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TX Companion Chip Specification Update Rev. 1.0

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Preface

Thank you for new or continued patronage of TOSHIBA semiconductor products.

Toshiba’s microprocessor and microcontroller offerings include discrete components suitable for a wide range of commercial and industrial systems.

This manual provides usage considerations for the PCI Connection Companion Chip, which can be connected to Toshiba’s microcontroller with an on-chip PCI bus.

March 2007

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TX Companion Chip Specification Update

Chapter 1 Introduction

1.1 Product Groups

This document covers the devices listed below:

- TC86C001F/FG(GOKU-S)
- TC6358TB/TBG(PLUM2)

1.2 Related Documents

Documents related to this manual are listed below.
The contents of this document will be incorporated in the next release of these documents.

Document Title	Document No.	Revision Date
PCI Connection Companion Chip TC86C001FG(GOKU-S) Rev. 2.1	BDE0061C	Oct 2006

1.3 Usage Considerations (List of serial numbers and the corresponding products)

The following table lists shows applicable usage considerations for each product.
(X: Applies, -: Does not apply)

Product Name (Product No.) / Serial Number	TC86C001 (GOKU-S)	TC6358 (PLUM2)
ERT-TXcompanion-001	X	X
ERT-TXcompanion-002	X	X

Chapter 2 Usage Considerations

Issue No.: ERT-TXcompanion-001

Applicable Products: TC86C001F/FG(GOKU-S), TC6358TB/TBG(PLUM2)
Conditions: For isochronous transactions of the USB Controller, when a descriptor that should have been processed in an expired frame is scheduled in the current or any subsequent frame

[Overview]

This problem occurs when the USB Controller performs isochronous transactions. For isochronous transactions, a frame number is identified within a descriptor (ITD) to indicate the frame in which it is to be transferred. However, frame numbers might not be synchronized between the USB Host Controller and software; if a descriptor was not processed in the frame in which it should have been retired and is processed in a latter frame, the USB Host Controller recognizes the situation as a time error and writes back DATAOVERRUN (4'h8) to the ConditionCode for the ITD. The problem is, when the specific conditions given below are met, the USB Host Controller writes back an incorrect code, 4'h0 indicating NOERROR, to the ConditionCode. (See Section 4.3.2.3.5.3, "Time Errors," on page 29 of the OpenHCI Specification.)

* ITD: Isochronous Transfer Descriptor

[Problem Description]

This problem occurs when both of the following conditions are true:

1. ITD.FC[2:0] = R[2:0]
2. ITD.FC[2:0] < R[15:0]

where, ITD.FC is the frame count for the ITD. R equals HcFmNumber (current frame number) minus ITD.SF (the frame number at which a transfer should start).

Despite the time error, the USB Host Controller writes back NOERROR (4'h0) to the ConditionCode for the ITD. Consequently, the occurrence of a time error can not be reported to the software. The implication of this depends on the software implementation.

[Work-around]

To avoid a problem, do not schedule ITDs for which the time for expiration has passed.

(Workaround Example)

Read the current frame number from the Host Controller Communication Area (HCCA) and add 8 to it to obtain the start_frame value for the ITD. This way, it is possible to prevent software from creating a link to an expired ITD.

[Status]

The applicable products will not be corrected.

Issue No.: ERT-TXcompanion-002

Applicable Products: TC86C001F/FG(GOKU-S), TC6358TB/TBG(PLUM2)
Conditions: When the USB Host Controller detected UnrecoverableError and, during a recovery process, a Remote Wakeup was generated from a device.

[Overview]

This problem occurs only when the USB Host Controller uses the Remote Wakeup function. When the USB Controller detects a fatal error in a USB system (e.g., Master Abort or Target Abort on the PCI Bus), the OHCI core sets the HcInterrupt.UnrecoverableError (UE) bit. If this bit is set with the HcInterrupt Enable.UnrecoverableError (UE) bit set, the OHCI core generates a hardware interrupt.

The USB Host Controller can recover from this error by generating a software reset (i.e., by setting HcCommandStatus.HCR to 1'b1) after detection of the interrupt. Then the USB Host Controller moves to the Suspend state (USBSUSPEND). Upon software reset, the OHCI registers are initialized. If a Remote Wakeup is genrerated from a device after the OHCI registers are initialized, the USB Host Controller should normally move to the Resume state (USBRESUME) but remains in the USBSUSPEND state due to a bug.

[Problem Description]

The occurrence of this problem is limited only to systems that support both of the following:

1. Detection of a system error as an UnrecoverableError (UE)
2. Remote Wakeup

In such systems, a problem takes place when all of these conditions are met:

3. An UE occurred.
4. A software reset is issued for initialization after the UE.
5. A Remote Wakeup is detected after the software reset.

Due to the bug, the USB Host Controller does not recover from the error even if it receives a Remote Wakeup from a device. Unless a recovery-from-Suspend routine is implemented in software, the USB Host Controller remains in the Suspend state.

[Work-around]

There would be several workarounds for this problem. Here are two workaround examples:

1. Issue a software reset to initialize the OHCI registers. Then set the HcControl.HCFS field to a state other than USBSUSPEND (2'b11).
2. When the USB Host Controller detects a Remote Wakeup, the HcInterruptStatus.RD bit is set to 1'b1. Upon detection of this inteerupt, set the HcControl.HCFS field to a state other than USBSUSPEND (2'b11).

[Correction]

The applicable products will not be corrected.

Appendix A Revision History

Date	Revision	Document No.	Revision History
03/29/2007	Rev.1.0	BFE0023A	Initial release