like another feature that you feel would make the XE8000 device an even better solution for your system, please let us know.

Scope

This document concerns all XE8000 devices.

Devices marked ES are engineering samples. These devices may have additional limitations.

Devices marked XE are fully qualified.

Announcing unexpected limitations

Any person that detects an unexpected limitation or a bug in one of the XE8000 series products should:

- 1) Check if this specific behavior is documented in the up-to-date datasheets that one can find on the Semtech web site at www.semtech.com
- 2) Check if this specific behavior is documented in the up-to-date version of this TN8000.10 that one can find on Semtech web site at www.semtech.com
- 3) If this limitation or bug is not yet documented, send it via email to hotline@semtech.com with the most precise description, including software example if needed, so that XEMICS support engineer can reproduce it and isolate it.

As soon as this limitation is isolated, registered XE8000 developers will be informed via email, and this list will be updated.

Known bugs

This section lists the known bugs in the different XE8000 products.

Function affected: UART.
Devices affected: XE8801(A), XE8805(A)
Description of the issue: UART cannot operate at 2400 bauds and below with the RC oscillator used as UART reference clock.
Workaround: Use the Xtal oscillator as the UART clock for low baudrates.

Function affected: VMULT off current consumption.
Devices affected: XE8805(A)M
Description of the issue: The power consumption of the VMULT block in the off state is larger than expected after it was switched on at least once before.
Workaround: Do not switch off the multiplier once it was switched on. The power consumption in the on state is smaller than in the off state. The current can be further reduced by setting Fin=11 in RegVmultCfg0 during the off state

Function affected: Program memory size.
Devices affected: XE8801(A), XE8805(A).
Description of the issue: The useful number of instructions is 8190 in stead of 8192. The remaining instructions are used for the checksum calculation and are automatically added by the programmer.
Workaround: Limit the software size in these circuits to 8190 instructions.

Function affected: SFLAG
Devices affected: XE8801(A), XE8805(A).
Description of the issue: The overflow flag is not correctly set after SFLAG if SFLAG follows immediately CMP or CMPA.
Workaround: Insert a "MOVE a, r0" instruction before the SFLAG instruction.
Be aware that the first SFLAG in an interrupt routine must also be preceded by the same "MOVE a, r0" as the last executed instruction is not known.
The SFLAG instruction is not used by the C compiler and therefore will not generate the problem.

Function affected: BitJockey™ RfifRxClock
Devices affected: XE8806A, XE8807A.
Description of the issue: When RfifRxClock=1 (use of external clock in reception mode), an interrupt is missing from time to time.
Workaround: Do not use the external clock (i.e. set RfifRxClock=0). The internal bit synchronizer of the BitJockey™ does reliably detect all bits of the incoming word.

Function affected: IRQ Handling
Devices affected: XE8801(A), XE8805(A).
Description of the issue: The routing of the interruption may not be correct in some cases (The high level interrupt may be routed like a middle level interrupt)
Workaround: Pool the interrupt registers for both middle and high level interrupts. The crt0.s file has been updated to include this workaround. Note that this file is available on C:\RIDE\COOLRCTS\WIN32\TEMPLATES\COMMON

Troubleshooting and application hints

This section describes frequent questions on the use of the different circuits in particular applications. Most of these additional comments have been added to the circuit datasheets but are repeated here for quick troubleshooting.

Function affected: Counters
Devices affected: XE8801(A), XE8802, XE8805(A), XE8806A, XE8807A.
Description of the issue: Counters seem not to count correctly depending on the selected signal source.
Application hints: 1. Be careful to select the counter mode (no capture, not PWM, specify cascaded or not and up or down counting mode) before writing any target or load value to the RegCntX register(s). This ensures that the counter will start from the correct initial value. When counters are cascaded, both counter registers must be written to ensure that both cascaded counters will start from the correct initial values. 2. The stopping and consecutive starting of a counter in counter mode without a target or load value write operation in between can generate an interrupt if this counter has been stopped at the zero value (downcount) or at its target value (upcount). This interrupt is additional to the interrupt which has already been generated when the counter reached the zero or the target value.

Function affected: Counters in capture mode.
Devices affected: XE8801(A), XE8805(A).
Description of the issue: Counters in Capture Mode seem not to always count correctly.
Application hints: Counters in Capture do count the same way as regular Up/Down.
Before starting Capture Mode, be sure to write to all the counter registers including RegCntA-B . These registers are not reset at Power-On-Reset, and their value at start-up is unknown until the software initializes them.

Function affected: Interrupts.
Devices affected: XE8801(A), XE8802, XE8805(A), XE8806A, XE8807A.
Description of the issue: Interleaved interrupts are not handled correctly.
Application hints: See XEMICS technical note TN8000.06.

Function affected: XE8000 operating on the Xtal oscillator.
Devices affected: XE8000.
Description of the issue: Although the XE8000 circuits have a more than average robustness against EMC, sometimes a strong electromagnetic pulse may lock the Xtal oscillator. When it is enabled, the watchdog using the Xtal oscillator is also locked.
Application hints: <ol style="list-style-type: none"> 1. The connections between the circuit and the crystal should be kept as short as possible. If possible, the connections should be made on a buried layer with ground shielding planes. 2. The crystal (and circuit) may be protected by a shield. 3. Run the circuit from the RC oscillator in stead. This oscillator is much less susceptible to EMC. 4. Add an external watchdog circuit to drive the (N)RESET pin of the circuit. This will unlock the circuit in all cases.

Function affected: RAM initial state.
Devices affected: XE8000.
Description of the issue: The program does not behave the same way in the simulator as in reality.
Application hints: This is most often due to variables that are not initialized. In the simulator, all variables are initialized to 0 during program reset. On the chip on the contrary, values in the RAM and in some registers are unknown at startup. Refer to the datasheet to know the startup value of all registers. Good programming practice is to initialize all variables in the software. This will avoid this issue.

Known bugs in emulators

The bond-out circuits used in the Phytion emulators (see www.phyton.com) may have different bugs from the regular production circuits. **These bugs do not appear in the normal production circuits.** The behavior of the emulator is therefore slightly different from normal production circuits in the cases listed below:

Function affected: BitJockey™
Devices affected: emulator only for XE8806A and XE8807A.
Difference with regular circuits: This bug does not exist in the production circuits and the workaround is not required. Using the workaround will however not harm the software execution in the production circuits.
Description of the issue: When switching the BitJockey™ from Rx to Tx mode, the BitJockey™ may hang.
Workaround: Test the status of the RfifRxBusy bit in the register RegRfifRxSta and try again if the switch was not successful. This workaround was implemented in the API of TN8000.18.

Function affected: Power-on-reset
Devices affected: emulator only for XE8802.
Difference with regular circuits: This bug does not exist in the production circuits and the workaround is not required. However, using the workaround will not harm the software execution in the production circuits.
Description of the issue: Under certain circumstances, the initial value of the registers could be different from the value given in the datasheet.
Workaround: Initialize the registers in the software.

Function affected: RAM
Devices affected: emulators only for all XE8000 circuits.
Difference with regular circuits: This bug only concerns emulator specific hardware and is not present in production circuits.
Description of the issue: The contents of the RAM are not displayed correctly in the memory dump window. The RAM contents can not be modified on the fly during a break. All other registers including the low power RAM are OK.
Workaround: Use the shadow data to display the RAM contents.

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