October 2009

Dear Customer

Important Notices

Thank you for your continued patronage of Toshiba microcontrollers.

This page gives you important information on using Toshiba microcontrollers. Please be sure to check each item for proper use of our products.

Restrictions on the Voltage Detection Circuit (October 2009)

*If your datasheet is dated 30 November 2008 or earlier, please download the latest datasheet or request it from your local Toshiba office.

Datasheet Corrections: Voltage Detecting Circuit and Power-On Reset Circuit (September 2008)

*If your datasheet is dated 1 July 2008 or earlier, please download the latest datasheet or request it from your local Toshiba office.

Caution in Setting the UART Noise Rejection Time (September 2008)

*If your datasheet is dated 1 July 2008 or earlier, please download the latest datasheet or request it from your local Toshiba office.

Datasheet Corrections: DC Characteristics (February 2008)

* If your datasheet is dated 26 June 2007 or earlier, please download the latest datasheet or request it from your local Toshiba office.

TOSHIBA Microcontrollers TLCS-870 Family
TLCS-870/C Series

TMP86CH92I TMP86CH92S TMP86FH92 TMP86FH92I TMP86FH93

October 2009

Restrictions on the Voltage Detection Circuit

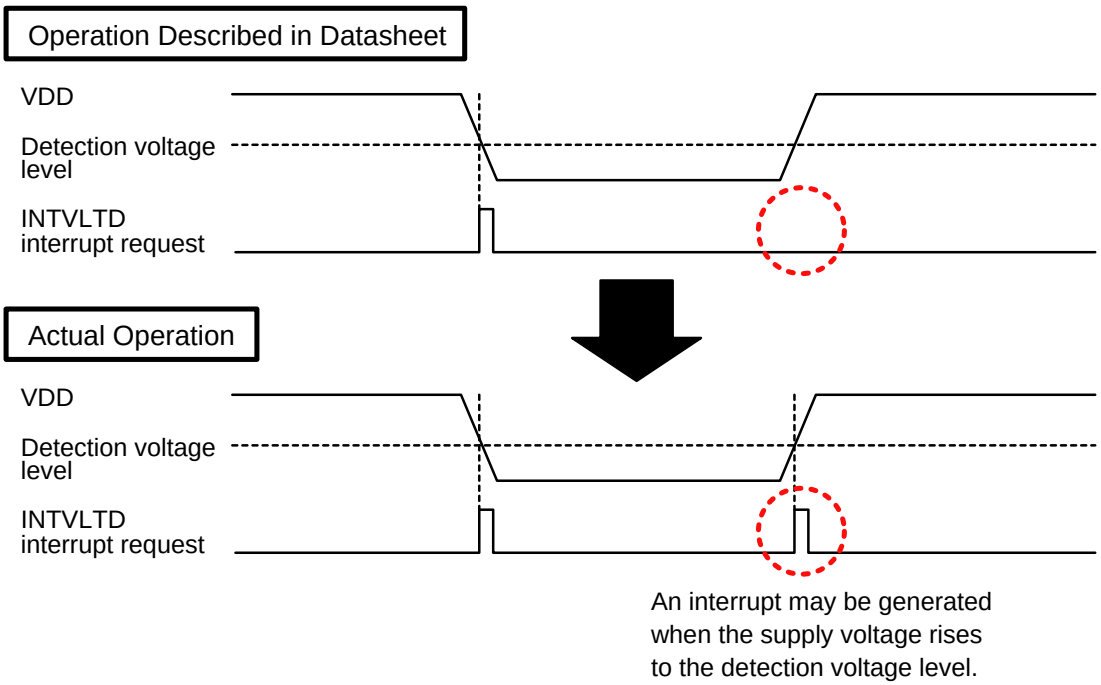
This is to inform you of restrictions on the voltage detection circuit in the TLCS-870/C Series of microcontrollers.

If you need any further information, please contact your local Toshiba sales representative.

[Restrictions]

INTVLTD Interrupt Request

When interrupt generation is enabled in the voltage detection circuit, an INTVLTD interrupt request may be generated not only when the supply voltage falls to the detection voltage level, but also when it rises to the detection voltage level.



[Workarounds]

INTVLTD Interrupt Request

Do not use the INTVLTD interrupt for voltage detection. The voltage level should be regularly checked using other timing such as the execution cycle of the main program. VDCR1<VDxSF> (x=1, 2) can be used to check the voltage level. However, if the operating voltage is near the detection voltage, the VDCR1<VDxSF> value may become unstable. It is recommended that VDCR1<VDxSF> be tested multiple times to determine the voltage level.

TOSHIBA Microcontrollers TLCS-870 Family
TLCS-870/C Series

TMP86FH92DMG TMP86FH93NG TMP86FH92IDMG
TMP86CH92IDMG TMP86CH92SDMG

September 2008

Datasheet Corrections: Voltage Detecting Circuit and Power-On Reset Circuit

With regard to the Toshiba 8-bit microcontrollers listed above, the following corrections should be made to the technical datasheets regarding the voltage detecting circuit and power-on reset circuit.
If you have any questions or require any further information, please contact your local Toshiba sales representative.

[Difference with the emulation chip]

In the technical datasheets of the above products, the following table should be added to indicate the differences between each derivative product and the emulation chip TMP86C993XB as to the availability of the voltage detecting circuit and power-on reset circuit.

	Above products	Emulation chip
Voltage detecting circuit	Available	Not available (*1)
Power-on reset circuit	Available	Not available (*2)

(*1) The TMP86C993XB does not allow an interrupt or a reset to be generated by voltage detection. Instead, it provides the emulation feature for voltage detection operation.

(*2) The TMP86C993XB does not support power-on reset operation, nor is it possible to emulate the power-on reset circuit. Therefore, in debugging your programs using the TMP86C993XB, make sure that the operating voltage is always within the specified operating voltage range of the target derivative product.

TOSHIBA Microcontrollers TLCS-870 Family

TLCS-870/X Series

TMP88CH40	TMP88CH40I	TMP88PH40	TMP88CH41	TMP88PH41	TMP88FH41	TMP88CS42
TMP88PS42	TMP88CS43	TMP88FW44	TMP88FW45	TMP88FW45A	TMP88F846	TMP88CH47
TMP88CK48	TMP88CM48	TMP88CS48A	TMP88CK49	TMP88CM49	TMP88C060	

TLCS-870/C Series

TMP86P202	TMP86P203	TMP86CH06	TMP86CH06A	TMP86PH06	TMP86C906	TMP86C407
TMP86C407I	TMP86C407S	TMP86C807	TMP86C807I	TMP86C807S	TMP86F807	TMP86P807
TMP86C408	TMP86C408I	TMP86C408S	TMP86C808	TMP86C808I	TMP86C808S	TMP86F808
TMP86P808	TMP86C908	TMP86C809	TMP86CH09	TMP86F409	TMP86F809	TMP86FH09
TMP86FH09A	TMP86C909	TMP86C912	TMP86CH12	TMP86FH12	TMP86C420	TMP86C820
TMP86P820	TMP86CH21	TMP86CH21A	TMP86C822	TMP86CH22	TMP86PH22	TMP86CP23
TMP86CP23A	TMP86CM23	TMP86CM23A	TMP86FS23	TMP86PM23	TMP86PS23	TMP86C923
TMP86FP24	TMP86CM25	TMP86CM25A	TMP86CS25	TMP86CS25A	TMP86FM25	TMP86PS25
TMP86C925	TMP86FM26	TMP86CM27	TMP86CP27A	TMP86FS27	TMP86PS27	TMP86C927
TMP86CS28	TMP86FS28	TMP86C829	TMP86C829A	TMP86C829B	TMP86CH29	TMP86CH29A
TMP86CH29B	TMP86CM29	TMP86CM29A	TMP86CM29B	TMP86CM29L	TMP86FM29	TMP86PM29
TMP86PM29A	TMP86PM29B	TMP86C929A	TMP86CS41	TMP86CS43	TMP86CS44	TMP86PS44
TMP86C944	TMP86C845	TMP86C846	TMP86CH46A	TMP86CM46A	TMP86FH46	TMP86FH46A
TMP86PH46	TMP86PM46	TMP86C847	TMP86C847I	TMP86C847S	TMP86CH47A	TMP86CH47I
TMP86CH47S	TMP86CM47A	TMP86FH47	TMP86FH47A	TMP86PH47	TMP86PM47	TMP86PM47A
TMP86C947	TMP86FM48	TMP86C948	TMP86CH49	TMP86CM49	TMP86CS49	TMP86FS49
TMP86FS49	TMP86FS49AI	TMP86FS49B	TMP86PM49	TMP86C949	TMP86CS64	TMP86CS64A
TMP86FS64	TMP86PS64	TMP86C964	TMP86CH72	TMP86CM72	TMP86PM72	TMP86C972
TMP86CK74A	TMP86CM74A	TMP86PM74A	TMP86C974	TMP86CH87R	TMP86CM87R	TMP86PM87R
TMP86C987	TMP86C989	TMP86CH92I	TMP86CH92S	TMP86FH92	TMP86FH92I	TMP86FH93
TMP86C993						

TLCS-870 Series

TMP87CH29	TMP87CK29	TMP87CM29	TMP87PM29	TMP87CH48	TMP87CH48I	TMP87CM48
TMP87PH48	TMP87PM48	TMP87CM53	TMP87PM53	TMP87CS68	TMP87PS68	

*Applicable products include all TLCS-870 Family microcontrollers with the UART function including custom products and products supplied as bare chips that are not listed above. If you have any questions, please contact your local Toshiba sales representative.

September 2008

Caution in Setting the UART Noise Rejection Time

With regard to the TLCS-870, TLCS-870/X and TLCS-870/C Series of Toshiba's 8-bit microcontrollers listed above, please be informed that certain combinations of transfer clock frequency and noise rejection time should not be used in the UART (asynchronous serial interface) as explained below. If you need further information, please contact your local Toshiba sales representative.

[Applicable Usage Conditions]

This caution applies when the timer/counter interrupt is selected as a transfer clock of the UART and the transfer clock frequency (fc) and the RXD input noise rejection time are set to one of the combinations shown in the table below. Under any other conditions, the noise rejection can be used without any problem.

Communication mode setting	Transfer clock select	Transfer clock frequency [Hz] (Note)	RXD input noise rejection time setting	fc frequency [MHz]	Communication speed [bps]
Receive operation (RXE=1)	Timer/counter interrupt (BRG=110)	fc/8	Reject pulses shorter than 31/fc as noise (RXDNC=01)	1.229	9600
				2.458	19200
				4.915	38400
				9.830	76800
		fc/16	Reject pulses shorter than 63/fc as noise (RXDNC=10)	1.229	4800
				2.458	9600
				4.915	19200
				9.830	38400
				19.661	76800
		fc/32	Reject pulses shorter than 127/fc as noise (RXDNC=11)	1.229	2400
				2.458	4800
				4.915	9600
				9.830	19200
				19.661	38400

Note: The transfer clock is calculated by the following equation:
Transfer clock [Hz] = Timer/counter source clock [Hz] ÷ TTREG set value

[Problem] In receive operation (RXE=1), input data on the RXD pin may not be received properly.

[Workaround] If you are using the UART with one of the above noise rejection time settings, disable the noise rejection or change the noise rejection time to a shorter period.

TOSHIBA Microcontrollers TLCS-870 Family

TLCS-870/C Series

TMP86FH92DMG TMP86FH93NG

February 2008

Datasheet Corrections: DC Characteristics

With regard to the Toshiba 8-bit microcontrollers listed above, please be informed that the supply currents in SLOW1, SLEEP1, and SLEEP0 modes which are specified in the DC electrical characteristics section are changed as shown in the attachment.

If you have any questions on this matter, please contact your local Toshiba sales representative.

Attachment

[DC Electrical Characteristics]

Before correction

Parameter	Symbol	Pins	Condition		Min	Typ.	Max	Unit
Supply current in SLOW1mode	I_{DD}		V_{DD}=3.0V V_{IN}=2.8V/0.2V fs=32.768kHz	When a program operates on flash memory	-	20	65	µA
				When a program operates on RAM	-	19	28	
Supply current in SLEEP1 mode					-	12	20	
Supply current in SLEEP0 mode					-	10	18	

After correction

Parameter	Symbol	Pins	Condition		Min	Typ.	Max	Unit
Supply current in SLOW1mode	I_{DD}		V_{DD}=3.0V V_{IN}=2.8V/0.2V fs=32.768kHz	When a program operates on flash memory	-	22	65	µA
				When a program operates on RAM **(FLSSTB<FSTB>=0)**	-	21	30	
				When a program operates on RAM **(FLSSTB<FSTB>=1)**	-	16	25	
Supply current in SLEEP1 mode					-	14	22	
Supply current in SLEEP0 mode					-	12	20	