

**TMS320F28069, TMS320F28068,  
TMS320F28067, TMS320F28066,  
TMS320F28065, TMS320F28064,  
TMS320F28063, TMS320F28062 Piccolo MCU**

## **Silicon Errata**



Literature Number: SPRZ342G  
January 2011–Revised August 2013

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<b>1</b>	<b>Introduction .....</b>	<b>4</b>
<b>2</b>	<b>Device and Development Support Tool Nomenclature .....</b>	<b>4</b>
<b>3</b>	<b>Device Markings .....</b>	<b>5</b>
<b>4</b>	<b>Known Design Marginality and Exceptions to Functional Specifications .....</b>	<b>6</b>
<b>5</b>	<b>Documentation Support .....</b>	<b>25</b>
<b>6</b>	<b>Revision History .....</b>	<b>26</b>

## List of Figures

1	Example of Device Markings .....	5
2	Example of Device Nomenclature .....	5

## List of Tables

1	Determining Silicon Revision From Lot Trace Code .....	5
2	Table of Contents for Advisories .....	6
3	Advisory List .....	7
4	PERINTSEL Field of Mode Register (MODE) .....	19
5	Instructions Affected .....	22
6	Get-Mode Boot Option Selection .....	24

## ***TMS320F2806x Piccolo MCU Silicon Errata***

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### **1 Introduction**

This document describes the silicon updates to the functional specifications for the TMS320F2806x microcontrollers (MCUs).

The updates are applicable to:

- 80-pin PowerPAD™ Thermally Enhanced Thin Quad Flatpack, PFP Suffix
- 80-pin Low-Profile Quad Flatpack, PN Suffix
- 100-pin PowerPAD™ Low-Profile Quad Flatpack, PZP Suffix
- 100-pin Low-Profile Quad Flatpack, PZ Suffix

### **2 Device and Development Support Tool Nomenclature**

To designate the stages in the product development cycle, TI assigns prefixes to the part numbers of all [TMS320] DSP devices and support tools. Each TMS320™ DSP commercial family member has one of three prefixes: TMX, TMP, or TMS (for example, **TMS320F28069**). Texas Instruments recommends two of three possible prefix designators for its support tools: TMDX and TMDS. These prefixes represent evolutionary stages of product development from engineering prototypes (with TMX for devices and TMDX for tools) through fully qualified production devices and tools (with TMS for devices and TMDS for tools).

<b>TMX</b>	Experimental device that is not necessarily representative of the final device's electrical specifications
<b>TMP</b>	Final silicon die that conforms to the device's electrical specifications but has not completed quality and reliability verification
<b>TMS</b>	Fully qualified production device

Support tool development evolutionary flow:

<b>TMDX</b>	Development-support product that has not yet completed Texas Instruments internal qualification testing
<b>TMDS</b>	Fully qualified development-support product

TMX and TMP devices and TMDX development-support tools are shipped against the following disclaimer:

"Developmental product is intended for internal evaluation purposes."

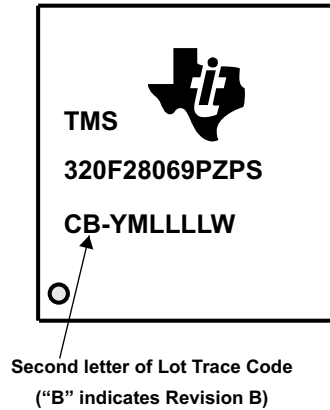
TMS devices and TMDS development-support tools have been characterized fully, and the quality and reliability of the device have been demonstrated fully. TI's standard warranty applies.

Predictions show that prototype devices (TMX or TMP) have a greater failure rate than the standard production devices. Texas Instruments recommends that these devices not be used in any production system because their expected end-use failure rate still is undefined. Only qualified production devices are to be used.

TI device nomenclature also includes a suffix with the device family name. This suffix indicates the package type (for example, PZP) and temperature range (for example, S).

### 3 Device Markings

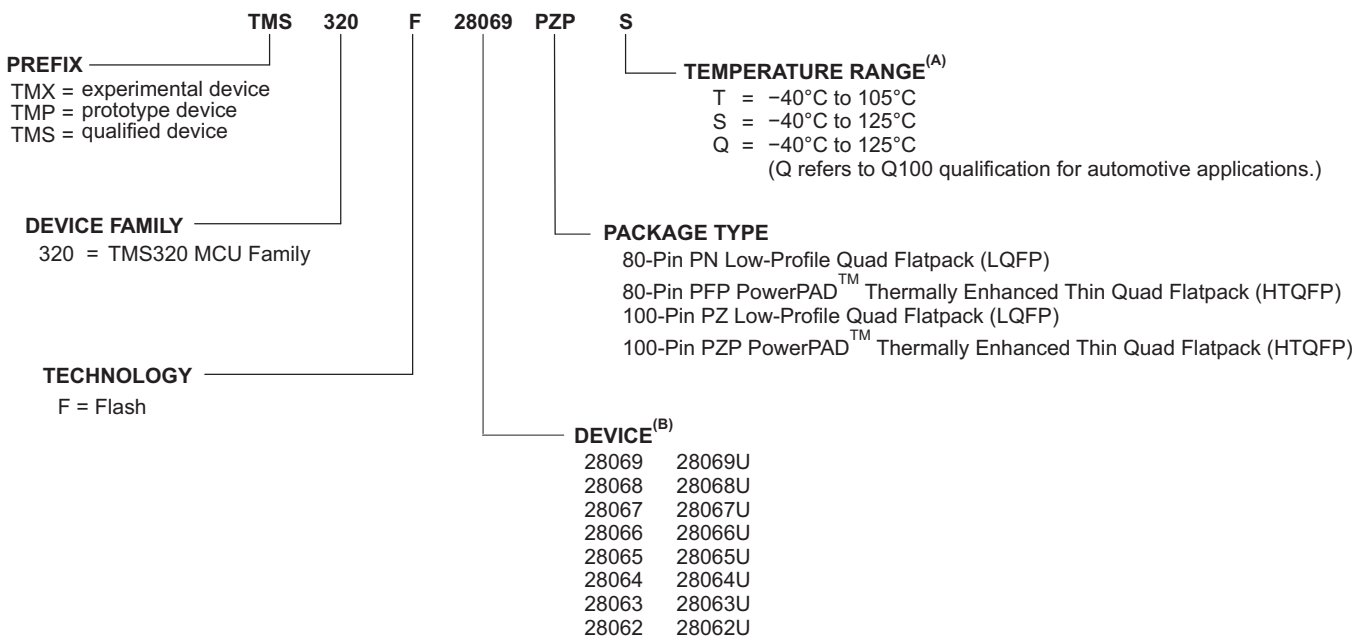
**Figure 1** provides an example of the 2806x device markings and defines each of the markings. The device revision can be determined by the symbols marked on the top of the package as shown in **Figure 1**. Some prototype devices may have markings different from those illustrated. **Figure 2** shows an example of the device nomenclature.



**Figure 1. Example of Device Markings**

**Table 1. Determining Silicon Revision From Lot Trace Code**

SECOND LETTER IN PREFIX OF LOT TRACE CODE	SILICON REVISION	REVISION ID (0x0883)	COMMENTS
Blank (no second letter in prefix)	Indicates Revision 0	0x0000	This silicon revision is available as TMX.
A	Indicates Revision A	0x0001	This silicon revision is available as TMS.
B	Indicates Revision B	0x0002	This silicon revision is available as TMS.



A The "Q" temperature option is **not** available on the 2806xU devices.

B USB is available only on 2806xU devices.

**Figure 2. Example of Device Nomenclature**

## 4 Known Design Marginality and Exceptions to Functional Specifications

**Table 2. Table of Contents for Advisories**

Title	Page
<b>Advisory</b> — FPU32 and VCU Back-to-Back Memory Accesses .....	8
<b>Advisory</b> — FPU: FPU Register Read Following MPYF32, ADDF32, SUBF32, or MACF32 .....	9
<b>Advisory</b> — FPU: FPU Register Write Followed by F32TOUI32, FRACF32, UI16TOF32, or F32TOUI32 .....	10
<b>Advisory</b> — ADC: Initial Conversion .....	11
<b>Advisory</b> — ADC: Temperature Sensor Minimum Sample Window Requirement .....	11
<b>Advisory</b> — ADC: ADC Result Conversion When Sampling Ends on 14th Cycle of Previous Conversion, ACQPS = 6 or 7 .....	12
<b>Advisory</b> — ADC: Offset Self-Recalibration Requirement .....	12
<b>Advisory</b> — ADC: ADC Revision Register (ADCREV) Limitation .....	12
<b>Advisory</b> — Memory: Prefetching Beyond Valid Memory .....	13
<b>Advisory</b> — GPIO: GPIO Qualification .....	14
<b>Advisory</b> — eCAN: Abort Acknowledge Bit Not Set .....	15
<b>Advisory</b> — eQEP: Missed First Index Event .....	16
<b>Advisory</b> — eQEP: eQEP Inputs in GPIO Asynchronous Mode .....	16
<b>Advisory</b> — eQEP: Incorrect Operation of EQEP2B Function on GPIO25 Pin (This advisory is applicable for the 100-pin packages only.) .....	16
<b>Advisory</b> — Watchdog: Incorrect Operation of CPU Watchdog When WDCLK Source is OSCCLKSRC2 .....	17
<b>Advisory</b> — Oscillator: CPU Clock Switching to INTOSC2 May Result in Missing Clock Condition After Reset .....	18
<b>Advisory</b> — DMA: ePWM Interrupt Trigger Source Selection via PERINTSEL is Incorrect .....	19
<b>Advisory</b> — CLA: Memory and Clock Configuration (MCMCFG) Register Bits 8, 9, and 10 are Write-Only .....	20
<b>Advisory</b> — ePWM: SWFSYNC Does Not Properly Propagate to Subsequent ePWM Modules or Output on EPWMSYNCO Pin .....	21
<b>Advisory</b> — VCU: First CRC Calculation May Not be Correct .....	22
<b>Advisory</b> — VCU: Overflow Flags Not Set Properly .....	22
<b>Advisory</b> — USB: Host Mode — Cannot Communicate With Low-Speed Device Through a Hub .....	23
<b>Advisory</b> — USB: End-of-Packet Symbol Not Generated .....	23
<b>Advisory</b> — Boot ROM: Boot ROM GetMode( ) Boot Option Selection .....	24

Table 3 shows which silicon revision(s) are affected by each advisory.

**Table 3. Advisory List**

ADVISORY TITLE	SILICON REVISION(S) AFFECTED		
	0	A	B
FPU32 and VCU Back-to-Back Memory Accesses	Yes	Yes	Yes
FPU: FPU Register Read Following MPYF32, ADDF32, SUBF32, or MACF32	Yes	Yes	Yes
FPU: FPU Register Write Followed by F32TOUI32, FRACF32, UI16TOF32, or F32TOUI32	Yes	Yes	Yes
ADC: Initial Conversion	Yes	Yes	Yes
ADC: Temperature Sensor Minimum Sample Window Requirement	Yes	Yes	Yes
ADC: ADC Result Conversion When Sampling Ends on 14th Cycle of Previous Conversion, ACQPS = 6 or 7	Yes	Yes	Yes
ADC: Offset Self-Recalibration Requirement	Yes	Yes	Yes
ADC: ADC Revision Register (ADCREV) Limitation	Yes	Yes	Yes
Memory: Prefetching Beyond Valid Memory	Yes	Yes	Yes
GPIO: GPIO Qualification	Yes	Yes	Yes
eCAN: Abort Acknowledge Bit Not Set	Yes	Yes	Yes
eQEP: Missed First Index Event	Yes	Yes	Yes
eQEP: eQEP Inputs in GPIO Asynchronous Mode	Yes	Yes	Yes
eQEP: Incorrect Operation of EQEP2B Function on GPIO25 Pin (This advisory is applicable for the 100-pin packages only.)	Yes	Yes	Yes
Watchdog: Incorrect Operation of CPU Watchdog When WDCLK Source is OSCCLKSRC2	Yes	Yes	Yes
Oscillator: CPU Clock Switching to INTOSC2 May Result in Missing Clock Condition After Reset	Yes	Yes	Yes
DMA: ePWM Interrupt Trigger Source Selection via PERINTSEL is Incorrect	Yes	Yes	Yes
CLA: Memory and Clock Configuration (MCMCFG) Register Bits 8, 9, and 10 are Write-Only	Yes	Yes	Yes
ePWM: SWFSYNC Does Not Properly Propagate to Subsequent ePWM Modules or Output on EPWMSYNCO Pin	Yes	Yes	Yes
VCU: First CRC Calculation May Not be Correct	Yes	Yes	Yes
VCU: Overflow Flags Not Set Properly	Yes		
USB: Host Mode — Cannot Communicate With Low-Speed Device Through a Hub	Yes	Yes	Yes
USB: End-of-Packet Symbol Not Generated	Yes		
Boot ROM: Boot ROM GetMode( ) Boot Option Selection	Yes		

**Advisory**
**FPU32 and VCU Back-to-Back Memory Accesses**
**Revision(s) Affected**

0, A, B

**Details**

This advisory applies when a VCU memory access and an FPU memory access occur back-to-back. There are three cases:

**Case 1.** Back-to-back memory reads: one read performed by a VCU instruction (VMOV32) and one read performed by an FPU32 instruction (MOV32).

If an R1 pipeline phase stall occurs during the first read, then the second read will latch the wrong data. If the first instruction is not stalled during the R1 pipeline phase, then the second read will occur properly.

The order of the instructions—FPU followed by VCU or VCU followed by FPU—does not matter. The address of the memory location accessed by either read does not matter.

**Case 1 Workaround:** Insert one instruction between the two back-to-back read instructions. Any instruction, except a VCU or FPU memory read, can be used.

**Case 1, Example 1:**

```
VMOV32  VR1,mem32      ; VCU memory read
NOP                                           ; Not a FPU/ VCU memory read
MOV32    R0H,mem32      ; FPU memory read
```

**Case 1, Example 2:**

```
VMOV32  VR1,mem32      ; VCU memory read
VMOV32  mem32, VR2      ; VCU memory write
MOV32    R0H,mem32      ; FPU memory read
```

**Case 2.** Back-to-back memory writes: one write performed by a VCU instruction (VMOV32) and one write performed by an FPU instruction (MOV32).

If a pipeline stall occurs during the first write, then the second write can corrupt the data. If the first instruction is not stalled in the write phase, then no corruption will occur.

The order of the instructions—FPU followed by VCU or VCU followed by FPU—does not matter. The address of the memory location accessed by either write does not matter.

**Case 2 Workaround:** Insert two instructions between the back-to-back VCU and FPU writes. Any instructions, except VCU or FPU memory writes, can be used.

**Case 2, Example 1:**

```
VMOV32  mem32,VR0      ; VCU memory write
NOP                                           ; Not a FPU/VCU memory write
NOP                                           ; Not a FPU/VCU memory write
MOV32    mem32,R3H      ; FPU memory write
```

**Case 2, Example 2:**

```
VMOV32  mem32,VR0      ; VCU memory write
VMOV32  VR1, mem32      ; VCU memory read
NOP                                           ;
MOV32    mem32,R3H      ; FPU memory write
```

**Case 3.** Back-to-back memory writes followed by a read or a memory read followed by a write. In this case, there is no interaction between the two instructions. No action is required.

**Workaround(s)**

See Case 1 Workaround and Case 2 Workaround.

<b>Advisory</b>	<b><i>FPU: FPU Register Read Following MPYF32, ADDF32, SUBF32, or MACF32</i></b>
<b>Revision(s) Affected</b>	0, A, B
<b>Details</b>	<p>This advisory applies when an FPU register read follows a multi-cycle FPU instruction.</p> <p><b>A 2p-cycle FPU instruction that writes to an FPU register followed by a read of the same register.</b> MPYF32, ADDF32, SUBF32, and MACF32 are classified as 2p-cycle instructions because they rely on data-forwarding of the result during the E2 phase of the pipeline. In situations where the instructions get stalled in the E3 phase, the result does not get forwarded in time (that is, during the E2 phase) for the subsequent read; the old value of the register gets read instead.</p>
<b>Workaround(s)</b>	<p>MPYF32, ADDF32, SUBF32, and MACF32 followed by a read of the result registers must be treated as 3p-cycle instructions, and either three NOPs or non-conflicting instructions must be placed after these instructions.</p>

#### Example of Problem:

```

MPYF32 R6H, R5H, R0H || MOV32 *XAR7++, R4H ; 2p FPU instruction that writes to R6H
F32TOUI16R R3H, R4H ; delay slot
ADDF32 R2H, R2H, R0H || MOV32 *--SP, R2H ; alignment cycle
MOV32 @XAR3, R6H ; FPU register read of R6H

```

#### Example of Workaround:

```

MPYF32 R6H, R5H, R0H || MOV32 *XAR7++, R4H ; 3p FPU instruction that writes to R6H
F32TOUI16R R3H, R4H ; delay slot
ADDF32 R2H, R2H, R0H || MOV32 *--SP, R2H ; delay slot
NOP ; alignment cycle
MOV32 @XAR3, R6H ; FPU register read of R6H

```

<b>Advisory</b>	<b><i>FPU: FPU Register Write Followed by F32TOUI32, FRACF32, UI16TOF32, or F32TOUI32</i></b>
<b>Revision(s) Affected</b>	0, A, B
<b>Details</b>	<p>This advisory applies when the execution phase of an FPU register write coincides with the F32TOUI32, FRACF32, UI16TOF32, and F32TOUI32 instructions.</p> <p>If the F32TOUI32 instruction and FPU register write operation occur in the same cycle, the target register (of the write operation) gets written with the output of the F32TOUI32 instruction instead of the data present on the C28x data write bus. This scenario also applies to the following instructions:</p> <ul style="list-style-type: none"> <li>• F32TOUI32 RaH, RbH</li> <li>• FRACF32 RaH , RbH</li> <li>• UI16TOF32 RaH , mem16</li> <li>• UI16TOF32 RaH , RbH</li> <li>• F32TOUI32 RaH , RbH</li> </ul>
<b>Workaround(s)</b>	An FPU register write must be followed by a gap of five NOPs or non-conflicting instructions before F32TOUI32, FRACF32, UI16TOF32, or F32TOUI32 can be used.

#### Example of Problem:

```

SUBF32 R5H, R3H, R1H || MOV32 *--XAR4, R4H
EISQRTF32 R4H, R2H
UI16TOF32 R2H, R3H
MOV32 R0H, @XAR0                                ; Write to R0H register
NOP                                              ;
NOP                                              ;
F32TOUI32 R1H, R1H                                ; R1H gets written to R0H
I16TOF32 R6H, R3H

```

#### Example of Workaround:

```

SUBF32 R5H, R3H, R1H || MOV32 *--XAR4, R4H
EISQRTF32 R4H, R2H
UI16TOF32 R2H, R3H
MOV32 R0H, @XAR0                                ; Write to R0H register
NOP
NOP
NOP
NOP
NOP
F32TOUI32 R1H, R1H
I16TOF32 R6H, R3H

```

<b>Advisory</b>	<b><i>ADC: Initial Conversion</i></b>
<b>Revision(s) Affected</b>	0, A, B
<b>Details</b>	When the ADC conversions are initiated by any source of trigger in either sequential or simultaneous sampling mode, the first sample may not be the correct conversion result.
<b>Workaround(s)</b>	<p>For sequential mode, discard the first sample at the beginning of every series of conversions. For instance, if the application calls for a given series of conversions, SOC0→SOC1→SOC2, to initiate periodically, then set up the series instead as SOC0→SOC1→SOC2→SOC3 and only use the last three conversions, ADCRESULT1, ADCRESULT2, ADCRESULT3, thereby discarding ADCRESULT0.</p> <p>For simultaneous sample mode, discard the first sample of both the A and B channels at the beginning of every series of conversions.</p> <p>User application should validate if this workaround is acceptable in their application.</p> <p>The magnitude of error is significantly reduced by writing a 1 to the ADCNONOVERLAP bit in the ADCCTRL2 register, which only allows the sampling of ADC channels when the ADC is finished with any pending conversion. Typically, the difference between the first sample and subsequent samples, with ADCNONOVERLAP enabled, will be less than or equal to four LSBs.</p>
<b>Advisory</b>	<b><i>ADC: Temperature Sensor Minimum Sample Window Requirement</i></b>
<b>Revision(s) Affected</b>	0, A, B
<b>Details</b>	If the minimum sample window is used (6 ADC clocks at 45 MHz, 155.56 ns), the result of a temperature sensor conversion can have a large error, making it unreliable for the system.
<b>Workaround(s)</b>	<ol style="list-style-type: none"> <li>1. If double-sampling of the temperature sensor is used to avoid the corrupted first sample issue, the temperature sensor result is valid. Double-sampling is equivalent to giving the sample-and-hold circuit adequate time to charge.</li> <li>2. In all other conditions, the sample-and-hold window used to sample the temperature sensor should not be less than 550 ns.</li> </ol>

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**Advisory**      ***ADC: ADC Result Conversion When Sampling Ends on 14th Cycle of Previous Conversion, ACQPS = 6 or 7***


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**Revision(s) Affected**      0, A, B

**Details**      The on-chip ADC takes 13 ADC clock cycles to complete a conversion after the sampling phase has ended. The result is then presented to the CPU on the 14th cycle post-sampling and latched on the 15th cycle into the ADC result registers. If the next conversion's sampling phase terminates on this 14th cycle, the results latched by the CPU into the result register are not assured to be valid across all operating conditions.

**Workaround(s)**      Some workarounds are as follows:

- Due to the nature of the sampling and conversion phases of the ADC, there are only two values of ACQPS (which controls the sampling window) that would result in the above condition occurring—ACQPS = 6 or 7. One solution is to avoid using these values in ACQPS.
- When the ADCNONOVERLAP feature (bit 1 in ADCTRL2 register) is used, the above condition will never be met; so the user is free to use any value of ACQPS desired.
- Depending on the frequency of ADC sampling used in the system, the user can determine if their system will hit the above condition if the system requires the use of ACQPS = 6 or 7. For instance, if the converter is continuously converting with ACQPS = 6, the above condition will never be met because the end of the sampling phase will always fall on the 13th cycle of the current conversion in progress.

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**Advisory**      ***ADC: Offset Self-Recalibration Requirement***


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**Revision(s) Affected**      0, A, B

**Details**      The factory offset calibration from Device\_cal() may not ensure that the ADC offset remains within specifications under all operating conditions in the customer's system.

**Workaround(s)**

- To ensure that the offset remains within the data sheet's "single recalibration" specifications, perform the AdcOffsetSelfCal() function after Device\_cal() has completed and the ADC has been configured.
- To ensure that the offset remains within the data sheet's "periodic recalibration" specifications, perform the AdcOffsetSelfCal() function periodically with respect to temperature drift.

For more details on AdcOffsetSelfCal(), refer to the "ADC Zero Offset Calibration" section in the Analog-to-Digital Converter and Comparator chapter of the *TMS320x2806x Piccolo Technical Reference Manual* (literature number [SPRUH18](#)).

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**Advisory**      ***ADC: ADC Revision Register (ADCREV) Limitation***


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**Revision(s) Affected**      0, A, B

**Details**      The ADC Revision Register, which is implemented to allow differentiation between ADC revisions and ADC types, will always read "0" for both fields.

**Workaround(s)**      On devices with CLASSID (at address 0x882) of 0x009F, 0x008F, 0x007F, or 0x006F, the "TYPE" field in the ADCREV register should be assumed to be 3 and the "REV" field should be inferred from the table below.

REVID (0x883)	ADCREV.REV Field
0	2
1	2

<b>Advisory</b>	<b><i>Memory: Prefetching Beyond Valid Memory</i></b>
<b>Revision(s) Affected</b>	0, A, B
<b>Details</b>	The C28x CPU prefetches instructions beyond those currently active in its pipeline. If the prefetch occurs past the end of valid memory, then the CPU may receive an invalid opcode.
<b>Workaround</b>	<p>The prefetch queue is 8 x16 words in depth. Therefore, code should not come within 8 words of the end of valid memory. This restriction applies to all memory regions and all memory types (flash, OTP, SARAM) on the device. Prefetching across the boundary between two valid memory blocks is all right.</p> <p>Example 1: M1 ends at address 0x7FF and is not followed by another memory block. Code in M1 should be stored no farther than address 0x7F7. Addresses 0x7F8-0x7FF should not be used for code.</p> <p>Example 2: M0 ends at address 0x3FF and valid memory (M1) follows it. Code in M0 can be stored up to and including address 0x3FF. Code can also cross into M1 up to and including address 0x7F7.</p>

<b>Advisory</b>	<b><i>GPIO: GPIO Qualification</i></b>
<b>Revision(s) Affected</b>	0, A, B
<b>Details</b>	<p>If a GPIO pin is configured for "n" SYSCLKOUT cycle qualification period (where <math>1 \leq n \leq 510</math>) with "m" qualification samples (<math>m = 3</math> or <math>6</math>), it is possible that an input pulse of <math>[n * m - (n - 1)]</math> width may get qualified (instead of <math>n * m</math>). The occurrence of this incorrect behavior depends upon the alignment of the asynchronous GPIO input signal with respect to the phase of the internal prescaled clock, and hence, is not deterministic. The probability of this kind of wrong qualification occurring is "1/n".</p> <p><b>Worst-case example:</b></p> <p>If <math>n = 510</math>, <math>m = 6</math>, a GPIO input width of <math>(n * m) = 3060</math> SYSCLKOUT cycles is required to pass qualification. However, because of the issue described in this advisory, the minimum GPIO input width which may get qualified is <math>[n * m - (n - 1)] = 3060 - 509 = 2551</math> SYSCLKOUT cycles.</p>
<b>Workaround(s)</b>	None. Ensure a sufficient margin is in the design for input qualification.

## Advisory

### eCAN: Abort Acknowledge Bit Not Set

#### Revision(s) Affected

0, A, B

#### Details

After setting a Transmission Request Reset (TRR) register bit to abort a message, there are some rare instances where the TRRn and TRSn bits will clear without setting the Abort Acknowledge (AAn) bit. The transmission itself is correctly aborted, but no interrupt is asserted and there is no indication of a pending operation.

In order for this rare condition to occur, all of the following conditions must happen:

1. The previous message was not successful, either because of lost arbitration or because no node on the bus was able to acknowledge it or because an error frame resulted from the transmission. The previous message need not be from the same mailbox in which a transmit abort is currently being attempted.
2. The TRRn bit of the mailbox should be set in a CPU cycle immediately following the cycle in which the TRSn bit was set. The TRSn bit remaining set due to incompleteness of transmission satisfies this condition as well; that is, the TRSn bit could have been set in the past, but the transmission remains incomplete.
3. The TRRn bit must be set in the exact SYSCLKOUT cycle where the CAN module is in idle state for one cycle. The CAN module is said to be in idle state when it is not in the process of receiving or transmitting data.

If these conditions occur, then the TRRn and TRSn bits for the mailbox will clear  $t_{clr}$  SYSCLKOUT cycles after the TRR bit is set where:

$$t_{clr} = [(\text{mailbox\_number}) * 2] + 3 \text{ SYSCLKOUT cycles}$$

The TAn and AAn bits will not be set if this condition occurs. Normally, either the TA or AA bit sets after the TRR bit goes to zero.

#### Workaround(s)

When this problem occurs, the TRRn and TRSn bits will clear within  $t_{clr}$  SYSCLKOUT cycles. To check for this condition, first disable the interrupts. Check the TRRn bit  $t_{clr}$  SYSCLKOUT cycles after setting the TRRn bit to make sure it is still set. A set TRRn bit indicates that the problem did not occur.

If the TRRn bit is cleared, it could be because of the normal end of a message and the corresponding TAn or AAn bit is set. Check both the TAn and AAn bits. If either one of the bits is set, then the problem did not occur. If they are both zero, then the problem did occur. Handle the condition like the interrupt service routine would except that the AAn bit does not need clearing now.

If the TAn or AAn bit is set, then the normal interrupt routine will happen when the interrupt is re-enabled.

<b>Advisory</b>	<b><i>eQEP: Missed First Index Event</i></b>
<b>Revision(s) Affected</b>	0, A, B
<b>Details</b>	<p>If the first index event edge at the QEPI input occurs at any time from one system clock cycle before the corresponding QEPA/QEPB edge to two system clock cycles after the corresponding QEPA/QEPB edge, then the eQEP module may miss this index event. This condition can result in the following behavior:</p> <ul style="list-style-type: none"> <li>• QPOSCNT will not be reset on the first index event if QEPCTL[PCRM] = 00b or 10b (position counter reset on an index event or position counter reset on the first index event).</li> <li>• The first index event marker flag (QEPSTS[FIMF]) will not be set.</li> </ul>
<b>Workaround(s)</b>	<p>Reliable operation is achieved by delaying the index signal such that the QEPI event edge occurs at least two system clock cycles after the corresponding QEPA/QEPB signal edge. For cases where the encoder may impart a negative delay (<math>t_d</math>) to the QEPI signal with respect to the corresponding QEPA/QEPB signal (that is, QEPI edge occurs before the corresponding QEPA/QEPB edge), the QEPI signal should be delayed by an amount greater than "<math>t_d + 2 \cdot \text{SYSCLKOUT}</math>".</p>
<b>Advisory</b>	<b><i>eQEP: eQEP Inputs in GPIO Asynchronous Mode</i></b>
<b>Revision(s) Affected</b>	0, A, B
<b>Details</b>	<p>If any of the eQEP input pins are configured for GPIO asynchronous input mode via the GPxQSELn registers, the eQEP module may not operate properly because the eQEP peripheral assumes the presence of external synchronization to SYSCLKOUT on inputs to the module. For example, QPOSCNT may not reset or latch properly, and pulses on the input pins may be missed.</p> <p>For proper operation of the eQEP module, input GPIO pins should be configured via the GPxQSELn registers for synchronous input mode (with or without qualification), which is the default state of the GPxQSEL registers at reset. All existing eQEP peripheral examples supplied by TI also configure the GPIO inputs for synchronous input mode.</p> <p>The asynchronous mode should not be used for eQEP module input pins.</p>
<b>Workaround(s)</b>	<p>Configure GPIO inputs configured as eQEP pins for non-asynchronous mode (any GPxQSELn register option except "11b = Asynchronous").</p>
<b>Advisory</b>	<b><i>eQEP: Incorrect Operation of EQEP2B Function on GPIO25 Pin (This advisory is applicable for the 100-pin packages only.)</i></b>
<b>Revision(s) Affected</b>	0, A, B
<b>Details</b>	<p>When the GPIO25 pin is configured for EQEP2B function, activity on the MFSXA pin will be reflected on this pin, regardless of which GPIO pin is configured for MFSXA operation. This issue surfaces only when the GPIO25 pin is configured for EQEP2B operation. This issue does not surface when the GPIO25 pin is configured for GPIO, ECAP2, or SPISOMIB operation.</p>
<b>Workaround(s)</b>	<p>Use GPIO55 for EQEP2B operation.</p>

<b>Advisory</b>	<b><i>Watchdog: Incorrect Operation of CPU Watchdog When WDCLK Source is OSCCLKSRC2</i></b>
<b>Revision(s) Affected</b>	0, A, B
<b>Details</b>	When OSCCLKSRC2 is used as the clock source for CPU watchdog, the watchdog may fail to generate a device reset intermittently.
<b>Workaround(s)</b>	WDCLK should be sourced only from OSCCLKSRC1 (INTOSC1). The CPU may be sourced from OSCCLKSRC2 or OSCCLKSRC1 (INTOSC1).

**Advisory**
***Oscillator: CPU Clock Switching to INTOSC2 May Result in Missing Clock Condition After Reset***
**Revision(s) Affected**

0, A, B

**Details**

After at least two system resets (not including power-on reset), when the application code attempts to switch the CPU clock source to internal oscillator 2, a missing clock condition will occur, and the clock switching will fail under the following conditions:

- X1 and X2 are unused (X1 is always tied low when unused).
- GPIO38 (muxed with TCK and XCLKIN) is used as JTAG TCK pin only.
- JTAG emulator is disconnected.

The missing clock condition will recover only after a power-on reset when the failure condition occurs.

**Workaround(s)**

Before switching the CPU clock source to INTOSC2 via the OSCCLKSRCSEL and OSCCLKSRC2SEL bits in the CLKCTL register, the user must toggle the XCLKINOFF and XTALOSCOFF bits in the CLKCTL register as illustrated in the below sequence:

```
CLKCTL |= 0x6000;      // XCLKINOFF = 1, XTALOSCOFF = 1
CLKCTL &=~0x6000;      // XCLKINOFF = 0, XTALOSCOFF = 0
CLKCTL |= 0x6000;      // XCLKINOFF = 1, XTALOSCOFF = 1
CLKCTL &=~0x6000;      // XCLKINOFF = 0, XTALOSCOFF = 0
CLKCTL |= 0x6000;      // XCLKINOFF = 1, XTALOSCOFF = 1
```

Once the above procedure is executed, then the OSC2 selection switches can be configured.

If the JTAG emulator is connected, and GPIO38 (TCK) is toggling, then the above procedure is unnecessary, but will do no harm.

If no clock is applied to GPIO38, TI also recommends that a strong pullup resistor on GPIO38 be added to  $V_{DDIO}$ .

**Advisory**
**DMA: ePWM Interrupt Trigger Source Selection via PERINTSEL is Incorrect**
**Revision(s) Affected** 0, A, B

**Details**

The MODE.CHx[PERINTSEL] field bit values of 18–29 should select ePWM1SOCA–ePWM6SOCB as DMA trigger sources. Instead, PERINTSEL values of 18–29 select ePWM2SOCA–ePWM7SOCB as DMA trigger sources as shown below in [Table 4](#). ePWM1SOCA and ePWM1SOCB are not implemented as PERINTSEL trigger sources.

**Workaround(s)** None

**Table 4. PERINTSEL Field of Mode Register (MODE)**

Bit	Field	Value	Description		
4-0	PERINTSEL		Peripheral Interrupt Source Select Bits: These bits select which interrupt triggers a DMA burst for the given channel. Only one interrupt source can be selected. A DMA burst can also be forced via the PERINTFRC bit.		
		<b>Value</b>	<b>Interrupt</b>	<b>Sync</b>	<b>Peripheral</b>
		0	None	None	No peripheral connection
		1	ADCINT1	None	ADC
		2	ADCINT2	None	
		3	XINT1	None	
		4	XINT2	None	External Interrupts
		5	XINT3	None	
		6	Reserved	None	
		7	USB0EP1RX	None	USB-0 End Points
		8	USB0EP1TX	None	
		9	USB0EP2RX	None	
		10	USB0EP2TX	None	
		11	TINT0	None	CPU Timers
		12	TINT1	None	
		13	TINT2	None	
		14	MXEVTA	MXSYNCA	McBSP-A
		15	MREVTA	MRSYNCA	
		16	Reserved	None	No peripheral connection
		17	Reserved	None	
		18	ePWM2SOCA	None	ePWM2
		19	ePWM2SOCB	None	
		20	ePWM3SOCA	None	ePWM3
		21	ePWM3SOCB	None	
		22	ePWM4SOCA	None	ePWM4
		23	ePWM4SOCB	None	
		24	ePWM5SOCA	None	ePWM5
		25	ePWM5SOCB	None	
		26	ePWM6SOCA	None	ePWM6
		27	ePWM6SOCB	None	
		28	ePWM7SOCA	None	ePWM7
		29	ePWM7SOCB	None	
		30	USB0EP3RX	None	USB-0 End Points
		31	USB0EP3TX	None	

<b>Advisory</b>	<b><i>CLA: Memory and Clock Configuration (MMEMCFG) Register Bits 8, 9, and 10 are Write-Only</i></b>
<b>Revision(s) Affected</b>	0, A, B
<b>Details</b>	CPU reads of bits 8, 9, and 10 of the MMEMCFG register in the CLA module will always return a zero. Writes to these bits will work as expected.
<b>Workaround(s)</b>	None. To modify the bits of this register, a single write to the entire register with the complete configuration should be performed. Read-Modify-Write should not be used as any Read-Modify-Write operation to the register will read a zero for bits 8, 9, and 10 and can write back a zero to those bits and thus modifying these bits unintentionally. An example is shown below:

```
#define CLA_PROG_ENABLE      0x0001
#define CLARAM0_ENABLE      0x0010
#define CLARAM1_ENABLE      0x0020
#define CLARAM2_ENABLE      0x0040
#define CLA_RAM0CPUE        0x0100
#define CLA_RAM1CPUE        0x0200
#define CLA_RAM1CPUE        0x0400

Cla1Regs.MMEMCFG.all = CLA_PROG_ENABLE1 |
CLARAM0_ENABLE | CLARAM1_ENABLE | CLARAM2_ENABLE | CLA_RAM1CPUE ;
```

<b>Advisory</b>	<b><i>ePWM: SWFSYNC Does Not Properly Propagate to Subsequent ePWM Modules or Output on EPWMSYNCO Pin</i></b>
<b>Revision(s) Affected</b>	0, A, B
<b>Details</b>	<p>When generating a software synchronization pulse using the TBCTL[SWFSYNC] bit, the sync signal does not propagate down to subsequent ePWM modules' EPWMSYNCI inputs. In the case of ePWM1, the software sync also does not generate an output on the EPWMSYNCO pin. Propagation of the synchronization signal between ePWM modules and to EPWMSYNCO operates as expected when generating a synchronization pulse via an external signal on the EPWMSYNCI pin.</p>
<b>Workaround(s)</b>	<p>If the application needs to generate a software sync:</p> <ol style="list-style-type: none"> <li>1. The application code should configure a single GPIO mux setting for EPWMSYNCI operation.</li> <li>2. The EPWMSYNCI pin should be tied to ground or consistently driven low.</li> <li>3. After the above, the application can use the TBCTL[SWFSYNC] bit as intended to generate a software synchronization pulse that passes to subsequent ePWM modules and onto the EPWMSYNCO pin.</li> </ol>

## Advisory **VCU: First CRC Calculation May Not be Correct**

**Revision(s) Affected** 0, A, B

**Details** Due to the internal power-up state of the VCU module, it is possible that the first CRC result will be incorrect. This condition applies to the first result from each of the eight CRC instructions. This **rare** condition can only occur after a power-on reset, but will not necessarily occur on every power on. A warm reset will not cause this condition to reappear.

**Workaround(s)** The application can reset the internal VCU CRC logic by performing a CRC calculation of a single byte in the initialization routine. This routine only needs to perform one CRC calculation and can use any of the CRC instructions. At the end of this routine, clear the VCU CRC result register to discard the result.

An example is shown below.

```
_VCUcrc_reset
    MOVZ        XAR7, #0
    VCRC8L_1    *XAR7
    VCRCLLR
    LRETR
```

## Advisory **VCU: Overflow Flags Not Set Properly**

**Revision(s) Affected** 0

**Details** The instructions listed in [Table 5](#) do not set the VSTATUS OVFR and OVFI flags for the expected conditions. For instructions not listed in [Table 5](#), the OVFR and OVFI flags are set as described in the *TMS320x2806x Piccolo Viterbi, Complex Math and CRC Unit (VCU) Type 0 Reference Guide* (literature number [SPRUGI7](#)).

**Table 5. Instructions Affected**

INSTRUCTIONS	DESCRIPTION	COMMENTS
VCADD VR5, VR4, VR3, VR2  VCADD VR5, VR4, VR3, VR2    VMOV32 VRa, mem32  VCADD VR7, VR6, VR5, VR4	32-bit complex addition	<b>Expected behavior:</b> OVFI and OVFR should be set if the final result overflows 32 bits. <b>Actual behavior:</b> If the shift-right operation (before the addition) overflows 16 bits, then OVFI or OVR is set. If the imaginary-part addition overflows 16 bits, OVFI is set. <sup>(1)</sup>
VCDADD16 VR5, VR4, VR3, VR2  VCDADD16 VR5, VR4, VR3, VR2    VMOV32 VRa, mem32	16 + 32 = 16-bit complex addition	<b>Expected behavior:</b> OVFI and OVFR should be set if the final 16-bit result overflows. <b>Actual behavior:</b> OVFR and OVFI are only set if the intermediate 32-bit calculation overflows.
VCDSUB16 VR6, VR4, VR3, VR2  VCDSUB16 VR6, VR4, VR3, VR2    VMOV32 VRa, mem32	16 + 32 = 16-bit complex subtraction	If only the final 16-bit result overflows, then OVFR and OVFI are not set.

<sup>(1)</sup> If the real-part addition overflows 16 bits, OVFR is not set. This is the expected behavior.

**Workaround** Algorithms using these instructions should not rely on the state of the OVFR and OVFI flags to determine if overflow has occurred. Algorithms should use techniques, such as scaling, to avoid overflow. This erratum does not affect the behavior of saturation when performed by these instructions. If saturation is enabled, results that overflow will still be properly saturated.

This issue has been fixed on the Revision A silicon.

---

**Advisory**      ***USB: Host Mode — Cannot Communicate With Low-Speed Device Through a Hub***


---

**Revision(s) Affected**      0, A, B

**Details**      When the USB controller is operating as a Host and a low-speed packet is sent to a device through a hub, the subsequent Start-of-Frame is corrupted. After a period of time, this corruption causes the USB controller to lose synchronization with the hub, which results in data corruption.

**Workaround(s)**      None

**Advisory**      ***USB: End-of-Packet Symbol Not Generated***


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**Revision(s) Affected**      0

**Details**      In all USB modes, the USB peripheral is not capable of generating the Single-Ended Zero symbol that signifies the end of a packet. This condition prevents any connected device from properly receiving USB data from the Piccolo™ device and renders USB inoperable.

**Workaround(s)**      None. This issue has been fixed in the revision A silicon.

## Advisory

### Boot ROM: Boot ROM GetMode( ) Boot Option Selection

**Revision(s) Affected** 0

**Details** DevEmuRegs in the Boot ROM is linked to an incorrect memory address, which causes the Boot ROM to read the state of the TRST pin incorrectly. This condition affects the ability of the device to boot into stand-alone/Emulation boot modes properly.

**Workaround(s)** A workaround function is implemented in the OTP area (reserved for TI) which bypasses this section of the Boot ROM, executes code that correctly reads the state of the TRST pin, and branches back to the Boot ROM to continue booting.

The implemented workaround modifies the operation of the Get-Mode boot option as listed in [Table 6](#).

**Table 6. Get-Mode Boot Option Selection**

OTP_KEY	OTP_BMODE	EXPECTED BOOT MODE	BOOT MODE SELECTED
!= 0x005A	x	Get Mode: Flash	Get Mode: Flash
0x005A	0x0001	Get Mode: SCI	Get Mode: SCI
	0x0004	Get Mode: SPI	Get Mode: SPI
	0x0005	Get Mode: I2C	Get Mode: I2C
	0x0006	Get Mode: OTP	Get Mode: OTP
	0x0007	Get Mode: CAN	Get Mode: CAN
	0x000B	Get Mode: Flash	Get Mode: Flash
	Other	Stand-alone boot: Get Mode: Flash Emulation boot: Wait Boot Mode	For both stand-alone and Emulation booting: <ul style="list-style-type: none"> <li>If bit 7 of Part ID of device == 0, Get Mode – Flash</li> <li>If bit 7 of Part ID of device == 1, Wait Boot Mode</li> </ul>

**NOTE:** The implemented workaround needs memory locations 0x0002–0x0200 in M0 RAM to be reserved for Boot-ROM usage. Applications can reuse this memory after Boot-ROM execution is completed.

This issue has been fixed on the Revision A silicon.

## 5 Documentation Support

For device-specific data sheets and related documentation, visit the TI web site at: <http://www.ti.com>.

For further information regarding the Piccolo devices, see the following documents:

- *TMS320F28069, TMS320F28068, TMS320F28067, TMS320F28066, TMS320F28065, TMS320F28064, TMS320F28063, TMS320F28062 Piccolo Microcontrollers Data Manual* (literature number [SPRS698](#))
- *TMS320x2806x Piccolo Technical Reference Manual* (literature number [SPRUH18](#))

## 6 Revision History

This revision history highlights the technical changes made to the SPRZ342F errata document to make it an SPRZ342G revision.

**Scope:** Added information and data on silicon revision B.  
See table below.

LOCATION	ADDITIONS, DELETIONS, AND MODIFICATIONS
Global	Added information and data on silicon revision B
<a href="#">Section 4</a>	Known Design Marginality and Exceptions to Functional Specifications: <ul style="list-style-type: none"> <li>"ADC: Initial Conversion" advisory: Updated Workaround(s)</li> </ul>

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