

Mask Set Errata for Mask 1M18Y

This report applies to mask 1M18Y for these products:

- MPC5601D
- MPC5602D

Table 1. Errata and Information Summary

Prior ID	Current ID	Erratum Title
PS6149	ERR003103	Accesses to reserved PSMI registers do not return a transfer error
PS4283	ERR003007	ADC1 : Do not use the configuration "00" for INPCMP bits of ADC1.CTRx registers
	ERR007938	ADC: Possibility of missing CTU conversions
	ERR004168	ADC: Abort switch aborts the ongoing injected channel as well as the upcoming normal channel
PS5485	ERR003069	ADC: ADC_DMAE[DCLR] set to 1 clears the DMA request incorrectly
PS4455	ERR003010	ADC: conversion chain failing after ABORT chain
	ERR004186	ADC: Do not trigger ABORT or ABORTCHAIN prior to the start of CTU triggered ADC conversions and do not trigger ABORTCHAIN prior to the start of INJECTED triggered ADC conversions.
PS3999	ERR002997	ADC: Injected conversion not executed during scan mode.
	ERR005569	ADC: The channel sequence order will be corrupted when a new normal conversion chain is started prior to completion of a pending normal conversion chain
	ERR008227	CGM & ME: The peripheral set clock must be active during a peripheral clock enable or disable request
	ERR003442	CMU monitor: FXOSC/FIRC and FMPLL/FIRC relation
	ERR003446	CTU : The CTU (Cross Trigger Unit) CLR_FLAG in EVTCFGR register does not function as expected
PS9212	ERR003252	CTU: ADC1_X[0:3] channels cannot be triggered by CTU
	ERR003449	DEBUG: Device may hang due to external or 'functional' reset while using debug handshaking mechanism
	ERR009976	DSPI: Incorrect data received by master with Modified transfer format enabled when using Continuous serial communication clock mode
	ERR006026	DSPI: Incorrect SPI Frame Generated in Combined Serial Interface Configuration

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Table 1. Errata and Information Summary (continued)

Prior ID	Current ID	Erratum Title
	ERR010755	DSPI: Transmit and Receive FIFO fill flags in status register is not cleared when DMA is improperly configured
	ERR003512	ECSM: ECSM_PFEEDR displays incorrect endianness
	ERR006967	eDMA: Possible misbehavior of a preempted channel when using continuous link mode
	ERR011235	EMIOS: Any Unified Channel running in OPWMB or OPWMCB mode may function improperly if the source counter bus is generated by Unified channel in MC mode
	ERR050575	eMIOS: Any Unified Channel running in OPWMCB mode may function improperly if the lead or trail dead time insertion features is used and its timebase is generated by Unified channel in MCB mode
	ERR011293	EMIOS: For any UC operating in OPWFMB mode the Channel Count register should not be written with a value greater than Channel B Data register value
	ERR011295	EMIOS: In OPWFMB mode, A1/B1 registers do not get reloaded with A2/B2 register values if counter value returns 0x1 after counter wrap condition
	ERR011294	EMIOS: OPWFMB and MCB mode counter rollover resets the counter to 0x0 instead of 0x1 as mentioned in the specification
	ERR009978	eMIOS: Unexpected channel flag assertion during GPIO to MCB mode transition
	ERR006620	FLASH: ECC error reporting is disabled for Address Pipelining Control (APC) field greater than Read Wait-State Control (RWSC) field.
	ERR002656	FlexCAN: Abort request blocks the CODE field
	ERR007322	FlexCAN: Bus Off Interrupt bit is erroneously asserted when soft reset is performed while FlexCAN is in Bus Off state
	ERR003407	FlexCAN: CAN Transmitter Stall in case of no Remote Frame in response to Tx packet with RTR=1
PS8099	ERR003195	LINFlex: Limitations for DMA access to LINFlex
PS4781	ERR003021	LINFlex: Unexpected LIN timeout in slave mode
	ERR006082	LINFlexD : LINS bits in LIN Status Register(LINSR) are not usable in UART mode.
	ERR004340	LINFlexD: Buffer overrun can not be detected in UART Rx FIFO mode
	ERR006427	LINFlexD: Communication failure when LIN timer is used in Output Compare mode
	ERR007274	LINFlexD: Consecutive headers received by LIN Slave triggers the LIN FSM to an unexpected state
	ERR006915	LINFlexD: Erroneous receiver interrupt generation in UART FIFO mode
	ERR008933	LINFlexD: Inconsistent sync field may cause an incorrect baud rate and the Sync Field Error Flag may not be set
	ERR006349	LINFlexD: Possibility of incorrect break delimiter length in header by LIN master
	ERR003466	LINFlexD: Register bus aborts are not generated on illegal accesses to reserved addresses within the register address space of LINFlexD
	ERR008970	LINFlexD: Spurious bit error in extended frame mode may cause an incorrect Idle State
	ERR007589	LINFlexD: Spurious timeout error when switching from UART to LIN mode or when resetting LINTCSR[MODE] bit in LIN mode
PS8761	ERR003219	MC_CGM: System clock may stop for case when target clock source stops during clock switching transition
PS8762	ERR003220	MC_CGM: system clock may stop in case target clock source dies during clock switching
PS9140	ERR003247	MC_ME: A mode transition will not complete if the FlexCAN is disabled for target mode at MC_ME and is enabled at the FlexCAN peripheral

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Table 1. Errata and Information Summary (continued)

Prior ID	Current ID	Erratum Title
	ERR007394	MC_ME: Incorrect mode may be entered on low-power mode exit.
PS7776	ERR003190	MC_ME: Main VREG not disabled during STOP0 or HALT0 mode if RUN[0..3] mode selects FXOSC to be running and target mode selects FXOSC as system clock
	ERR003570	MC_ME: Possibility of Machine Check on Low-Power Mode Exit
	ERR006976	MC_ME: SAFE mode not entered immediately on hardware-triggered SAFE mode request during STOP0 mode
	ERR003574	MC_RGM: A non-monotonic ramp on the VDD_HV/BV supply can cause the RGM module to clear all flags in the DES register
PS2835	ERR002958	MC_RGM: Clearing a flag at RGM_DES or RGM_FES register may be prevented by a reset
PS5301	ERR003060	MC_RGM: SAFE mode exit may be possible even though condition causing the SAFE mode request has not been cleared
	ERR007953	ME: All peripherals that will be disabled in the target mode must have their interrupt flags cleared prior to target mode entry
PS8499	ERR003209	NMI pin configuration limitation in standby mode
PS9073	ERR003242	PB[10],PD[0:1] pins configuration during standby
PS8329	ERR003200	PIT events cannot be used to trigger ADC conversion incase BCTU runs on divided system clock
	ERR007688	RTC: An API interrupt may be triggered prematurely after programming the API timeout value
	ERR009764	SARADC : DMA interface limitation depending on PBRIDGE/SARADC clock ratio
	ERR004146	SARADC: Interrupted conversions are aborted, but may not be properly restored
	ERR009682	SPI: Inconsistent loading of shift register data into the receive FIFO following an overflow event
PS9725	ERR004405	SR bit of LINFlexD GCR register is not cleared automatically by hardware
PS9684	ERR003288	Wakeup line functionality on PB[8], PB[9] not available in STANDBY
	ERR004136	XOSC and IRCOSC: Bus access errors are generated in only half of non-implemented address space of XOSC and IRCOSC, and the other half of address space is mirrored

Table 2. Revision History

Revision	Changes
25AUG2011	Initial revision
17MAY2012	<p>The following errata were removed.</p> <ul style="list-style-type: none"> • ERR003220: Moved to e3219 to maintain numbering across devices • ERR003250: Moved to e3209 to maintain numbering across devices • ERR003269: Now described in RM • ERR003286: Moved to e3247 to maintain numbering across devices • ERR003287: Moved to e3242 to maintain numbering across devices • ERR003301: Moved to e3200 to maintain numbering across devices • ERR003442: Now described in RM

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Table 2. Revision History (continued)

Revision	Changes
	<p>The following errata were added.</p> <ul style="list-style-type: none"> • ERR003200: Moved from e3301 to maintain numbering across devices • ERR003209: Moved from e3250 to maintain numbering across devices • ERR003219: Moved from e3220 to maintain numbering across devices • ERR003242: Moved from e3287 to maintain numbering across devices • ERR003247: Moved from e3286 to maintain numbering across devices • ERR004146: New errata • ERR004168: New errata • ERR004186: New errata • ERR004340: New errata • ERR004405: New errata <p>The following errata were revised.</p> <ul style="list-style-type: none"> • ERR003512: Description updated for clarity • ERR003570: Description updated for clarity
24th June 2013	<p>The following errata were added.</p> <ul style="list-style-type: none"> • ERR003220 • ERR006620 <p>The following errata were revised.</p> <ul style="list-style-type: none"> • ERR002656 • ERR003574 • ERR004146 • ERR004168 • ERR004340
27th June 2013	<p>The following erratum was revised.</p> <ul style="list-style-type: none"> • ERR004168
12 Dec 2013	<p>The following errata were added.</p> <ul style="list-style-type: none"> • ERR004136 • ERR005569 • ERR006026 • ERR006082 • ERR006349 • ERR006427 • ERR006915 • ERR006967 • ERR006976 • ERR007274 • ERR007322 • ERR007394 <p>The following erratum was revised.</p> <ul style="list-style-type: none"> • ERR004186
16th July 2014	<p>The following errata were added.</p> <ul style="list-style-type: none"> • ERR003442 • ERR007589 • ERR007688 • ERR007938 • ERR007953 • ERR008227

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Table 2. Revision History (continued)

Revision	Changes
	The following errata were revised. <ul style="list-style-type: none">• ERR003247• ERR005569
7th June 2022	The following errata were added. <ul style="list-style-type: none">• ERR002997• ERR003007• ERR003010• ERR003021• ERR008933• ERR008970• ERR009682• ERR009764• ERR009976• ERR009978• ERR010755• ERR011235• ERR011293• ERR011294• ERR011295• ERR050575 The following errata were revised. <ul style="list-style-type: none">• ERR004146• ERR007274• ERR007394• ERR007589

ERR003103: Accesses to reserved PSMI registers do not return a transfer error

Description: When accessing the following reserved locations in the SIUL address space, a transfer error will not be returned:

SIUL base address 0xC3F90000 + offsets 0x500-0x504, 0x50A-0x50C, 0x512-0x514, 0x51A-0x525, 0x528-0x539, 0x53B-0x53D

Workaround: None

ERR003007: ADC1 : Do not use the configuration “00” for INPCMP bits of ADC1.CTRx registers

Description: INPCMP bits of ADC1.CTRx registers cannot be programmed to “00”. Due to this, ADC performance is not guaranteed above 5MHz at 3.3V and 8MHz at 5V range. The performance is same as INPCMP bits programmed to “01”. If minimum conversion time is desired then other configurations can be used.

Workaround: No workaroud.

ERR007938: ADC: Possibility of missing CTU conversions

Description: The CTU prioritizes and schedules trigger sources so that the ADC will receive only one CTU trigger at a time. However, whilst a Normal or Injected ADC conversion is ongoing as the ADC moves state from IDLE-to-SAMPLE, SAMPLE-to-WAIT, WAIT-to-SAMPLE and WAIT-to-IDLE there are 2 clock cycles at the state transition that a CTU trigger may be missed by the ADC.

Workaround: To ensure all CTU triggers are received at the ADC Normal and Injected modes must be disabled.

ERR004168: ADC: Abort switch aborts the ongoing injected channel as well as the upcoming normal channel

Description: If an Injected chain (jch1,jch2,jch3) is injected over a Normal chain (nch1,nch2,nch3,nch4) the Abort switch does not behave as expected.

Expected behavior:

Correct Case (without SW Abort on jch3): Nch1- Nch2(aborted) -Jch1 – Jch2 – Jch3 – Nch2(restored) - Nch3 – Nch4
Correct Case(with SW Abort on jch3): Nch1 – Nch2(aborted) - Jch1 – Jch2 – Jch3(aborted) - Nch2(restored) - Nch3 – Nch4

Observed unexpected behavior:

Fault1 (without SW abort on jch3): Nch1 – Nch2(aborted) - Jch1 – Jch2 - Jch3 – Nch3 – Nch4 (Nch2 not restored)
Fault2 (with SW abort on jch3): Nch1- Nch2 (aborted) - Jch1 – Jch2 – Jch3(aborted) - Nch4(Nch2 not restored &Nch3 conversion skipped)

Workaround: It is possible to detect the unexpected behavior by using the CEOCFRx register. The CEOCFRx fields will not be set for a not restored or skipped channel, which indicates this issue has occurred. The CEOCFRx fields need to be checked before the next Normal chain execution (in scan mode). The CEOCFRx fields should be read by every ECH interrupt at the end of every chain execution.

ERR003069: ADC: ADC_DMAE[DCLR] set to 1 clears the DMA request incorrectly

Description: When ADC_DMAE[DCLR] is set the DMA request should be cleared only after the data registers are read. However for this case the DMA request is automatically cleared and will not be recognised by the eDMA.

Workaround: None

ERR003010: ADC: conversion chain failing after ABORT chain

Description: During a chain conversion while the ADC is in scan mode when ADC_MCR[ABORTCHAIN] is asserted the current chain will be aborted as expected. However, in the next scan the first conversion of the chain is performed twice and the last conversion of the chain is not performed.

Workaround: When aborting a chain conversion enable ADC_MCR[ABORTCHAIN] and disable ADC_MCR[START].

ADC_MCR[START] can be enabled when the abort is complete.

ERR004186: ADC: Do not trigger ABORT or ABORTCHAIN prior to the start of CTU triggered ADC conversions and do not trigger ABORTCHAIN prior to the start of INJECTED triggered ADC conversions.

Description: When ADC_MCR[ABORT] or ADC_MCR[ABORTCHAIN] is set prior to the ADC receiving a CTU trigger, the next CTU triggered ADC conversion will not be performed and further CTU triggered ADC conversions will be blocked.

When ADC_MCR[ABORTCHAIN] is set prior to the ADC receiving an INJECTED trigger, the next INJECTED ADC conversion will not be performed. Following the ABORTCHAIN command the MCU behaviour does not meet the specification as ADC_ISR[JECH] is not set and ADC_MCR[ABORTCHAIN] is not cleared.

Workaround: Do not program ADC_MCR[ABORT] or ADC_MCR[ABORTCHAIN] before the start of ADC conversions.

The case when CTU triggered ADC conversions are blocked should be avoided however it is possible to reactivate CTU conversions by clearing and setting ADC_MCR[CTUEN].

ERR002997: ADC: Injected conversion not executed during scan mode.

Description: When ADC is converting a chain in scan mode -configured using NSTART bit in non-CTU mode

operation; and a injected conversion arrives -triggered by software with JSTART bit or by hardware from eTimer_1 channel 5 (internal connection); the ADC gets stuck in the sampling phase (the triggered conversion is not executed and the chain is not restarted).

Workaround: None

ERR005569: ADC: The channel sequence order will be corrupted when a new normal conversion chain is started prior to completion of a pending normal conversion chain

Description: If One shot mode is configured in the Main Configuration Register (MCR[MODE] = 0) the chained channels are automatically enabled in the Normal Conversion Mask Register 0 (NCMR0). If the programmer initiates a new chain normal conversion, by setting MCR[NSTART] = 0x1, before the previous chain conversion finishes, the new chained normal conversion will not follow the requested sequence of converted channels.

For example, if a chained normal conversion sequence includes three channels in following sequence: channel0, channel1 and channel2, the conversion sequence is started by MCR[NSTART] = 0x1. The software re-starts the next conversion sequence when MCR[NSTART] is set to 0x1 just before the current conversion sequence finishes.

The conversion sequence should be: channel0, channel1, channel2, channel0, channel1, channel2.

However, the conversion sequence observed will be: channel0, channel1, channel2, channel1, channel1, channel2. Channel0 is replaced by channel1 in the second chain conversion and channel1 is converted twice.

Workaround: Ensure a new conversion sequence is not started when a current conversion is ongoing. This can be ensured by issuing the new conversion setting MCR[NSTART] only when MSR[NSTART] = 0.

Note: MSR[NSTART] indicates the present status of conversion. MSR[NSTART] = 1 means that a conversion is ongoing and MSR[NSTART] = 0 means that the previous conversion is finished.

ERR008227: CGM & ME: The peripheral set clock must be active during a peripheral clock enable or disable request

Description: An individual peripheral clock can be enabled or disabled for a target mode via the Mode Entry Peripheral Control register (ME_PCTL) and the Mode Entry RUN/Low Power Peripheral Configuration register (ME_RUN_PC & ME_LP_PC). For this process to complete the user must ensure that the peripheral set clock relative to the specific peripheral is enabled for the duration of the current-mode-to-target-mode transition. The peripheral set clock is configured at the Clock Generation Module System Clock Divider Configuration Register (CGM_SC_DC).

A caveat for FlexCAN is for the case when the FXOSC is selected for the CAN Engine Clock Source (FLEXCAN_CTRL[CLK_SRC]). In this instance to enable or disable the FlexCAN peripheral clock the user must ensure FXOSC is enabled through the target mode transition i.e. FXOSC must be enabled for the target mode.

Workaround: To enable a peripheral clock:

1. Enable the peripheral set clock at CGM_SC_DC.
2. Enable the peripheral clock for the target mode at ME_PCTL & ME_RUN_PC/ ME_LP_PC.
3. Note steps 1 & 2 are interchangeable.
4. Transition to the target mode to enable the peripheral clock.

To disable a peripheral clock:

1. Disable the peripheral clock for the target mode at ME_PCTL & ME_RUN_PC/ ME_LP_PC.
2. Transition to the target mode to disable the peripheral clock.
3. Optionally disable peripheral set clock at CGM_SC_DC. Note to check other peripherals in this peripheral set are not required.

ERR003442: CMU monitor: FXOSC/FIRC and FMPLL/FIRC relation

Description: Functional CMU monitoring can only be guaranteed when the following conditions are met:

- FXOSC frequency must be greater than $(FIRC / 2^{RCDIV}) + 0.5\text{MHz}$ in order to guarantee correct FXOSC monitoring
- FMPLL frequency must be greater than $(FIRC / 4) + 0.5\text{MHz}$ in order to guarantee correct FMPLL monitoring

Workaround: Refer to description

ERR003446: CTU : The CTU (Cross Trigger Unit) CLR_FLAG in EVTCFGR register does not function as expected

Description: If the CTU CLR_FLG is set and the CTU is idle, a PIT triggered request to the CTU does not result in the correct ADC channel number being latched. The previous ADC channel number is latched instead of the requested channel number.

Workaround: There is no software workaround to allow the CLR_FLAG functionality to operate correctly. Do not program the CLR_FLAG bit to '1'.

ERR003252: CTU: ADC1_X[0:3] channels cannot be triggered by CTU

Description: CTU_EVTCFGRx[CHANNEL_VALUE] bitfield is 6 bit wide and can select ADC channels within the range 0-63.

ADC1_X[0:3] indexed CH[64-95], cannot be selected.

Workaround: None

ERR003449: DEBUG: Device may hang due to external or 'functional' reset while using debug handshaking mechanism

Description: If the low-power mode debug handshake has been enabled and an external reset or a 'functional' reset occurs while the device is in a low-power mode, the device will not exit reset.

Workaround: The NPC_PCR[LP_DBG_EN] bit must be cleared to ensure the correct reset sequence.

ERR009976: DSPI: Incorrect data received by master with Modified transfer format enabled when using Continuous serial communication clock mode

Description: When the Deserial Serial Peripheral Interface (DSPI) module is configured as follows:

1. Master mode is enabled (Master/Slave Mode Select bit in Module Configuration Register is set (DSPI_MCR [MSTR] = 0b1))
2. Modified transfer format is enabled (Modified Transfer Format Enable bit in Module Configuration Register is set (DSPI_MCR [MTFE] = 0b1))
3. Continuous serial communication clock mode is enabled (Continuous SCK Enable bit in Module Configuration Register is set (DSPI_MCR [CONT_SCKE] = 0b1))

In this configuration if the frame size of the current frame is greater than the frame size of the next received frame, corrupt frames are received in two scenarios:

- a) Continuous Peripheral Chip Select Enable bit in PUSH TX FIFO Register is set (DSPI_PUSHR [CONT] = 0b1)
- b) DSPI_PUSHR [CONT] = 0b0 and lower significant bit of the frame is transferred first (LSB first bit in Clock and Transfer Attributes Register is set (DSPI_CTAR [LSBFE] = 0b1))

Workaround: To receive correct frames:

- a) When DSPI_PUSHR [CONT] = 0b1, configure the frame size of the current frame less than or equal to the frame size of the next frame (for all frames).
- b) When DSPI_PUSHR [CONT] = 0b0, configure DSPI_CTAR [LSBFE] = 0b0. Alternatively, configure the frame size of the current frame less than or equal to the frame size of the next frame (for all frames).

Make sure that for all received frames, the bits are read equal to their respective frame sizes and any extra bits during POP operation are masked.

ERR006026: DSPI: Incorrect SPI Frame Generated in Combined Serial Interface Configuration

Description: In the Combined Serial Interface (CSI) configuration of the Deserial Serial Peripheral Interface (DSPI) where data frames are periodically being sent (Deserial Serial Interface, DSI), a Serial Peripheral Interface (SPI) frame may be transmitted with incorrect framing.

The incorrect frame may occur in this configuration if the user application writes SPI data to the DSPI Push TX FIFO Register (DSPI_PUSHR) during the last two peripheral clock cycles of the Delay-after-Transfer (DT) phase. In this case, the SPI frame is corrupted.

Workaround: Workaround 1: Perform SPI FIFO writes after halting the DSPI.

To prevent writing to the FIFO during the last two clock cycles of DT, perform the following steps every time a SPI frame is required to be transmitted:

Step 1: Halt the DSPI by setting the HALT control bit in the Module Configuration Register (DSPI_MCR[HALT]).

Step 2: Poll the Status Register's Transmit and Receive Status bit (DSPI_SR[TXRXS]) to ensure the DSPI has entered the HALT state and completed any in-progress transmission. Alternatively, if continuous polling is undesirable in the application, wait for a fixed time interval such as 35 baud clocks to ensure completion of any in-progress transmission and then check once for DSPI_SR[TXRXS].

Step 3: Perform the write to DSPI_PUSHR for the SPI frame.

Step 4: Clear bit DSPI_MCR[HALT] to bring the DSPI out of the HALT state and return to normal operation.

Workaround 2: Do not use the CSI configuration. Use the DSPI in either DSI-only mode or SPI-only mode.

Workaround 3: Use the DSPI's Transfer Complete Flag (TCF) interrupt to reduce worst-case wait time of Workaround 1.

Step 1: When a SPI frame is required to be sent, halt the DSPI as in Step 1 of Workaround 1 above.

Step 2: Enable the TCF interrupt by setting the DSPI DMA/Interrupt Request Select and Enable Register's Transmission Complete Request Enable bit (DSPI_RSER[TCF_RE])

Step 3: In the TCF interrupt service routine, clear the interrupt status (DSPI_SR[TCF]) and the interrupt request enable (DSPI_RSER[TCF_RE]). Confirm that DSPI is halted by checking DSPI_SR[TXRXS] and then write data to DSPI_PUSHR for the SPI frame. Finally, clear bit DSPI_MCR[HALT] to bring the DSPI out of the HALT state and return to normal operation.

ERR010755: DSPI: Transmit and Receive FIFO fill flags in status register is not cleared when DMA is improperly configured

Description: The Deserial/Serial Peripheral Interface Transmit and Receive First In/First Out (FIFO) buffers can request additional information to be transferred via the Direct Memory Access (DMA) module when either the Transmit or Receive FIFO Fill/Drain Flags are set in the DSPI Status Register (SR[TFFF/RFDF]). However, the Transmit Fill Flag indicates that at least 1 location each (2 bytes each) in the Transmit and Command FIFOs is available to be written. It does not indicate that the FIFO is empty. Similarly, Receive FIFO fill flag only indicates at least 1 location (2 bytes) of the FIFO is available to be read. It does not indicate that the FIFO is full. If the DMA is configured to transfer more than 1 FIFO location size of data, the FIFO Fill/Drain Flags may not be properly cleared indicating that the FIFO is not full even when the FIFO is actually full (for Transmit FIFO) and not empty when the FIFO is actually empty (for Receive FIFO).

Workaround: Properly configure the DMA to fill/drain only 2 bytes to Transmit, Command and Receive FIFOs. Use the DMA loop to transfer more data if needed.

ERR003512: ECSM: ECSM_PFEDR displays incorrect endianness

Description: The ECSM_PFEDR register reports ECC data using incorrect endianness. For example, a flash location that contains the data 0xAABBCCDD would be reported as 0xDDCCBBAA at ECSM_PFEDR.

This 32-bit register contains the data associated with the faulting access of the last, properly-enabled flash ECC event. The register contains the data value taken directly from the data bus.

Workaround: Software must correct endianness.

ERR006967: eDMA: Possible misbehavior of a preempted channel when using continuous link mode

Description: When using Direct Memory Access (DMA) continuous link mode Control Register Continuous Link Mode (DMA_CR[CLM]) = 1) with a high priority channel linking to itself, if the high priority channel preempts a lower priority channel on the cycle before its last read/write sequence, the counters for the preempted channel (the lower priority channel) are corrupted. When the preempted channel is restored, it continues to transfer data past its “done” point (that is the byte transfer counter wraps past zero and it transfers more data than indicated by the byte transfer count (NBYTES)) instead of performing a single read/write sequence and retiring.

The preempting channel (the higher priority channel) will execute as expected.

Workaround: Disable continuous link mode (DMA_CR[CLM]=0) if a high priority channel is using minor loop channel linking to itself and preemption is enabled. The second activation of the preempting channel will experience the normal startup latency (one read/write sequence + startup) instead of the shortened latency (startup only) provided by continuous link mode.

ERR011235: EMIOS: Any Unified Channel running in OPWMB or OPWMCB mode may function improperly if the source counter bus is generated by Unified channel in MC mode

Description: The Unified channel (UC) configured in Center Aligned Output Pulse Width Modulation Buffered (OPWMCB) or Output Pulse Width Modulation Buffered (OPWMB) modes is not working properly when it is sourced from the UC configured in Modulus Counter (MC) mode by setting the channel control register MODE bitfield to 0x10 or 0x11 and any of its pre-scalers (internal or global) divider ratio is higher than 1.

Workaround: When a counter bus is generated by the UC set in the MC mode with any pre-scaler (internal or global) divider ration higher than 1, don't use this counter bus for the UC set in OPWMCB or OPWMB mode.

ERR050575: eMIOS: Any Unified Channel running in OPWMCB mode may function improperly if the lead or trail dead time insertion features is used and its timebase is generated by Unified channel in MCB mode

Description: The Unified channel (UC) configured in Center Aligned Output Pulse Width Modulation Buffered (OPWMCB) mode is not working properly when:

1. It's timebase is sourced from the UC configured in Modulus Counter Buffered (MCB) mode.
2. The lead or trail dead time insertion features is used.
3. Its channel prescaler is different than timebase channel prescaler.

Workaround: Channel configured in OPWMCB mode with lead or trail dead time insertion features enabled must have channel prescaler equal to the timebase channel prescaler configured in MCB mode.

ERR011293: EMIOS: For any UC operating in OPWFMB mode the Channel Count register should not be written with a value greater than Channel B Data register value

Description: For any Unified Channel (UC) running in Output Pulse-Width and Frequency Modulation Buffered (OPWFMB) mode, Channel Control Register MODE bitfield = 7'h1011000 or 7'h1011010, the internal counter runs from 0x1 to Channel B Data register value.

The internal counter can be overwritten by software using the Chanel Count register during 'freeze' operation.

If a counter wrap occurs due to overwriting of the counter with a value greater than its expiry value (B Data Register value); than the output signal behavior cannot be guaranteed.

Workaround: For any UC operating in OPWFMB mode the Channel Count register should not be written with a value greater than Channel B Data register value.

ERR011295: EMIOS: In OPWFMB mode, A1/B1 registers do not get reloaded with A2/B2 register values if counter value returns 0x1 after counter wrap condition

Description: In Output Pulse-Width and Frequency Modulation Buffered (OPWFMB) mode, A1/B1 registers do not get reloaded with A2/B2 register values if counter value returns 0x1 after counter wrap condition.

In order to avoid the counter wrap condition make sure internal counter value is within the 0x1 to B1 register value range when the OPWFMB mode is entered. Also overwriting of Channel Count register by forcing 'freeze' in OPWFMB mode should not take internal counter outside 0x1 to B register value.

Workaround: In order to avoid the counter wrap condition:

1. Make sure internal counter value is within the 0x1 to (B1 register) value range when the OPWFMB mode is entered.
2. Overwrite of Channel Count register by forcing 'freeze' in OPWFMB mode should not be outside the range of 0x1 to (B register) value.

ERR011294: EMIOS: OPWFMB and MCB mode counter rollover resets the counter to 0x0 instead of 0x1 as mentioned in the specification

Description: When the enhanced Modular Input/Output System (eMIOS) is used in Output Pulse-Width and Frequency Modulation Buffered (OPWFMB) or Modulus Counter Buffered (MCB) modes, when the counter rolls over, the counter returns to 0x0 instead of 0x1 as specified in the reference manual.

Workaround: In order to avoid the counter wrap condition:

1. Make sure internal counter value is within the 0x1 to (B1 register) value range when the OPWFMB mode is entered.
2. Overwrite of Channel Count register by forcing 'freeze' in OPWFMB mode should not be outside the range of 0x1 to (B register) value.

ERR009978: eMIOS: Unexpected channel flag assertion during GPIO to MCB mode transition

Description: When changing an Enhanced Modular IO Subsystem (eMIOS) channel mode from General Purpose Input/Output (GPIO) to Modulus Counter Buffered (MCB) mode, the channel flag in the eMIOS Channel Status register (eMIOS_Sn[FLAG]) may incorrectly be asserted. This will cause an unexpected interrupt or DMA request if enabled for that channel.

Workaround: In order to change the channel mode from GPIO to MCB without causing an unexpected interrupt or DMA request, perform the following steps:

- (1) Clear the FLAG enable bit in the eMIOS Control register (eMIOS_Cn[FEN] = 0).
- (2) Change the channel mode (eMIOS_Cn[MODE]) to the desired MCB mode.
- (3) Clear the channel FLAG bit by writing '1' to the eMIOS Channel Status register FLAG field (eMIOS_Sn[FLAG] = 1).

(4) Set the FLAG enable bit (eMIOS_Cn[FEN] = 1) to re-enable the channel interrupt or DMA request reaction.

ERR006620: FLASH: ECC error reporting is disabled for Address Pipelining Control (APC) field greater than Read Wait-State Control (RWSC) field.

Description: The reference manual states the following at the Platform flash memory controller Access pipelining functional description.

“The platform flash memory controller does not support access pipelining since this capability is not supported by the flash memory array. As a result, the APC (Address Pipelining Control) field should typically be the same value as the RWSC (Read Wait-State Control) field for best performance, that is, BK_n_APC = BK_n_RWSC. It cannot be less than the RWSC.”

The reference manual advises that the user must not configure APC to be less than RWSC and typically APC should equal RWSC. However the documentation does not prohibit the configuration of APC greater than RWSC and for this configuration ECC error reporting will be disabled. Flash ECC error reporting will only be enabled for APC = RWSC.

For the case when flash ECC is disabled and data is read from a corrupt location the data will be transferred via the system bus however a bus error will not be asserted and neither a core exception nor an ECSM interrupt will be triggered. For the case of a single-bit ECC error the data will be corrected but for a double-bit error the data will be corrupt.

Notes

1. Both CFlash & DFlash are affected by this issue.
2. For single-bit and double-bit Flash errors neither a core exception nor an ECSM interrupt will be triggered unless APC=RWSC.
3. The Flash Array Integrity Check feature is not affected by this issue and will successfully detect an ECC error for all configurations of APC >= RWSC.
4. For the APC > RWSC configuration other than flash ECC error reporting there will be no other unpredictable behaviour from the flash.
5. The write wait-state control setting at PFCRx[BK_n_WWSC] has no affect on the flash. It is recommend to set WWSC = RWSC = APC.

Workaround: PFCRx[BK_y_APC] must equal PFCRx PFCRx[BK_y_RWSC]. See datasheet for correct setting of RWSC.

ERR002656: FlexCAN: Abort request blocks the CODE field

Description: An Abort request to a transmit Message Buffer (TxMB) can block any write operation into its CODE field. Therefore, the TxMB cannot be aborted or deactivated until it completes a valid transmission (by winning the CAN bus arbitration and transmitting the contents of the TxMB).

Workaround: Instead of aborting the transmission, use deactivation instead.

Note that there is a chance that the deactivated TxMB can be transmitted without setting IFLAG and updating the CODE field if it is deactivated.

ERR007322: FlexCAN: Bus Off Interrupt bit is erroneously asserted when soft reset is performed while FlexCAN is in Bus Off state

Description: Under normal operation, when FlexCAN enters in Bus Off state, a Bus Off Interrupt is issued to the CPU if the Bus Off Mask bit (CTRL[BOFF_MSK]) in the Control Register is set. In consequence, the CPU services the interrupt and clears the ESR[BOFF_INT] flag in the Error and Status Register to turn off the Bus Off Interrupt.

In continuation, if the CPU performs a soft reset after servicing the bus off interrupt request, by either requesting a global soft reset or by asserting the MCR[SOFT_RST] bit in the Module Configuration Register, once MCR[SOFT_RST] bit transitions from 1 to 0 to acknowledge the soft reset completion, the ESR[BOFF_INT] flag (and therefore the Bus Off Interrupt) is re-asserted.

The defect under consideration is the erroneous value of Bus Off flag after soft reset under the scenario described in the previous paragraph.

The Fault Confinement State (ESR[FLT_CONF] bit field in the Error and Status Register) changes from 0b11 to 0b00 by the soft reset, but gets back to 0b11 again for a short period, resuming after certain time to the expected Error Active state (0b00). However, this late correct state does not reflect the correct ESR[BOFF_INT] flag which stays in a wrong value and in consequence may trigger a new interrupt service.

Workaround: To prevent the occurrence of the erroneous Bus Off flag (and eventual Bus Off Interrupt) the following soft reset procedure must be used:

1. Clear CTRL[BOFF_MSK] bit in the Control Register (optional step in case the Bus Off Interrupt is enabled).
2. Set MCR[SOFT_RST] bit in the Module Configuration Register.
3. Poll MCR[SOFT_RST] bit in the Module Configuration Register until this bit is cleared.
4. Wait for 4 peripheral clocks.
5. Poll ESR[FLTCONF] bit in the Error and Status Register until this field is equal to 0b00.
6. Write "1" to clear the ESR[BOFF_INT] bit in the Error and Status Register.
7. Set CTRL[BOFF_MSK] bit in the Control Register (optional step in case the Bus Off Interrupt is enabled).

ERR003407: FlexCAN: CAN Transmitter Stall in case of no Remote Frame in response to Tx packet with RTR=1

Description: FlexCAN does not transmit an expected message when the same node detects an incoming Remote Request message asking for any remote answer.

The issue happens when two specific conditions occur:

- 1) The Message Buffer (MB) configured for remote answer (with code "a") is the last MB. The last MB is specified by Maximum MB field in the Module Configuration Register (MCR[MAXMB]).
- 2) The incoming Remote Request message does not match its ID against the last MB ID.

While an incoming Remote Request message is being received, the FlexCAN also scans the transmit (Tx) MBs to select the one with the higher priority for the next bus arbitration. It is expected that by the Intermission field it ends up with a selected candidate (winner). The

coincidence of conditions (1) and (2) above creates an internal corner case that cancels the Tx winner and therefore no message will be selected for transmission in the next frame. This gives the appearance that the FlexCAN transmitter is stalled or “stops transmitting”.

The problem can be detectable only if the message traffic ceases and the CAN bus enters into Idle state after the described sequence of events.

There is NO ISSUE if any of the conditions below holds:

- a) The incoming message matches the remote answer MB with code “a”.
- b) The MB configured as remote answer with code “a” is not the last one.
- c) Any MB (despite of being Tx or Rx) is reconfigured (by writing its CS field) just after the Intermission field.
- d) A new incoming message sent by any external node starts just after the Intermission field.

Workaround: Do not configure the last MB as a Remote Answer (with code “a”).

ERR003195: LINFlex: Limitations for DMA access to LINFlex

Description: The DMA handshaking to the LINFlex can fail when the LINFlex operates on a divided peripheral clock.

Workaround: Don't divide the LINFlex peripheral clock if DMA access is required.

ERR003021: LINFlex: Unexpected LIN timeout in slave mode

Description: If the LINFlex is configured in LIN slave mode, an unexpected LIN timeout event (LINESR[OCF]) may occur during LIN Break reception.

Workaround: It is recommended to disable this functionality during LINFlex initialization by clearing LINTCSR[IOT] and LINIER[OCIE] bits, and ignore timeout events.

ERR006082: LINFlexD : LINS bits in LIN Status Register(LINSR) are not usable in UART mode.

Description: When the LINFlexD module is used in the Universal Asynchronous Receiver/Transmitter (UART) mode, the LIN state bits (LINS3:0) in LIN Status Register (LINSR) always indicate the value zero. Therefore, these bits cannot be used to monitor the UART state.

Workaround: LINS bits should be used only in LIN mode.

ERR004340: LINFlexD: Buffer overrun can not be detected in UART Rx FIFO mode

Description: When the LINFlexD is configured in UART Receive (Rx) FIFO mode, the Buffer Overrun Flag (BOF) bit of the UART Mode Status Register (UARTSR) register is cleared in the subsequent clock cycle after being asserted.

User software can not poll the BOF to detect an overflow.

The LINFlexD Error Combined Interrupt can still be triggered by the buffer overrun. This interrupt is enabled by setting the Buffer Overrun Error Interrupt Enable (BOIE) bit in the LIN Interrupt enable register (LINIER). However, the BOF bit will be cleared when the interrupt routine is entered, preventing the user from identifying the source of error.

Workaround: Buffer overrun errors in UART FIFO mode can be detected by enabling only the Buffer Overrun Interrupt Enable (BOIE) in the LIN interrupt enable register (LINIER).

ERR006427: LINFlexD: Communication failure when LIN timer is used in Output Compare mode

Description: In the Local Interconnect Network Module (LINFlexD), the LIN state machine can be reset to the IDLE state on a timeout event, setting the Idle on timeout bit (IOT) bit of the LIN Time-Out Control Status Register (LINTCSR).

If the Timeout counter mode is set as Output compare (LINTCSR[MODE]=1), even if the Idle on Timeout bit is set (LINTCSR[IOT]=1), the LIN state machine does not move to IDLE state on timeout event.

Thus, further incoming data would not be interpreted correctly leading to communication failure.

Workaround: The LIN state machine can be reset to the IDLE state on timeout event only using “LIN mode” as the timeout counter mode (LINTCSR[MODE] =0).

ERR007274: LINFlexD: Consecutive headers received by LIN Slave triggers the LIN FSM to an unexpected state

Description: As per the Local Interconnect Network (LIN) specification, the processing of one frame should be aborted by the detection of a new header sequence and the LIN Finite State Machine (FSM) should move to the protected identifier (PID) state. In the PID state, the LIN FSM waits for the detection of an eight bit frame identifier value.

In LINFlexD, if the LIN Slave receives a new header instead of data response corresponding to a previous header received, it triggers a framing error during the new header’s reception and returns to IDLE state.

Workaround: The following three steps should be followed -

- 1) Configure slave to Set the MODE bit in the LIN Time-Out Control Status Register (LINTCSR[MODE]) to ‘0’.
- 2) Configure slave to Set Idle on Timeout in the LINTCSR[IOT] register to ‘1’. This causes the LIN Slave to go to an IDLE state before the next header arrives, which will be accepted without any framing error.
- 3) Configure master to wait for Frame maximum time (T Frame_Maximum as per LIN specifications) before sending the next header.

Note:

$T_{Header_Nominal} = 34 * T_{Bit}$

$T_{Response_Nominal} = 10 * (N_{Data} + 1) * T_{Bit}$

$T_{Header_Maximum} = 1.4 * T_{Header_Nominal}$

$T_{\text{Response_Maximum}} = 1.4 * T_{\text{Response_Nominal}}$

$T_{\text{Frame_Maximum}} = T_{\text{Header_Maximum}} + T_{\text{Response_Maximum}}$

where TBit is the nominal time required to transmit a bit and NData is number of bits sent.

ERR006915: LINFlexD: Erroneous receiver interrupt generation in UART FIFO mode

Description: In the Local Interconnect Network Interrupt Enable Register (LINIER), the Data Reception Interrupt enable bit (LINIER[DRIE]) and Data Transmission Interrupt enable bit (LINIER[DTIE]) are significant only in LIN mode and Universal Asynchronous Receiver/Transmitter (UART) buffer mode.

Enabling these bits in UART First-In-First-Out (FIFO) mode will lead to an erroneous receiver interrupt being generated when the Receiver FIFO empty flag (UARTSR[RFE]) or Tx FIFO full flag (UARTSR[TFF]) in the UART Mode Status register are set.

Workaround: Do not enable LINIER[DRIE] and LINIER[DTIE] bits in UART FIFO mode as these bits have functional significance only in LIN mode or UART buffer mode.

ERR008933: LINFlexD: Inconsistent sync field may cause an incorrect baud rate and the Sync Field Error Flag may not be set

Description: When the LINFlexD module is configured as follows:

1. LIN (Local Interconnect Network) slave mode is enabled by clearing the Master Mode Enable bit in the LIN Control Register 1 (LINCR1[MME] = 0b0)
2. Auto synchronization is enabled by setting LIN Auto Synchronization Enable (LINCR1[LASE] = 0b1)

The LINFlexD module may automatically synchronize to an incorrect baud rate without setting the Sync Field Error Flag in the LIN Error Status register (LINESR[SFEF]) in case Sync Field value is not equal to 0x55, as per the Local Interconnect Network (LIN) specification.

The auto synchronization is only required when the baud-rate in the slave node can not be programmed directly in software and the slave node must synchronize to the master node baud rate.

Workaround: There are 2 possible workarounds.

Workaround 1:

When the LIN time-out counter is configured in LIN Mode by clearing the MODE bit of the LIN Time-Out Control Status register (LINTCSR[MODE]= 0x0):

1. Set the LIN state Interrupt enable bit in the LIN Interrupt Enable register (LINIER[LSIE] = 0b1)
2. When the Data Reception Completed Flag is asserted in the LIN Status Register (LINSR[DRF] = 0b1) read the LIN State field (LINSR[LINS])
3. If LINSR[LINS]= 0b0101, read the Counter Value field of the LIN Time-Out Control Status register (LINTCSR[CNT]), otherwise repeat step 2
4. If LINTCSR[CNT] is greater than 0xA, discard the frame.

When the LIN Time-out counter is configured in Output Compare Mode by setting the LINTCSR[MODE] bit:

1. Set the LIN State Interrupt Enable bit in the LIN Interrupt Enable register (LINIER[LSIE])
2. When the Data Reception Completed flag bit is asserted in the LIN Status Register (LINSR[DRF] = 0b1), read the LINSR[LINS] field
3. If LINSR[LINS]= 0b0101, store LINTCSR[CNT] value in a variable (ValueA), otherwise repeat step 2
4. Clear LINSR[DRF] flag by writing LINSR[LINS] field with 0xF
5. Wait for LINSR[DRF] to become asserted again and read LINSR[LINS] field
6. If LINSR[LINS] = 0b0101, store LINTCSR[CNT] value in a variable (ValueB), else repeat step 4
7. If ValueB – ValueA is greater than 0xA, discard the frame

Workaround 2:

Do not use the auto synchronization feature (disable with LINCR1[LASE] = 0b0) in LIN slave mode.

ERR006349: LINFlexD: Possibility of incorrect break delimiter length in header by LIN master

Description: When the Local Interconnect Network module (LINFlexD) is used in LIN mode, the length of the break field delimiter can be configured to either 1 or 2 bits using the Two Bit Delimiter bit (TBDE) of the LIN Control Register 2 (LINCR2).

Once LINCR2[TBDE] has been set (selecting 2 bits length), it is no longer possible to clear it (selecting 1 bit length).

This may result in LIN master always transmitting the header with two bits of delimiter in the break field.

Workaround: To clear LINCR2[TBDE] field, a system reset has to be performed.

ERR003466: LINFlexD: Register bus aborts are not generated on illegal accesses to reserved addresses within the register address space of LINFlexD

Description: Register bus aborts are not generated on illegal accesses to reserved addresses within the register address space of LINFlexD. This is applicable to LINFlex modules supporting master-only mode.

Workaround: None

ERR008970: LINFlexD: Spurious bit error in extended frame mode may cause an incorrect Idle State

Description: The LINFlexD module may set a spurious Bit Error Flag (BEF) in the LIN Error Status Register (LINESR), when the LINFlexD module is configured as follows:

- Data Size greater than eight data bytes (extended frames) by configuring the Data Field Length (DFL) bitfield in the Buffer Identifier Register (BIDR) with a value greater than seven (eight data bytes)
- Bit error is able to reset the LIN state machine by setting Idle on Bit Error (IOBE) bit in the LIN Control Register 2 (LINCR2)

As consequence, the state machine may go to the Idle State when the LINFlexD module tries the transmission of the next eight bytes, after the first ones have been successfully transmitted and Data Buffer Empty Flag (DBEF) was set in the LIN Status Register (LINSR).

Workaround: Do not use the extended frame mode by configuring Data Field Length (DFL) bit-field with a value less than eight in the Buffer Identifier Register (BIDR) ($BIDR[DFL] < 8$)

ERR007589: LINFlexD: Spurious timeout error when switching from UART to LIN mode or when resetting LINTCSR[MODE] bit in LIN mode

Description: If the LINFlexD module is enabled in Universal Asynchronous Receiver/Transmitter (UART) mode and the value of the MODE bit of the LIN Timeout Control Status register (LINTCSR) is 0 (default value after reset), any activity on the transmit or receive pins will cause an unwanted change in the value of the 8-bit field Output Compare Value 2 (OC2) of the LIN Output Compare register (LINOOCR).

If the LINFlexD module is enabled in LIN mode and the value of the MODE bit of the LIN Timeout Control Status register (LINTCSR) is changed from '1' to '0', then the old value of the Output Compare Value 1 (OC1) and Output Compare Value 2 (OC2) of the LIN Output Compare register (LINOOCR) is retained.

As a consequence, if the module is reconfigured from UART to Local Interconnect Network (LIN) mode, or LINTCSR MODE bit is changed from '1' to '0', an incorrect timeout exception is generated when the LIN communication starts.

Workaround: If the LINFlexD module needs to be switched from UART mode to LIN mode, before writing UARTCR[UART] to 1, ensure that the LINTCSR[MODE] is first set to 1.

If the LINFlexD module is in LIN mode and LINTCSR[MODE] needs to be switched from 1 to 0 in between frames, the LINOOCR must be set to 0xFFFF by software.

ERR003219: MC_CGM: System clock may stop for case when target clock source stops during clock switching transition

Description: The clock switching is a two step process. The availability of the target clock is first verified. Then the system clock is switched to the new target clock source within two target clock cycles.

For the case when the FXOSC stops during the required two cycles, the switching process may not complete, causing the system clock to stop and prevent further clock switching. This may happen if one of the following cases occurs while the system clock source is switching to FXOSC:

- FXOSC oscillator failure
- SAFE mode request occurs, as this mode will immediately switch OFF the FXOSC (refer to ME_SAFE_MC register configuration)

Workaround: The device is able to recover through any reset event ('functional', 'destructive', internal or external), so typically either the SWT (internal watchdog) will generate a reset or, in case it is used in the application, the external watchdog will generate an external reset. In all cases the devices will restart properly after reset.

To reduce the probability that this issue occurs in the application, disable SAFE mode transitions when the device is executing a mode transition with the FXOSC as the system clock source in the target mode.

ERR003220: MC_CGM: system clock may stop in case target clock source dies during clock switching

Description: The clock switching is a two step process. The availability of the target clock is first verified. Then the system clock is switched to the new target clock source within two target clock cycles.

For the case when the FXOSC stops during the required two cycles, the switching process may not complete, causing the system clock to stop and prevent further clock switching. This may happen if one of the following cases occurs while the system clock source is switching to FXOSC:

- FXOSC oscillator failure
- SAFE mode request occurs, as this mode will immediately switch OFF the FXOSC (refer to ME_SAFE_MC register configuration)

Workaround: The device is able to recover through any destructive reset event, so typically either the SWT (internal watchdog) will generate a reset and the device will restart properly after reset.

To reduce the probability that this issue occurs in the application, it is recommended to disable SAFE mode transitions when the device is executing a mode transition with the FXOSC as the system clock source in the target mode.

ERR003247: MC_ME: A mode transition will not complete if the FlexCAN is disabled for target mode at MC_ME and is enabled at the FlexCAN peripheral

Description: If a FlexCAN module is enabled for the current mode at MC_ME using the ME_RUN_PCx/ME_PCTLx registers and also enabled at the FlexCAN Module Configuration Register, for the case when the target mode (run or low power) disables the FlexCAN module, this transition will only complete if the FlexCAN is disabled at the FlexCAN peripheral prior to the target mode transition.

Workaround: Before initiating the target mode change at the MC_ME the FlexCAN Module Configuration Register should be configured to set Freeze Enable, Halt and Module Disable (FLEXCAN_MCR) i.e. FLEXCAN_MCR[FRZ] = FLEXCAN_MCR[HALT] = FLEXCAN_MCR[MDIS] = 1.

ERR007394: MC_ME: Incorrect mode may be entered on low-power mode exit.

Description: For the case when the Mode Entry (MC_ME) module is transitioning from a run mode (RUN0/1/2/3) to a low power mode (HALT/STOP/STANDBY*) if a wake-up or interrupt is detected one clock cycle after the second write to the Mode Control (ME_MCTL) register, the MC_ME will exit to the mode previous to the run mode that initiated the low power mode transition.

Example correct operation DRUN->RUN1-> RUN3->STOP->RUN3

Example failing operation DRUN->RUN1-> RUN3->STOP->RUN1

*Note STANDBY mode is not available on all MPC56xx microcontrollers

Workaround: To ensure the application software returns to the run mode (RUN0/1/2/3) prior to the low power mode (HALT/STOP/STANDBY*) it is required that the RUNx mode prior to the low power mode is entered twice.

The following example code shows RUN3 mode entry prior to a low power mode transition.

```
ME.MCTL.R = 0x70005AF0; /* Enter RUN3 Mode & Key */
```

```
ME.MCTL.R = 0x7000A50F; /* Enter RUN3 Mode & Inverted Key */
```

```
while (ME.GS.B.S_MTRANS) {} /* Wait for RUN3 mode transition to complete */
```

```
ME.MCTL.R = 0x70005AF0; /* Enter RUN3 Mode & Key */
```

```
ME.MCTL.R = 0x7000A50F; /* Enter RUN3 Mode & Inverted Key */
```

```
while (ME.GS.B.S_MTRANS) {} /* Wait for RUN3 mode transition to complete */
```

ERR003190: MC_ME: Main VREG not disabled during STOP0 or HALT0 mode if RUN[0..3] mode selects FXOSC to be running and target mode selects FXOSC as system clock

Description: If STOP0 or HALT0 is configured with ME_[mode]MC.MVRON = '0', ME_[mode]MC.FIRCON = '0' and ME_[mode]_MC.SYSCLK = '0010/0011' the Main VREG will nevertheless remain enabled during the STOP0 mode if the previous RUN[0..3] mode is configured with ME_RUN[0..3]_MC.FXOSCON = '1'. This will result in increased current consumption of 500uA than expected.

Workaround: Before entering STOP0 or HALT0 mode with the following configuration – ME_[mode]MC.MVRON = '0', ME_[mode]MC.FIRCON = '0' and ME_[mode]_MC.SYSCLK = '0010/0011' - ensure the RUN[0..3] mode switches off FXOSC – ME_RUN[0..3]_MC.FXOSCON = '0' before attempting to low power mode transition.

ERR003570: MC_ME: Possibility of Machine Check on Low-Power Mode Exit

Description: When executing from the flash and entering a Low-Power Mode (LPM) where the flash is in low-power or power-down mode, 2-4 clock cycles exist at the beginning of the RUNx to LPM transition during which a wakeup or interrupt will generate a checkstop due to the flash not being available on RUNx mode re-entry. This will cause either a checkstop reset or machine check interrupt.

Workaround: If the application must avoid the reset, two workarounds are suggested:

- 1) Configure the application to handle the machine check interrupt in RAM dealing with the problem only if it occurs
- 2) Configure the MCU to avoid the machine check interrupt, executing the transition into low power modes in RAM

There is no absolute requirement to work around the possibility of a checkstop reset if the application can accept the reset, and associated delays, and continue. In this event, the WKPU.WISR will not indicate the channel that triggered the wakeup though the F_CHKSTOP flag will indicate that the reset has occurred. The F_CHKSTOP flag could still be caused by other error conditions so the startup strategy from this condition should be considered alongside any pre-existing strategy for recovering from an F_CHKSTOP condition.

ERR006976: MC_ME: SAFE mode not entered immediately on hardware-triggered SAFE mode request during STOP0 mode

Description: If a SAFE mode request is generated by the Reset Generation Module (MC_RGM) while the chip is in STOP0 mode, the chip does not immediately enter SAFE mode if STOP0 is configured as follows in the STOP0 Mode Configuration register (ME_STOP0_MC):

- the system clock is disabled (ME_STOP0_MC[SYSCLK] = 0b1111) - the internal RC oscillator is enabled (ME_STOP0_MC[IRCON] = 0b1)

In this case, the chip will remain in STOP0 mode until an interrupt request or wakeup event occurs, causing the chip to return to its previous RUNx mode, after which the still pending SAFE mode request will cause the chip to enter SAFE mode.

Workaround: There are two possibilities.

1. Configure the internal RC oscillator to be disabled during STOP0 mode (ME_STOP0_MC[IRCON] = 0b0) if the device supports it.
2. Prior to entering STOP0 mode, configure all hardware-triggered SAFE mode requests that need to cause an immediate transition from STOP0 to SAFE mode to be interrupt requests. This is done in the MC_RGM's 'Functional' Event Alternate Request register (RGM_FEAR).

ERR003574: MC_RGM: A non-monotonic ramp on the VDD_HV/BV supply can cause the RGM module to clear all flags in the DES register

Description: During power up, if there is non-monotonicity in power supply ramp with a voltage drop > 100 mV due to external factors, such as battery cranking or weak board regulators, the SoC may show a no flag condition (F_POR == LVD12 == LVD27 == 0).

Under these situations, it is recommended that customers use a workaround to detect a POR.

In all cases, initialization of the device will complete normally.

Workaround: The software workaround need only be applied when neither the F_POR, LVD27 nor LVD12 flag is set and involves checking SRAM contents and monitoring for ECC errors during this process. In all cases, an ECC error is assumed to signify a power-on reset (POR).

Three suggestions are made for software workarounds. In each case, if POR is detected all RAM should be initialized otherwise no power-on condition is detected and it is possible to initialize only needed parts of RAM while preserving required information.

Software workaround #1 :

An area of RAM can be reserved by the compiler into which a KEY, such as 0x3EC1_9678, is written. This area can be checked at boot and if the KEY is incorrect or an ECC error occurs, POR can be assumed and the KEY should be set. Use of a KEY increases detection rate to 31 bits ($\leq 10e-9$) or 23 bits ($\leq 5.10e-6$) instead of 7 bit linked to ECC ($\leq 10e-2$)

Software workaround #2 :

When runtime data should be retained and RAM only fully re-initialized in the case of POR, a checksum should be calculated on the runtime data area after each data write. In the event of a reset where no flags are set, the checksum should be read and compared with one calculated across the data area. If reading the checksum and the runtime data area succeeds without an ECC error, and the checksums match, it is assumed that no POR occurred. The checksum could be a CRC, a CMAC or any other suitable hash.

Software workaround #3 :

Perform a read of memory space that is expected to be retained across an LVD reset. If there are no ECC errors, it can be assumed that an LVD reset occurred rather than a POR.

ERR002958: MC_RGM: Clearing a flag at RGM_DES or RGM_FES register may be prevented by a reset

Description: Clearing a flag at RGM_DES and RGM_FES registers requires two clock cycles because of a synchronization mechanism. As a consequence if a reset occurs while clearing is on-going the reset may interrupt the clearing mechanism leaving the flag set.

Note that this failed clearing has no impact on further flag clearing requests.

Workaround: No workaround for all reset sources except SW reset.

Note that in case the application requests a SW reset immediately after clearing a flag in RGM_xES the same issue may occur. To avoid this effect the application must ensure that flag clearing has completed by reading the RGM_xES register before the SW reset is requested.

ERR003060: MC_RGM: SAFE mode exit may be possible even though condition causing the SAFE mode request has not been cleared

Description: A SAFE mode exit should not be possible as long as any condition that caused a SAFE mode entry is still active. However, if the corresponding status flag in the RGM_FES register has been cleared, the SAFE mode exit may incorrectly occur even though the actual condition is still active.

Workaround: Software must clear the SAFE mode request condition at the source before clearing the corresponding RGM_FES flag. This will ensure that the condition is no longer active when the RGM_FES flag is cleared and thus the SAFE mode exit can occur under the correct conditions.

ERR007953: ME: All peripherals that will be disabled in the target mode must have their interrupt flags cleared prior to target mode entry

Description: Before entering the target mode, software must ensure that all interrupt flags are cleared for those peripheral that are programmed to be disabled in the target mode. A pending interrupt from these peripherals at target mode entry will block the mode transition or possibly lead to unspecified behaviour.

Workaround: For those peripherals that are to be disabled in the target mode the user has 2 options:

1. Mask those peripheral interrupts and clear the peripheral interrupt flags prior to the target mode request.
2. Through the target mode request ensure that all those peripheral interrupts can be serviced by the core.

ERR003209: NMI pin configuration limitation in standby mode

Description: NMI pin cannot be configured to generate Non Maskable Interrupt event to the core (WKPU_NCR[NDSS] = "00") if the following standby mode is to be used:

- NMI pin enabled for wake-up event,
- standby exit sequence boot from RAM,
- code flash module power-down on standby exit sequence.

With following configuration following scenario may happen:

1. System is in standby
2. NMI event is triggered on PA[1]
3. System wakeup z0 core power domain.
4. z0 core reset is released and NMI event is sampled by core on first clock-edge.
5. z0 core attempt to fetch code at 0x10 address (IVPR is not yet initialized by application) and receive an exception since flash is not available
6. z0 core enter machine check and execution is stalled.

Workaround: If NMI is configured as wake-up source, WKPU_NCR[NDSS] must be configured as "11". This will ensure no NMI event is triggered on the core but ensure system wakeup is triggered.

After standby exit, core will boot and configure its IVOR/IVPR, it may then re-configure WKPU_NCR:DSS to the appropriate configuration for enabling NMI/CI/MCP.

ERR003242: PB[10],PD[0:1] pins configuration during standby

Description: PB[10], PD[0:1] are the pins having both wake-up functionality and analog functionality.

As for all wake-up pins, it must be driven either high level or low level (possibly using the internal pull-up) during standby.

In case the pin is connected to external component providing analog signal, it is important to check that this external analog signal is either lower than $0.2 \cdot VDD_HV$ or higher than $0.8 \cdot VDD_HV$ not to incur extra consumption.

Workaround: None

ERR003200: PIT events cannot be used to trigger ADC conversion incase BCTU runs on divided system clock

Description: If BCTU operates on divided system clock (i.e MC_CGM.CGM_SC_DC2.DIV0 NOT EQUAL 0x0), events from PIT timer cannot be used to trigger ADC conversion. In this case BCTU fails to latch the channel number to be converted. So BCTU will send the conversion request to ADC but the channel number will be corresponding to previous non-PIT conversion request or 0th channel in case no previous non-PIT event has occurred

Workaround: Always write MC_CGM.CGM_SC_DC2.DIV0 to 0x0 to run BCTU at system frequency.

ERR007688: RTC: An API interrupt may be triggered prematurely after programming the API timeout value

Description: When the API is enabled (RTCC[APIEN]), the API interrupt flag is enabled (RTCC[APIIE]) and the API timeout value (RTCC[APIVAL]) is programmed the next API interrupt may be triggered before the programmed API timeout value. Successive API Interrupts will be triggered at the correct time interval.

Workaround: The user must not use the first API interrupt for critical timing tasks.

ERR009764: SARADC : DMA interface limitation depending on PBRIDGE/SARADC clock ratio

Description: The Successive Approximation Register Analog-to-Digital Converter (SARADC) modules can trigger a Direct Memory Access (DMA) request through the DMA Enable (DMAE) register interface.

When the SARADC clock (SAR_CLK) frequency is slower than half of the peripheral bridge (PBRIDGE_{Ex}_CLK) clock frequency, the SARADC may trigger a spurious transfer request to the DMA module after the completion of a first valid transfer.

Workaround: Setting the DMA clear sequence enable (DCLR) bit in the DMAE register (DMAE[DCLR] = 1) forces the clearing of the DMA request on read access to the data register and therefore prevents the spurious DMA transfer request.

In case the Internal Channel Data Registers (ICDR_n) are only accessed through DMA module (i.e. there are no bus accesses to ICDR_n registers triggered by other than DMA bus master when the DMAE[DMAEN] bit is set), it is possible to configure DMAE[DCLR] bit to '1'. This will clear DMA transfer request on the first DMA read access, ensuring both that DMA triggered transfer will complete successfully and that no other spurious DMA request will be triggered.

This work-around can be applied when any of below condition can be met:

- frequency ratio PBRIDGE_{Ex}_CLK/SAR_CLK <= 8/3
- PBRIDGE_{Ex}_CLK is 40MHz and SAR_CLK >= 14MHz

ERR004146: SARADC: Interrupted conversions are aborted, but may not be properly restored

Description: When a triggered conversion interrupts an in process conversion in the Successive Approximation Analog to Digital Converter (SARADC), it is possible that the aborted conversion does not get restored to the SARADC and is not converted during the chain. Vulnerable configurations are:

- Injected chain over a normal chain
- Cross Triggering Unit (CTU) trigger over a normal chain
- CTU trigger over an injected chain

When any of these triggers arrive while the SARADC is in the conversion stage of the sample and conversion, the sample is discarded and is not restored. This means that the channel data register (SARADC_xCDRn) will not show the channel as being valid and the register SARADC_xCIPRn field CEOCFRx will not indicate a pending conversion. The sample that was aborted is lost.

If the injection occurs when the finite state machine switches from the sample phase, it is possible that on resuming normal chain, the chain is restored from an incorrect channel. This may lead to a second conversion on one of the channels in the chain.

When the trigger arrives during the final (last) channel conversion in a normal or injected chain, the same failure mode can cause two ECH (End of chain) interrupts to be raised in the interrupt register (SARADC_ISR).

If the trigger arrives during the sampling phase of the last channel in the chain, an ECH is triggered immediately, the trigger is processed and the channel is restored and after sampling/conversion, a second ECH interrupt occurs.

In scan mode, the second ECH does not occur if the trigger arrives during the conversion phase. In one-shot mode, a trigger arriving during the conversion phase of the last channel restarts the whole conversion chain and the next ECH occurs at completion of that chain.

Workaround: The application should check for valid data using the Channel Data Register, Internal Channel Data Register or Test Channel Data Register (CDR) status bits or the CEOCFRx registers to ensure all expected channels have converted. This can be tested by running a bitwise AND and an XOR with either the Channel Conversion Mask Register (JCMRx) or the Channel Conversion Mask Register (NCMRx and the CEOCFRx registers during the JECH handler. Any non-zero value for $(xCMRx \& (xCMRx \oplus CEOCFRx)) / (SARADC_ICxCMRn \& (SARADC_ICxCMRn \oplus SARADC_IPICRn.EOC_CHx))$ indicates that a channel has been missed and conversion should be requested again.

Spurious ECH interrupts can be detected by checking the NSTART/JSTART flags in the SARADC_MSR Module Status Registers – if the flag remains set during an ECH interrupt then another interrupt will follow after the restored channel or chain has been sampled and converted.

The spurious ECH workaround above applies to single-shot conversions. In single-shot mode, NSTART changes from 1 to 0. Therefore, the user can rely on checking the NSTART bit to confirm if a spurious ECH has occurred. However, for scan mode, the NSTART bit will remain set during normal operation, so it cannot be relied upon to check for the spurious ECH issue. Consequently, if the CTU is being used in trigger mode, the conversions must be single-shot and not scan mode.

ERR009682: SPI: Inconsistent loading of shift register data into the receive FIFO following an overflow event

Description: In the Serial Peripheral Interface (SPI) module, when both the receive FIFO and shift register are full (Receive FIFO Overflow Flag bit in Status Register is set (SR [RFOF] = 0b1)) and then the Clear Rx FIFO bit in Module Configuration Register (MCR [CLR_RXF]) is asserted to clear the receive FIFO, shift register data is loaded into the receive FIFO after the clear operation completes.

Workaround: 1. Avoid a receive FIFO overflow condition (SR[RFOF] should never be 0b1). To do this, monitor the RX FIFO Counter field of the Status Register (SR[RXCTR]) which indicates the number of entries in receive FIFO and clear before the counter equals the FIFO depth.

2. Alternatively, after every receive FIFO clear operation (MCR[CLR_RXF] = 0b1) following a receive FIFO overflow (SR[RFOF] = 0b1) scenario, perform a single read from receive FIFO and discard the read data.

ERR004405: SR bit of LINFLEXD GCR register is not cleared automatically by hardware

Description: After setting the SR bit of GCR (Global Control Register) to reset the LinFlexD controller, this bit is not cleared automatically by the hardware, keeping the peripheral in reset state

Workaround: This bit should be cleared by software to perform further operations

ERR003288: Wakeup line functionality on PB[8], PB[9] not available in STANDBY

Description: Wakeup line functionality is not available on ports PB[8], PB[9] during STANDBY mode. These pads are not supplied with ultra low power regulator, but are driven from main regulator which is switched off in STANDBY mode.

Workaround: None

ERR004136: XOSC and IRCOSC: Bus access errors are generated in only half of non-implemented address space of XOSC and IRCOSC, and the other half of address space is mirrored

Description: Bus access errors are generated in only half of the non-implemented address space of Oscillator External Interface (40MHz XOSC) and IRCOSC Digital Interface (16MHz Internal RC oscillator [IRC]). In both cases, the other half of the address space is a mirrored version of the 1st half. Thus reads/writes to the 2nd half of address space will actually read/write the registers of corresponding offset in the 1st half of address space.

Workaround: Do not access unimplemented address space for XOSC and IRCOSC register areas OR write software that is not dependent on receiving an error when access to unimplemented XOSC and IRCOSC space occurs.

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