dsPIC33AK128MC106 Family Silicon Errata and Data Sheet Clarification

The dsPIC33AK128MC106 family devices that you have received conform functionally to the current device data sheet (DS70005539**C**), except for the anomalies described in this document.

The silicon issues discussed in the following pages are for silicon revisions with the Device and Revision IDs listed in Table 1. The silicon issues are summarized in Table 2.

The errata described in this document will be addressed in future revisions of dsPIC33AK128MC106 family silicon.

Note:	This document summarizes all silicon errata issues from all revisions of silicon, previous as well as current. Only the issues indicated in the last column of Table 2 apply to the current silicon revision (**A2**).

Data sheet clarifications and corrections start on Page 9, following the discussion of silicon issues.

The silicon revision level can be identified using the current version of MPLAB® IDE and Microchip's programmers, debuggers and emulation tools, which are available at the Microchip corporate website (www.microchip.com).

For example, to identify the silicon revision level using MPLAB X IDE in conjunction with a hardware debugger:

1. Using the appropriate interface, connect the device to the hardware debugger.
2. Open an MPLAB X IDE project.
3. Configure the MPLAB X IDE project for the appropriate device and hardware debugger.
4. For MPLAB X IDE, select *Window > Dashboard* and click the **Refresh Debug Tool Status** icon ( ).
5. Depending on the development tool used, the part number *and* Device Revision ID value appear in the **Output** window.

Note:	If you are unable to extract the silicon revision level, please contact your local Microchip sales office for assistance.

The DEVREV values for the various silicon revisions of the dsPIC33AK128MC106 family are shown in Table 1.

TABLE 1: SILICON DEVREV VALUES

Part Number	Device ID(1)	Revision ID for Silicon Revision(1)
		A2
dsPIC33AK32MC102	0x9D00	02h
dsPIC33AK32MC103	0x9D01	
dsPIC33AK32MC105	0x9D02	
dsPIC33AK32MC106	0x9D03	
dsPIC33AK64MC102	0x9D10	
dsPIC33AK64MC103	0x9D11	
dsPIC33AK64MC105	0x9D12	
dsPIC33AK64MC106	0x9D13	
dsPIC33AK128MC102	0x9D20	
dsPIC33AK128MC103	0x9D21	
dsPIC33AK128MC105	0x9D22	
dsPIC33AK128MC106	0x9D23	

Note 1: Refer to the *"dsPIC33AK128MC106 Family Flash Programming Specification"* (DS70005470) for detailed information on Device and Revision IDs for your specific device.

TABLE 2: SILICON ISSUE SUMMARY

Module	Feature	Item Number	Issue Summary	Affected Revisions[1]
				A2
ADC	Sign Bit	1.	ADC Result Sign bit is not extended in Differential mode	X
CCP	Output	2.	When ASDGM = 1, the CCP generates an output with shut-down gate input at 0	X
CCP	Capture	3.	When CCSEL= 1 and IGSM= 1, CCP will capture the timer value without an edge	X
CCP	Overflow	4.	Overflow condition not clear when ICBNE = 0	X
CPU	PCTRAP	5.	PCTRAP captures trap origination address of math error trap even when disabled	X
DMA	Channel Overrun	6.	DMA channel overrun not set when triggered by software or external interrupts	X
DMA	Ping-Pong Operation	7.	DMA channel ping-pong operation works only once for One-Shot and Continuous Transfer modes	X
DMA	Ping-Pong Channel	8.	Ping-Pong Channel Enable bit is not reset by hardware in Repeated Transfer modes of DMA	X
DMA	Bus Read Error	9.	DMA Bus Read Error Fault bit not set	X
I/O	$\overline{\text{MCLR}}$	10.	When $\overline{\text{MCLR}}$ pin is driven low, the I/O pins take five cycles to tri-state	X
I/O	Change Notification	11.	Change notification interrupt fails when in sleep	X
I2C	Host: 1 MHz Baud	12.	Bus collision may get asserted when STOP bit is sent from HOST at 1 MHz baud rate	X
INT	Math Error Trap	13.	COVB Math error trap cannot be disabled	X
INT	Edge Detect	14.	INT4 External interrupts are raised only during positive edge of trigger irrespective of Edge Detect Polarity Select bit	X
OSC/CLK	POSC	15.	POSCRDY sets early on clock switch to POSC	X
OSC/CLK	Clk Divider	16.	CLKxDIV register does not get reset on $\overline{\text{MCLR}}$	X
OSC/CLK	FRC	17.	FRC is always enabled	X
PTG	Software Trigger	18.	PTGSWT bit is not cleared in hardware	X
PWM	PCI	19.	PCI SR latch does not reset in RESET Dominant mode	X
PWM	TRIGx	20.	When TRIGx = EOC and CAHALF is changed by software, trigger event can occur in opposite phase	X
QEI	Index Event	21.	Index event is missed when clock divider (INTDIV[2:0]) is configured for greater than 1	X
QEI	Index Counter	22.	Position counter is loaded with 0x00000001 on an index event for PIMOD[2:0] = 0b001	X
SPI	Ignore Overflow	23.	SPI Receiver does not continue to run on overflow with Ignore Overflow bit set	X
SPI	Interrupt	24.	CPU is not waking up from sleep with SPI watermark interrupt	X
UART	RX Interrupt	25.	UART Transmit collision is not suppressing RX interrupt	X
UART	Buffer Overflow	26.	Address not causing the buffer overflow in Address Detect mode	X
WDT	Wake-up	27.	RCON.WDTO bit not set when WDT wakes up device from PWRSAV modes	X
CPU	Trap	28.	Address error trap generated on legal indirect+offset mov	X

Note 1: Only those issues indicated in the last column apply to the current silicon revision.

Silicon Errata Issues

Note: This document summarizes all silicon errata issues from all revisions of silicon, previous as well as current. Only the issues indicated by the shaded column in the following tables apply to the current silicon revision (**A2**).

1. Module: ADC

ADC Result Sign bit is not extended in Differential mode (DIFF = 1). This affects the operation of the ADC's comparator and accumulators.

Work around

Extend the Sign bit in software after reading the buffer. There is no workaround for ADC's internal comparator and accumulator.

Affected Silicon Revisions

A2							
X							

2. Module: CCP

When ASDGM = 1 and shutdown gate input is low (OCFx = 0), CCP output is still generated.

Work around

Read the auto shutdown fault RP pin through LAT register bits, and if the LAT value reads as zero, use the CCP Software Shutdown/Gate Control bit to turn off the CCP.

Affected Silicon Revisions

A2							
X							

3. Module: CCP

When CCP is configured for input capture and One-Shot mode (IGSM = 1), the CCP will capture the timer value without an edge.

Work around

Once CCP is turned ON, and before enabling gate capture, re-arm the capture module using Input Capture Gate Arm bit.

Affected Silicon Revisions

A2							
X							

4. Module: CCP

When CCP is configured for Input Capture mode (CCM = 1) and an overflow condition occurs (ICOV = 1), the read capture buffer will not accept the next value until ICBNE is cleared. However, an interrupt is still generated.

Work around

Clear the ICOV bit in software; this will also cause the ICBNE bit to be cleared.

Affected Silicon Revisions

A2							
X							

5. Module: CPU

In any trap event, the trap origination address register (PCTRAP) is loaded with the value of the Program Counter (PC) associated with the instruction that caused the trap. However, it is not expected to capture the trap origination address of math error traps when they are disabled.

Work around

There is no workaround. Alternatively, enable math error traps, ignore the PCTRAP value and clear PCTRAP before exiting the math error trap handler. This re-enables the PCTRAP to capture the trap origination address of any other traps.

Affected Silicon Revisions

A2							
X							

6. Module: DMA

A DMA channel is configured to perform the data transfer using a software trigger or an external interrupt. When the transaction is still ongoing and repeated, a trigger is issued via software or external interrupt and the overrun flag is not set as expected. Consequently, this means that any data loss occurring due to repeated software or external triggers is not being recorded.

Work around

There is no workaround if the DMA channel is triggered by an external interrupt. In case the DMA channel is triggered by software, the application is expected to make sure that another software trigger is not issued when the DMA channel is busy.

Affected Silicon Revisions

A2							
X							

7. Module: DMA

A pair of DMA channels is configured in either One-Shot or Continuous Transfer modes and enabled to operate in Ping-Pong mode. The two available channels for ping-pong work only for the first pair of triggers. The count register of the DMA channels is not reloaded as expected, causing the transactions to halt.

Work around

Reload the count, source and destination address registers manually after transfer completion of the respective channel and before re-enabling the respective channel.

Affected Silicon Revisions

A2							
X							

8. Module: DMA

A pair of DMA channels is configured for either repeated one-shot or continuous transfers and is enabled to operate in Ping-Pong mode. For the configured ping-pong pair, after each channel completes its transaction, the PCHAEN bit is not reset by the hardware. Therefore, the ping-pong operation ceases.

Work around

The application software is expected to reset the Ping-Pong Channel Enable bit (PCHAEN) explicitly for each DMA channel once the channel has completed its ongoing transaction.

Affected Silicon Revisions

A2							
X							

9. Module: DMA

To initiate a read error trap, it is necessary to activate the Read Error Trap Enable (RETEN) bit. On setting RETEN bit, a read error trap is triggered, which concurrently sets the DMA Bus Read Error Fault bit (DMASTATx.DMAFLT2) to high. Conversely, if the RETEN bit is not enabled, the DMA Bus Read Error Fault bit (DMASTATx.DMAFLT2) will not be set. Therefore, to guarantee the detection of bus read errors in the DMA through the Bus Read Fault bit, RETEN needs to be enabled, although this action may result in the generation of undesired traps.

Work around

Set the RETEN bit explicitly in the application software. When the trap is generated, ignore the trap, and exit from the respective ISR.

Affected Silicon Revisions

A2							
X							

10. Module: I/O

When the $\overline{\text{MCLR}}$ pin is driven to a low state, all I/O pins should tristate asynchronously. However, it takes five CPU clock cycles.

Work around

None.

Affected Silicon Revisions

A2							
X							

11. Module: I/O

When change notification is configured to generate an interrupt on the positive edge and the device enters Sleep mode, if the first edge is high to low, the device fails to wake up on the subsequent low to high input edge.

Work around

None. However, in cases when only a single I/O is used for waking up the device from sleep using the I/O change notification feature in the application, use an external interrupt as the wake-up source.

Affected Silicon Revisions

A2							
X							

12. Module: I²C

Depending on various factors (MIPS, pull-up resistor, pull-up voltage, SMBus/I²C voltage levels), bus collision may get asserted when the STOP bit is sent from the host at 1 MHz baud rate.

Work around

None.

Affected Silicon Revisions

A2							
X							

13. Module: INT

The COVTE bit of the INTCON4 register is used to enable/disable math error traps caused by a catastrophic overflow of Accumulator A or B. However, a catastrophic overflow of Accumulator B raises a math error trap, irrespective of the status of the COVTE bit.

Work around

None.

Affected Silicon Revisions

A2							
X							

14. Module: INT

The INTxEP bit in the INTCON2 register can be used to select polarity of external interrupt triggers, allowing them to trigger on either the positive or negative edge. However, INT4 interrupt triggers only on the positive edge trigger, irrespective of the state of the INT4EP bit in INTCON2 register.

Work around

There is no workaround for the negative polarity trigger on external interrupt 4. If it is required to set up external interrupts to trigger on the negative edge of signal, use INT0-INT3 external interrupts.

Affected Silicon Revisions

A2							
X							

15. Module: OSC/CLK

The Status bit POSCRDY, which indicates the POSC source is ready to use, can be set before the POSC circuit has reached a sufficient amplitude. A subsequent clock switch to POSC can result in a corrupt clock.

Work around

Software should configure the clock settings (OSCCTRL & OSCCFG) while POSCEN = 0 to ensure a stable clock switch. After POSCEN = 1, software should wait until POSCRDY Status bit is asserted.

EXAMPLE 1:

```
OSCCTRLbits.POSCEN = 1;   //Enable POSC

while(OSCCTRLbits.POSCRDY == 0);

CLK1CONbits.OSWEN = 1; //initiate clk switch

while(CLK1CONbits.OSWEN != 0);
//wait clk switch to complete
```

Affected Silicon Revisions

A2							
X							

16. Module: OSC/CLK

When the device is reset using the MCLR pin, the CLKxDIV registers are not reset to default values specified in the device data sheet.

Work around

Use software to reset the CLKxDIV register following an MCLR reset.

Affected Silicon Revisions

A2							
X							

17. Module: OSC/CLK

The FRCEN bit has no effect and FRC is always enabled.

Work around

None.

Affected Silicon Revisions

A2							
X							

18. Module: PTG

When executing back-to-back wait for software trigger step commands, the PTGSWT bit is not cleared by hardware.

Work around

Manually clear the PTGSWT bit before setting it again, between the two PTGSW trigger commands.

Affected Silicon Revisions

A2							
X							

19. Module: PWM

When the PCI input is high, the PCI Active signal is terminated when there is no termination signal.

Work around

None. Only the PCI active signal is affected and the PWM outputs remain halted.

Affected Silicon Revisions

A2							
X							

20. Module: PWM

A trigger event is generated at the wrong phase when the trigger value is programmed to be equal to EOC, and the trigger compare event time (CAHALF) is changed on the fly.

Work around

Minimum difference between EOC and trigger values should be at least 64.

Affected Silicon Revisions

A2							
X							

21. Module: QEI

When QEI is configured with Position Counter Initialization Mode bits (PIMOD[2:0]) equal to 0b001, 0b010, 0b011, 0b100 or 0b111, any index event initializes the position counter. However, if the clock divider value is configured by INTDIV[2:0] bits greater than 1, and if the index event occurs between two clock edges, then the index event will be missed.

Work around

Index pulse width should be sufficiently high enough so that the event is captured by the QEI clock.

Affected Silicon Revisions

A2							
X							

22. Module: QEI

When QEI is configured in Quadrature mode (CCM[1:0] = 0b00) with PIMOD[2:0] = 0b001, any index event is supposed to reset the position counter. However, an index event will not reset the position counter, but it will be loaded with 0x00000001.

Work around

User application can enable interrupt on index event and load the position counter with zero. The index event should be sufficiently large enough so that software can reset the position counter before the next count up or count down pulse.

Affected Silicon Revisions

A2							
X							

23. Module: SPI

In the event of an overflow, the SPI reception is suspended when the Ignore Overflow bit is activated, and the SPIROV bit is not cleared.

Work around

Clear the SPIROV bit during the reception of the next byte that triggered the overflow. Additionally, SPIBUF must be read at least once.

Affected Silicon Revisions

A2							
X							

24. Module: SPI

In Sleep mode, SPI receive watermark interrupts are not asserted even though the configured number of elements has been received, resulting in the device not waking up from sleep.

Work around

Ensure that the device enters Sleep mode with SPI receive buffer full interrupts enabled for properly waking up from sleep.

Affected Silicon Revisions

A2							
X							

25. Module: UART

When the TXCIE bit is set and the TXCIF = 1, the RX watermark interrupt is not suppressed, causing an unintentional interrupt.

Work around

Ignore the RX watermark interrupt when the TXCIF flag is raised.

Affected Silicon Revisions

A2							
X							

26. Module: UART

In Address Detect mode, the address byte does not cause the buffer overflow if an address is received when the RX buffer is full.

Work around

Read the data from the RX buffer before it is full.

Affected Silicon Revisions

A2							
X							

27. Module: WDT

The WDTO bit (RCON[4]) fails to set when WDT is the wake-up source from Sleep and Idle modes.

Work around

None. Alternatively, enable WDT interrupts in order to determine whether the source of wake-up from Power-Save modes was the WDT.

Affected Silicon Revisions

A2							
X							

28. Module: CPU

An address error trap is generated in Indirect Register Offset Addressing mode (represented as [Ws + Wb] within instructions), when the value of Ws (Source) used is beyond 24-bits wide (size of address path). The issue may occur even when the effective address (Ws + Wb) is a valid address.

Work around

Either of the following workarounds can be used to overcome the issue:

1) Define the value of Ws within 24-bits of address range.

2) When using the XC-DSC V3.20 or newer C Compiler for dsPIC® DSCs, enable the compiler option: `-merrata=base_offset (Project Properties>XC_DSC>xc-dsc-gcc>Additonal options)`

Affected Silicon Revisions

A2							
X							

Data Sheet Clarifications

The following typographic corrections and clarifications are to be noted for the latest version of the device data sheet (DS70005539**C**).

Note:	Corrections are shown in **bold**. Where possible, the original bold text formatting has been removed for clarity.

None.

APPENDIX A: DOCUMENT REVISION HISTORY

Rev A Document (7/2024)

Initial version of this document; issued for silicon revision A2.

Rev B Document (3/2025)

Added silicon issue 28 (CPU).

NOTES:

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