FREESCALE SEMICONDUCTOR, MICROCONTROLLER DIVISION
CUSTOMER ERRATA AND INFORMATION SHEET
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MPC561.C

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AR_846 READI: Synchronize the MCKI input clock to the MCKO output clock.
AR_698 READI Input message requires 2 MCKI idle after READI Enabled.
AR_1021 READI: Manufacturer ID in Device ID register is incorrect
AR_1059 READI: 8-bit and some 16-bit data trace messages can't be differentiated
AR_1065 READI: Queue entries to change from 16 to 32 on future revisions
AR_1066 READI: Program trace requires all change of flow show cycles
AR_783 READI input messages must be 4 MCKI apart.
AR_1144 TouCAN: Transmit buffers may freeze or indicate missing frame
AR_1045 CAN: Bus Off recovery not ISO compliant
AR_1142 TouCAN: Writing to an active receive MB may corrupt MB contents
AR_627 TPU: (Microcode) Add neg_mrl with write_mer and end_of_phase
AR_985 USIU: Do not use ORx[EHTR] with Dual Mapping
AR_909 USIU: Do not assert cr_b to abort pending store reservation access
AR_910 USIU: PITRTC Clock may not work when SCCR[RTDIV] is 0
AR_984 USIU: Setting of SCCR[EBDF] may slow execution of code
AR_1134 USIU: RTC, DEC, TB and PIT counters may not count after PORESET or HRESET
AR_1158 USIU: Stop Time Base to write new value
AR_287 USIU: System to Time Base frequency ratio must be greater than 4
AR_479 USIU: The MEMC does not support external master burst cycles
AR_1135 USIU: Disable USIU burst in debug mode if READI R/W feature is used
AR_1152 USIU: PORESET must always be asserted before the 2.6V supplies reach 0.5V
AR_867 USIU: Do not operate USIU burst on a burst-inhibited memory region
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AR_895 USIU: Do not assert TEA pin on fetch while SIUMCR[BURST_EN] bit set.
AR_965 USIU: Program All Chip Selects with the same Burst Length
AR_1153 USIU: Sleep and Deep-Sleep modes require power to all 2.6V supplies
AR_389 Little Endian modes are not supported
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DETAILED ERRATA DESCRIPTIONS

CDR_AR_1082 Customer Erratum MPC561.C

TPU ROM: Channels with the COMM ROM function affect other channels

DESCRIPTION:
The TPU COMM ROM Function causes problems in other channels. When the Host Service request is set to 0b11, all channels that do not use the COMM function will be forced to outputs and a random state will be selected.

WORKAROUND:
Either: 1) Re-initialize all other channels after the COMM function has been initialized; or 2) If a fixed COMM TPU function is required, download an updated TPU ROM image into the DPTRAM and use the TPU in emulation mode.

CDR_AR_916 Customer Information MPC561.C

Shunt Regulator: VDDSRAM pin renamed IRAMSTBY

DESCRIPTION:
The VDDSRAM pin has been renamed IRAMSTBY to clarify that it requires a current source and should not be connected directly to a power supply.

WORKAROUND:
Consult the MPC561/MPC563 Reference Manual dated after May 2003. Rename the VDDSRAM pin to IRAMSTBY.

CDR_AR_954 Customer Information MPC561.C

Shunt Regulator: Max average current into IRAMSTBY (VDDSRAM) must be < 1.75 mA

DESCRIPTION:
Changes have been made to MPC563.A and MPC561.C to increase the maximum average IRAMSTBY current to 1.75 mA.

WORKAROUND:
Size the resistor between the supply and the IRAMSTBY pin (was VDDSRAM) to limit the maximum average current to 1.75 mA into the pin. Refer to manual dated on or after May 2003.

CDR_AR_970 Customer Information MPC561.C

MASKNUM field in the USIU is 0x20

DESCRIPTION:
The MASKNUM field of the IMMR register has been changed to 0x20 and may change for future revisions.

WORKAROUND:
Modify software to expect a new value (0x20) for the MASKNUM field of the IMMR.

CDR_AR_978 Customer Information MPC561.C

USIU: Don’t Enable Internal Non-Existent Flash

DESCRIPTION:
If the internal flash memory region is enabled (by setting IMMR[FLEN] = 1) on the MPC561, access to that region will result in an exception causing failure of the application code.

WORKAROUND:
Never set the FLEN bit in the IMMR or in the external Reset Configuration Word for the MPC561. Refer to manual dated on or after May 2003.

CDR_AR_1033 Customer Information MPC561.C

REV field in the READI is 0x2

DESCRIPTION:
The REV field of the READI Device Identification (DID) register has been changed to 0x2 and may change for future revisions.

WORKAROUND:
Modify software to expect a new value (0x2) for the REV field of the READI DID.

CDR_AR_1034 Customer Information MPC561.C

Shunt Regulator: ZOREG may be set if minimum current is less than 150uA

DESCRIPTION:
Memories supplied by the IRAMSTBY pin only require a minimum of 50uA to guarantee data retention, but the VSRMCR[ZOREG] may get set inadvertently at currents less than 150uA. When designing a system where the minimum current on the IDDSRAM pin can fall below 150uA, the VSRMCR[ZOREG] bit might be set.

WORKAROUND:
Either insure that IRAMSTBY is supplied with at least 150uA when designing the system, or software should expect that the VSRMCR[ZOREG] bit might be set and take the neccessary precautions that the memory contents may or may not be corrupted. Refer to manual dated on or after May 2003.

CDR_AR_1094 Customer Information MPC561.C

MPC561: Marking is MPC561MZP40, MPC561MZP56, MPC561CZP40, or MPC561CZP56

DESCRIPTION:
On devices that no longer show the mask set in the part marking, the part number marked on this revision is MPC561MZP40 (40 MHz) or MPC561MZP56 (56 MHZ) for full automotive temperature grade parts (-40 to +125C) and MPC561CZP40 (40 MHz) or MPC561CZP56 (56 MHz) for commercial grade temperature range (-40 to +85C).

WORKAROUND:
Expect new marking on these devices.

CDR_AR_1140 Customer Information MPC561.C

USIU: BR0 Fields are not cleared by any Reset

DESCRIPTION:
The Reset state of Chip Select Base Register 0 (BR0) in the September 2003 (09/2003) MPC561/563 Reference Manual is incorrect. The Base Address (BA) and Address Type (AT) fields are undefined after PORESET and are unchanged by HRESET.

WORKAROUND:
BR0 should always be written to a known state prior to writing the Option Register 0 that clears the Global Chip Select mode.

CDR_AR_904 Customer Erratum BBC2.CDR3UBUS_07_0

BBC2: Branch targets must be 4 sequential instructions before MTSPR BBC SPR.

DESCRIPTION:
A user application may crash when a BBC SPR is written in a program loop, if the MTSPR is within 4 instructions of a branch target.

WORKAROUND:
1) Make sure that a "mtspr" instruction writing to any BBC SPR register is preceded by four instructions that are not the target of any branch and followed by "isync" instruction, or 2) Disable BTB. Refer to manual dated on or after May 2003.

CDR_AR_983 Customer Erratum BBC2.CDR3UBUS_07_0

BBC2: Disable instruction show cycles while BTB is in use

DESCRIPTION:
If the BBCMCR[BTEE] is set and instruction show cycles are enabled (ICTRL[ISCT_SER] not equal to 0x7), the RCPU may execute incorrect code.

WORKAROUND:
Disable show cycles (set ICTRL[ISCT_SER] to 0bX11) while the BBCMCR[BTEE] is set, or disable the BTB while instruction show cycles are enabled. Note this workaround is also required for AR_1078.

CDR_AR_1078 Customer Erratum BBC2.CDR3UBUS_07_0

BBC2: Do not enable BTB and Instruction Show Cycles at the same time

DESCRIPTION:
If the BTB is enabled together with instruction show cycles (ICTRL[ISCT_SER] not equal to 0x7), the RCPU may execute incorrect instructions.

WORKAROUND:
Do not enable instruction show cycles when the BTB is enabled; or disable the BTB if instruction show cycles are required.

CDR_AR_870 Customer Erratum BBC2.CDR3UBUS_07_0

BBC2: Do not use debug mode with BTB enabled, if code has 0x2F30 branch target.

DESCRIPTION:
The BTB (Branch Target Buffer) incorrectly matches in debug mode if there was a change of flow address of 0x2F30 and code from the address resides in the valid BTB buffer when the part enters debug mode. The address 0x2F30 is the debug port instruction register (SPR) address that the core issues to the BBC in debug mode for instruction fetches. The debug tool may lose communication with the part since the debug port will not assert the "ready" status (DSDO pin "low") until reset.

WORKAROUND:
Do not use debug mode on applications running with the BTB enabled if there is a branch with a target address of 0x2F30. Alternatively, either do not enable the BTB in debug mode or do not put any code at 0x2F30.

CDR_AR_1079 Customer Erratum **BBC2.CDR3UBUS_07_0**

BBC2: Flush the BTB if instructions in a region are changed during execution

DESCRIPTION:
If an IMPU region register has the BTB inhibit bit set (MI_RAx[BTBINH] = 1), the BTB inhibit function does not work for the first branch pointing into the region. These instructions will be stored in a vacant BTB table entry. Any following branches in the same region will NOT be stored in the BTB. This is the correct operation. In addition, the instructions following a branch out of the region will not be stored in the BTB table. This issue will only cause problems if there is a possibility that the instructions at a cached address are changed after they have been executed once.

WORKAROUND:
1) Disable the BTB if the caching from a memory region is undesirable; or 2) Flush the BTB by disabling and then re-enabling the BBCMCR[BTEE] any time the contents of a memory changes, prior to executing from that memory.

CDR_AR_1121 Customer Erratum **BBC2.CDR3UBUS_07_0**

BBC2: Do not run software from the DECRAM that modifies the DECRAM contents

DESCRIPTION:
When executing code from the DECRAM, a store instruction with destination address in the DECRAM may result in an overwrite of that code area.

WORKAROUND:
Do not perform data writes to the DECRAM while also executing code from DECRAM. The DECRAM should only be loaded while executing from a different memory.

CDR_AR_793 Customer Information **BBC2.CDR3UBUS_07_0**

BBC2 Compression: No Compressed Code in Addresses $FFF00000 to $FFFFFFFF

DESCRIPTION:
IMPU translates addresses in compression mode regardless of address form. Note that this may have a minor application impact. It will cause a failure ONLY if the compressed address space covers $FFF00000 to $FFFFFFFF and the BBCMCR[ETRE] and BBCMCR[EIR] are set, enabling Exception Table Relocation and Enhanced External Interrupt Relocation.

WORKAROUND:
Do not put compressed code at addresses $FFF00000 to $FFFFFFFF if Exception Table Relocation or Enhanced External Interrupt Relocation are enabled by BBCMCR[ETRE] and BBCMCR[EIR]. Refer to manual dated on or after May 2003.

CDR_AR_1073 **Customer Erratum** **CALBIU32K.CDR3LBUS_02_0**

CALRAM: Aborted overlay accesses could halt processor

DESCRIPTION:
If using the overlay feature of the CALRAM, aborted accesses could lock up the microcontroller if the second of two consecutive overlayed back-to-back data reads is aborted due to an exception and the exception writes to the same CALRAM module that is used for the overlay.

WORKAROUND:
Avoid consecutive overlayed CALRAM accesses in applications with interrupts or other exceptions. Specifically, avoid accessing the same CALRAM module (such as save registers to the stack) within an exception routine that is being used for flash overlay until a bus transaction is performed to a different data area (another CALRAM module, an IMB or USIU register or an SPR in the L2U or BBC). The easiest and least impact workaround is to perform a dummy write to any unused register through the L-bus in all exception handlers prior to any CALRAM access. Any SPR outside the RCPU could be used. An example is to use a write of any register to a L2U Region Attribute Register (mtspr 827, r0; L2U_RA3) that is disabled in the L2U Global region Attribute register (L2U_GRA[EN3]=0).

CDR_AR_1143 **Customer Information** **L2U.CDR3LBUSUBUS_03_0**

L2U: Care required when changing a slave MCU’s mode in multi-master systems

DESCRIPTION:
If an external master changes the mode of a slave MCU from slave to peripheral mode by setting EMCR[PRPM], and then accesses addresses on the slave MCU’s LBUS at the same time as the slave MCU’s RCPU accesses addresses over the UBUS for data, a deadlock may occur. The slave MCU may lock up until reset assertion.

WORKAROUND:
Ensure the slave MCU’s RCPU does not perform data accesses over the UBUS when an external master changes the slaves MCU mode from slave to peripheral mode, and then accesses the slave MCU’s LBUS (i .e. CALRAM). Use interrupts or other notification mechanisms to prevent the slave MCU’s RCPU from writing/reading data over UBUS.If the slave MCU changes its own mode, ensure any subsequent load/store instruction over the UBUS is at least 6 instructions after the write to EMCR[PRPM], or that they are separated by an ISYNC instruction.

CDR_AR_929 Customer Erratum MIOS14.CDR3IMB3_03_0A

MIOS: Problem with DASM Duty Cycle Change to 0%

DESCRIPTION:
If the MIOS DASM is used for a OPWM function, a problem occurs if the duty cycle is changed to 0%. The module finishes the current cycle and then it generates one period with 100% duty cycle before it switches to 0% duty cycle.

WORKAROUND:
There are three cases required for the workaround (case 3 has two different solutions): 1.) When changing from a duty cycle >0% to a different duty cycle >0%, change the dataB register to the new value. 2.) When changing from a duty cycle >0% to a duty cycle of 0%, change the dataA register to equal the value currently in the dataB register. 3a.) When changing from a duty cycle of 0% to a duty cycle >0%, change the dataA register and dataB register by doing a 32-bit write that writes both registers to new values. OR 3b.) When changing from a duty cycle of 0% to a duty cycle >0%, write the dataA register to a value that will never match, then write the dataB register to its new value, then write the dataA register to its new value. An alternative implementation of 0% or 100% duty cycle can be achieved using the FORCE bits. For 0% duty cycle (100% if EDPOL=1), stop the associated MMCSM counter by writing 00 to the MMCSMSCR CLS bits, then write the MDASM FORCB bit to 1. For 100% duty cycle (0% if EDPOL=1), stop the associated MMCSM counter by writing 00 to the MMCSMSCR CLS bits, the write the MDASM FORCA bit to 1.

CDR_AR_1127 Customer Information MIOS14.CDR3IMB3_03_0A

MIOS: MDASMSCR polarity bit has no effect when open-drain mode selected

DESCRIPTION:
MDASMSCR[EDPOL] does not change the polarity of the MDA pin when MDASMSCR[WOR] = 1. This only applies to the MDASM output modes (OCB, OCAB and OPWM).

WORKAROUND:
Do not rely on MDASMSCR[EDPOL] to change the output polarity when open-drain mode is selected for an MDASM pin in output mode. Refer to the latest version of the Reference Manual (dated August 2003 or later).

CDR_AR_1015 Customer Erratum PADRING.561_CDR3_03_0

PADRING_561 Use ESD control measures when handling VDDSYN pin.

DESCRIPTION:
VDDSYN supply passes ESD stressing at 250V MM. VDDSYN fails IDD testing after 2500V HBM stressing. VDDSYN passes after 500V HBM.

WORKAROUND:
Use ESD control measures when handling the VDDSYN pin.

CDR_AR_1058 Customer Erratum PADRING.561_CDR3_03_0

PADRING_561: No pull-down on SGPIOC[6]/FRZ/PTR

DESCRIPTION:
SGPIOC[6]/FRZ/PTR does not have a pull down as specified in the signal description of the Reference Manual.

WORKAROUND:
The pin should be pulled to the desired value when not in use.

CDR_AR_1080 Customer Erratum PADRING.561_CDR3_03_0

PADRING_561: TS_B hold time may not be met in multi-processor systems

DESCRIPTION:
In a multi-processor application, the slave TS_B hold time may be violated by the master MCU. Before being sampled, TS_B may change depending on loads and board layout.

WORKAROUND:
For multi-processor systems, migrate to the MPC561 rev D which has decreased hold time requirement on TS_B.

CDR_AR_964 Customer Information PADRING.561_CDR3_03_0

MPC561: MPIO32B[11] and MPIO32B[12] Follow PULL_SEL, not PU5 at Reset

DESCRIPTION:
When the MPIO function is selected on MPIO32B[11]/C_CNRX0 and MPIO32B[12]/C_CNTX0, the pull polarity will follow the state of the PULL_SEL pin.

WORKAROUND:
1) Set the PULL_SEL pin to reflect desired pull value on MPIO32B[11]/C_CNRX0 and MPIO32B[12]/C_CNTX0. Or 2) Place desired external pull device on these pins.

CDR_AR_1074 Customer Information PADRING.561_CDR3_03_0

PADRING_561: Oscillator may overdrive some 20Mhz cyrstals

DESCRIPTION:
The oscillator output may overdrive some low-power 20Mhz crystals, and over the lifetime of the crystal this may cause degredation

WORKAROUND:
Design the crystal circuit to withstand the oscillator output.

CDR_AR_1128 Customer Information PADRING.561_CDR3_03_0

PADS: Pull device is always enabled on BR, BB, DSDI, DSCK, TMS, JCOMP and TEXP

DESCRIPTION:
If PDMCR[SPRDS] is set by software after reset negates, the weak internal pull device on the following pads remains enabled: VF1/IWP2/BR, VF2/IWP3/BB, TDI/DSDI/MDI0, TCK/DSCK/MCKI, TMS/EVTI, JCOMP/RSTI and RSTCONF/TEXP. This has no impact on applications designed according to the specification.

WORKAROUND:
There is no workaround required for applications designed according to the specification. If PDMCR[SPRDS] is set, and the pin is set to input mode, the existing external pull device or driver will overdrive the weak internal pull device (maximum = 130uA) on the following pads: VF1/IWP2/BR, VF2/IWP3/BB, TDI/DSDI/MDI0, TCK/DSCK/MCKI, TMS/EVTI, JCOMP/RSTI and RSTCONF/TEXP.

CDR_AR_922 Customer Information PADRING.561_CDR3_03_0

PADS: VOH2.6 Spec changed to -1 mA

DESCRIPTION:
The IOH specification for all 2.6 volt outputs has been changed from -2 mA to -1 mA to insure a VOH2.6 of 2.3 volts. An additional specification has been added for VOH2.6A for a -2.0 mA load with a minimum VOH of 2.1 volts.

WORKAROUND:
2.6 volt outputs will only drive -1.0 mA with a VOH of 2.3 volts and will drive -2.0 mA with an output voltage of 2.1 volts minimum. Refer to manual dated after June 2001.

CDR_AR_932 Customer Information PADRING.561_CDR3_03_0

PADS: Leakage higher when 2.6V pads are pulled above 2.6V supply during reset

DESCRIPTION:
2.6V and 2.6V/5V pads will leak up to 10uA during reset. The leakage will occur to the QVDDL supply from each 2.6V pad which has a voltage greater than QVDDL. This additional leakage does not occur on 5V only pads.

WORKAROUND:
Cumulative input leakage of all pins pulled above the 2.6V supply must be utilized by loads on the 2.6V supply during low power modes while reset is applied. Refer to manual dated on or after May 2003.

CDR_AR_940 Customer Information PADRING.561_CDR3_03_0

JTAG: Do Not Switch All Pads Simultaneously When JTAG Enabled

DESCRIPTION:
JTAG mode puts all output pins in fast slew rate mode. The power supply pins of the device cannot supply enough current to allow all pins to be changed at the same time in fast slew rate mode. During normal operation, this is not an issue since all pins on the device do not switch at the same time.

WORKAROUND:
When using JTAG, all pins should not be switched simultaneously. Refer to manual dated on or after May 2003.

CDR_AR_966 Customer Information PADRING.561_CDR3_03_0

USIU: MODCK[1] Reset State is Pull Up to 2.6v

DESCRIPTION:
The 29 June 2001 MPC561/MPC563 Reference Manual lists the default reset value of the MODCK[1] as Pull Down until reset negates. It is actually Pull Up to 2.6 volts until reset negates.

WORKAROUND:
Put an external pull down resistor on MODCK[1] if a 0 value is needed at reset to configure the default clock mode. The Reference Manual will be updated, see manual dated after November 2002.

CDR_AR_1018 Customer Information PADRING.561_CDR3_03_0

Execute memory write prior to slave read for slave predischarge

DESCRIPTION:
When using multiple processors on a common bus with an external device that outputs voltages exceeding 3.1v, the predischarge cycle will not occur if the processor that initiated the read is different than the processor that initiated the write.

WORKAROUND:
Perform a write access to external memory to discharge the external bus, or read a value of 0x0 from the external device prior to accessing another MPC56x device on the same bus. Refer to manual dated on or after May 2003.

CDR_AR_837 Customer Information PPM.CDR3_IMB3_02_0

PPM: Shorting TPU3 channels via PPM will not drive the data on the input pin.

DESCRIPTION:
If TPU3B ch[0] direction is set to output and TPU3A ch[0] direction is set to input, then TPU3A channel will get the data from TPU3B ch[0], the TPU3B ch[0] pad will show the data, but TPU3A ch[0] pad will not. The TPU3A will capture the data of TPU3B ch[0], however, this data will not show on TPU3A ch[0] pad. Same will apply for TPU3A/B ch[1], and when TPU3B is an output.

WORKAROUND:
Connect the external device to the pin of the module that has the output function. Refer to manual dated on or after May 2003.

CDR_AR_1019 **Customer Erratum** **RCPU.CDR3LBUSIBUS_16_1A**

RCPU: Don’t execute overflow type before update type MUL/DIV instruction

DESCRIPTION:
When an integer overflow type non multiply or divide instruction (designated by an ’o’ in the instruction mneumonic, such as addo) starts to execute before a previously started Condition Register 0 (CR0) update type integer multiply or divide instruction (designated by a ’.’ in the instruction mneumonic, such as divw.) completes, the CR0[SO] bit may be wrongly updated from the XER[SO] bit earlier changed by the overflow type instruction. For example, instruction sequence "divw. Rx,Ry,Rz , subfo Rt,Ru,Rv" may cause this problem. It does not happen if the overflow type instruction is also a CR0 update type instruction (designated by ’o.’ in the instruction mneumonic, such as addo.), or if register dependencies exist.

WORKAROUND:
Do any one of the following: 1) Keep a gap of at least 1 instruction between a CR0 update type integer multiply instruction and an overflow type instruction or a gap of 4 integer or 6 other instructions between a CR0 update integer divide instruction and an overflow type instruction; 2) Use the CR0 update type for both instructions; 3) Run the RCPU in serialized mode; 4) Place a "sync" instruction between the integer multiply/divide instruction and the overflow type instruction; 5) Don’t use the update form of integer multiply or divide instructions; or 6) Don’t use overflow type integer instructions. (Note: most compiler vendors do not generate the error case.)

CDR_AR_1077 **Customer Erratum** **RCPU.CDR3LBUSIBUS_16_1A**

RCPU: Do not run multi-master compressed application with Show Cycles and BTB

DESCRIPTION:
If instruction show cycles (ICTRL[ISCT_SER] not equal to 0x7) and BTB are enabled in a compressed application with interrupts and another master (READI or External Bus master) initiates internal accesses on UBUS, the RCPU may execute incorrect instructions.

WORKAROUND:
Do not enable instruction show cycles together with BTB while running compressed application with interrupts if a UBUS master (READI or External Master) other than the RCPU or the L2U operated by the RCPU, accesses MCU internal resources through the UBUS.

CDR_AR_1138 Customer Erratum RCPU.CDR3LBUSIBUS_16_1A

RCPU: Data breakpoint exception may occur even if conditions are not met

DESCRIPTION:
The RCPU may incorrectly take a second data breakpoint exception, if a data breakpoint occurs on a load/store instruction with a load following within five instructions in the RCPU program flow. This extra exception will only be taken if very specific internal bus timing occurs during the instruction sequence and the data breakpoint state remains set after the first data breakpoint exception is taken. In this condition, any load/store instruction executed with breakpoints enabled will cause the second data breakpoont exception.The additional exception sets SRR0 to the effective address of the instruction after the second load/store instruction, but the BAR register remains set to the effective address of the first load/store instruction that met the data breakpoint conditions.If the processor is in a non-recoverable state (MSR[RI] = 0) and breakpoints are not masked (LCTRL2[BRKNOMASK] = 1), the first load/store instruction within the data breakpoint exception handler (usually saving CPU context) will cause the second exception, handler re-entrance and loss of program tracking.

WORKAROUND:
1) Run RCPU in serialized mode. 2) Create conditions for an exception during the data breakpoint exception handler execution after saving SRR0/1 on the stack, for example, use ’SC’ instruction inside the handler, or a floating point instruction if the Floating Point Unit is disabled, or an unimplemented instruction. This exception will reset the internal data breakpoint state, eliminating the false data breakpoint exception.

CDR_AR_1076 Customer Erratum RCPU.CDR3LBUSIBUS_16_1A

RCPU: Treat VF queue flush information value of 6 as 2

DESCRIPTION:
When the RCPU fetches instructions from zero wait state slaves on UBUS (Internal flash or SIU when in enhanced burst mode), the VF queue flush information may have the reserved value of 6.

WORKAROUND:
If a VF instruction queue flush value of 6 is shown on the VF pins, tools should treat this value as 2 for program tracking purposes.

CDR_AR_907 Customer Information RCPU.CDR3LBUSIBUS_16_1A

RCPU: Issue ISYNC command when entering debug mode

DESCRIPTION:
If the ICTRL[29] bit is set (non-serialized mode) then the RCPU issues two instruction fetch requests into the instruction pipeline after entering debug mode. The debug port and the debug tool may get confused when processing an "mtspr DPDR,Rx" instruction. The debug tool loses synchronization with debug port and receives the wrong data for the "Rx" register. The typical case is when the debug tool tries to save scratch registers or read the debug mode cause.

WORKAROUND:
Issue an ISYNC instruction to the debug port prior to any other instructions when the RCPU enters debug mode after running code. Refer to manual dated on or after May 2003.

CDR_AR_440 Customer Information RCPU.CDR3LBUSIBUS_16_1A

RCPU: Execute any IMUL/DIV instruction prior to entering low power modes.

DESCRIPTION:
There is a possibility of higher than desired currents during low power modes. This is caused by a possible contention in the IMUL/DIV control area. This contention may only exist prior to the execution of any IMUL/DIV instruction.

WORKAROUND:
Execute a MULLW instruction prior to entering into any low power mode (anytime after reset, and prior to entering the low power mode). Refer to manual dated on or after May 2003.

CDR_AR_211 Customer Information RCPU.CDR3LBUSIBUS_16_1A

Do not set breakpoint on mtspr ICTRL instruction

DESCRIPTION:
When a breakpoint is set on an "mtspr ICTRL,Rx" instruction and ICTRL[IIFM] = 1, the result will be unpredictable. The breakpoint may or may not be taken on the instruction and value of the IIFM bit can be either 0 or 1.

WORKAROUND:
Do not put a break point on mtspr ICTRL, Rx instruction when ICTRL[IIFM] is set to 1. Refer to manual dated on or after May 2003.

CDR_AR_214 Customer Information RCPU.CDR3LBUSIBUS_16_1A

Only negate interrupts while the MSR[EE] disables interrupts (MSR[EE]=0)

DESCRIPTION:
If the MSR[EE] bit is set and an external interrupt request to the RCPU is negated before the external interrupt vector is issued, the RCPU may become unpredictable until the device is reset. This interrupt event may be generated by software while managing peripheral modules in the MCU, or external devices connected to external interrupt request pins of the MCU or the MCU interrupt controller. This issue may occur when performing USIU operations like masking interrupt requests, clearing interrupt flags, masking or changing interrupt logic in the interrupt controller, or switching on/off enhanced interrupt control if available.

WORKAROUND:
Do not clear an interrupt that is not being serviced by software while MSR[EE]=1. Software should disable interrupts (MSR[EE]=0) in the RCPU before clearing or masking any interrupt source from the USIU, IMB or external pin. For external interrupt request pins, it is recommended that edge triggered interrupts be used. No delay time is required before re-enabling interrupts (MSR[EE]=1). Refer to manual dated on or after May 2003.

CDR_AR_949 Customer Erratum QADC64E.CDR3IMB3_03_0B

QADC64E: Write CCW[EOQ] to 0x3F for the End of Queue

DESCRIPTION:
Using 0x7F as an EOQ (end of queue) causes a conversion of VRL to occur when the EOQ is reached. In single or continuous scan modes, this conversion is underway when the queue wraps back to the first word, and the first conversion is not performed. The result for the conversion of VRL gets written in the result space for the first conversion word. The queue and conversions then proceed on correctly.

WORKAROUND:
Always use 0x3F instead of 0x7F as an EOQ in the CCW for both Legacy and Enhanced modes of QADC64E operation. Refer to an updated Reference Manual dated after January 2003.

CDR_AR_915 Customer Erratum QADC64E.CDR3IMB3_03_0B

QADC64E: Conversion Clock cannot be shared between Master/Slave Modules

DESCRIPTION:
In a multiple QADC64E module configuration it is not possible to operate the modules on synchronous conversion clocks. The conversion clock of a module configured as Master cannot be input to the Slave .

WORKAROUND:
If simultaneous conversions are required, the customer can trigger both QADC64E modules SIMULTANEOUSLY using the external trigger inputs (ETRIG1 or 2), however, the conversions will not be performed SYNCHRONOUSLY. There is no workaround to allow synchronous QADC64E module operation. Do not set EXTCLK of the QADCMCR register to use the conversion clock of a master QADC (don’t set to 1). References to this feature are removed in updated Reference Manuals dated after January 2003.

CDR_AR_1125 Customer Erratum QADC64E.CDR3IMB3_03_0B

QADC64: Don’t change both BQ2 and MQ2 while Q2 is running

DESCRIPTION:
There exists a window of 2 system clocks in the conversion cycle during which a change to the Queue2 trigger mode (QACR2[MQ2]) along with a change to the Queue2 start location (QACR2[BQ2]) while Queue2 is active will cause the new value for BQ2 to be ignored. The new trigger mode takes place and conversions continue to be stored in Q2 as defined by the previous BQ2. Hence the locations following the new BQ2 will not contain results.

WORKAROUND:
Before changing the Queue2 mode, disable Q2 (MQ2=0b0000), then update MQ2 and BQ2.

CDR_AR_420 Customer Information QADC64E.CDR3IMB3_03_0B

QADC64: Don’t change BQ2 with a set of SSE2 without a mode change.

DESCRIPTION:
Changing BQ2 and setting SSE2 with no mode change will cause Q2 to begin but not recognize the change in BQ2. Further, changes of BQ2 after SSE2 is set, but before Q2 is triggered are also not recognized. All other sequences involving a change in BQ2 are recognized.

WORKAROUND:
Be sure to do mode change when changing BQ2 and setting SSE2. Recommend setting BQ2 first then setting SSE2. Refer to manual dated on or after May 2003.

CDR_AR_1048 Customer Information QADC64E.CDR3IMB3_03_0B

QADC64E: Sample Time is 8 QCLKs instead of 16 when CCW[IST]=1 in Enhanced Mode

DESCRIPTION:
If the QADC64E is in enhanced mode, the documentation says that the Input sample time is 16 QCLKs when CCW[IST]=1. Actually the Input sample time is 8 QCLKs. On the MPC561-564, enhanced mode is enabled by setting QADCMCR[FLIP]=1. The MPC565 is always in enhanced mode.

WORKAROUND:
Always expect the Input Sample time to be 8 QCLKs when CCW[IST]=1 when operating in enhanced mode. Refer to manual dated after January 2003.

CDR_AR_1151 Customer Erratum QSMCM.CDR3IMB3_04_0

SCI: TXD pin reverts to output immediately when SCCxR1[TE] is cleared

DESCRIPTION:
When the Transmiter Enable bit of the SCI Control Register 1 is cleared (SCCxR1[TE]=0), the Transmit Data pin, TXD, reverts immediately to general purpose output mode, and the pin will be driven high or low as determined by the PortQS Data Register, PORTQS. If the transmitter is not idle when SCCxR1[TE] is cleared, any data still being output on the TXD pin will be lost.

WORKAROUND:
Ensure SCCxR1[TE] is only cleared after the Transmit Complete bit of the SCI status Register is set (SCxSR[TC]=1).

CDR_AR_1041 **Customer Erratum** **READI.CDR3LBUSUBUS_02_1**

READI: Trace may show incorrect Addresses When Exception Relocation is used

DESCRIPTION:
When the BBC2 Exception relocation feature is used, the READI (Nexus) may report the incorrect addresses for exceptions that are relocated.

WORKAROUND:
Tools should expect either the relocated exception address or the non-relocated address for flow reconstruction. The following READI Nexus trace message may use either of these addresses as its base for next relative address. i.e. when the non relocated address was transmitted via Nexus, the correct relocated address could be used in calculating the relative address. In the case of the Enhanced External Interrupt Relocation feature, the tool may need to know the EEIR base address (EIBADR) and additional information to fully reconstruct the flow of instructions.The tool can either "fingerprint" each exception vector routine to identify the exact exception or require users to set a watchpoint at the non-relocated address (0xFFF0_0500).

CDR_AR_1050 **Customer Erratum** **READI.CDR3LBUSUBUS_02_1**

READI: Unexpected READI Overflow Error Messages

DESCRIPTION:
Under certain internal bus conditions the READI program trace may generate an overrun condition regardless of the state of the queue. This has been seen on miss-predicted branches that follow multi-cycle instructions and generate a branch message and a correction message in consecutive cycles. No incorrect information is generated by the READI, information currently in the queue is lost and this is indicated. Examples of multi-cycle instructions are reads and writes to IMB/USIU registers, floating point operations, integer multiply/divide, etc. It can also be seen when an exception message causes a correction message (cancels a previous branch) on the bus. This causes back-to-back U-bus transactions. If this occurs and the READI module was not ready for the first transaction it will also cause the trace overrun message. Either of these trace overrun conditions cause the Nexus message queue to be flushed.

WORKAROUND:
Either run the PPC in serialized mode or add 3 nop instructions between the instruction that sets the condition code flags and the branch. Eliminating U-bus and internal READI bus traffic will help minimize the occurrence of this issue. An additional option is to accept gaps in the reconstruction flow trace.

CDR_AR_1051 Customer Erratum READI.CDR3LBUSUBUS_02_1

READI: Trace can’t handle multiple change of flow without a show cycle

DESCRIPTION:
The READI program trace state machine can not handle multiple VF change of flow indications before the corresponding show cycle for the first change of flow appears on the U-bus. The READI matches change of flow indications to the show cycles and can only store one of each at a time. If two of either occur before the other, then incorrect information is sent in the Nexus trace packet.

WORKAROUND:
Run the PPC in serialized mode. If code cannot be run serialized (due to performance impact), reducing U-bus traffic will help in minimize the occurrence of this issue. Turn on SIUMCR[NOSHOW] and turn off L-bus data show cycles.

CDR_AR_1118 Customer Erratum READI.CDR3LBUSUBUS_02_1

READI: Program Flow Tracking Error Under Rare Condition

DESCRIPTION:
Under certain conditions, the program trace information output by the READI module may not accurately reflect the actual program flow. This condition requires ALL of the following conditions: 1) Either the BTB or code compression is enabled. 2) A double branch instruction sequence must occur where: the first branch is indirect and its condition is already determined or is non-conditional, the second branch is conditional and is miss-predicted and then corrected due to a long (execution time) instruction. And 3) the BBC must be held off the U-bus so that U-bus show cycle addresses are delayed.

WORKAROUND:
Either disable code compression and the BTB, or accept erroneous trace reconstruction under this rare condition.

CDR_AR_1061 Customer Erratum READI.CDR3LBUSUBUS_02_1

READI: New Feature added to allow queue mode to empty instead of flush

DESCRIPTION:
The READI flushes all information out of the queue on an overrun detection. The theory was trace could be restarted as soon as possible after the overrun. In practice, this information is valuable in determining the cause of the overrun for tuning what is getting traced.

WORKAROUND:
Tools may need to be modified to allow selection of the behavior of the READI queue being filled. A new register has been added to the Nexus memory map at address 0xB (11). See an updated Reference Manual (dated after November 2002) for a complete description.

CDR_AR_1060 Customer Information READI.CDR3LBUSUBUS_02_1

READI: Program Trace Sync Messages do not include sequential instruction count

DESCRIPTION:
Program Trace Sync Messages do not include sequential instruction count which can cause a loss of synchronization in some cases. This operation is in compliance with the IEEE-ISTO 5001-1999 standard which can lead to the loss of trace information when the program sync message is sent.

WORKAROUND:
The development tool can analyze the trace information along with the disassembled code to determine the I-CNT value in most cases. The tool may not be able to determine the exact number of instructions that were executed if the Program Trace Sync Message is sent due to an exception or interrupt.

CDR_AR_846 Customer Information READI.CDR3LBUSUBUS_02_1

READI: Synchronize the MCKI input clock to the MCKO output clock.

DESCRIPTION:
The READI module may not properly receive input messages if the input clock is not synchronous with the output clock.

WORKAROUND:
Synchronize the MCKI input clock to the MCKO output clock. Refer to manual dated on or after May 2003.

CDR_AR_698 Customer Information READI.CDR3LBUSUBUS_02_1

READI Input message requires 2 MCKI idle after READI Enabled.

DESCRIPTION:
If an input message is sent to the READI immediately after deassertion of RSTI_B (enabling READI) the READI may not recognize the start of the message and will ignore it. This behavior could cause the tool to get out of sync with the READI.

WORKAROUND:
Do not send an input message until at least 2 MCKI after READI is enabled, or better, until the DID message is received from the READI. Refer to manual dated on or after May 2003.

CDR_AR_1021 Customer Information READI.CDR3LBUSUBUS_02_1

READI: Manufacturer ID in Device ID register is incorrect

DESCRIPTION:
The manufacturer ID number in the READI Device Identification (DID) register is incorrect for Motorola’s assigned JEDEC value.

WORKAROUND:
Nexus Tools should not expect the JEDEC defined Motorola ID (0x0E), but instead should expect the documented value of 0x1C for the MID field in the READI Device ID Register.

CDR_AR_1059 Customer Information READI.CDR3LBUSUBUS_02_1

READI: 8-bit and some 16-bit data trace messages can’t be differentiated

DESCRIPTION:
8-bit data trace messages transmit the same message as 16-bit data trace messages with a most significant byte of 0. This is a result of a shortcoming in the IEEE-ISTO 5001-1999 standard.

WORKAROUND:
Any Trace Tool that supports data trace via an 8-bit wide Nexus port must determine the data size from the source code or code disassembly and not rely on the number of bits transmitted.

CDR_AR_1065 Customer Information READI.CDR3LBUSUBUS_02_1

READI: Queue entries to change from 16 to 32 on future revisions

DESCRIPTION:
The number of entries in the READI queue will increase from 16 to 32 on future revisions of READI. This change will not affect external tools, but should allow more information to be traced at the same time without queue overflows.

WORKAROUND:
None required.

CDR_AR_1066 Customer Information READI.CDR3LBUSUBUS_02_1

READI: Program trace requires all change of flow show cycles

DESCRIPTION:
A mode may be added to a future revision of the READI module to allow program trace to be done with the ICTRL field ISCTL equal to anything except 0b11 (no show cycles). Currently this field must equal 0b01 (show all change of flows). Operating with ISCTL==0b10 increases performance of the system. The only effect is that synchronization messages will no longer be transmitted with direct branch messages, so the sync request is held until the next indirect branch.

WORKAROUND:
Set ICTRL[ISCT_SER] to 0x5. Tools will need to be updated to support ICTRL[ISCT_SER]=0x6 mode of operation in the future.

CDR_AR_783 Customer Information READI.CDR3LBUSUBUS_02_1

READI input messages must be 4 MCKI apart.

DESCRIPTION:
READI input messages must be spaced by at least 4 MCKI input clocks.

WORKAROUND:
Wait for an output message response before sending in another input message.

CDR_AR_1144 Customer Erratum TOUCAN.CDR3IMB3_05_1A

TouCAN: Transmit buffers may freeze or indicate missing frame

DESCRIPTION:
If a received frame is serviced during reception of a second frame identified for the same MB (message buffer) and a new Tx frame is also initiated during this time, the Tx MB can become frozen and will not transmit while the bus is idle. The MB remains frozen until a new frame appears on the bus. If the new frame is a received frame, the frozen MB is released and will arbitrate for external transmission. If the new frame is a transmitted frame from another Tx MB, the frozen MB changes its C/S (control status word) and IFLAG to indicate that transmission has occurred, although no frame was actually transmitted. The frozen MB occurs if lock, unlock and initiate Tx events all occur at specific times during reception of two frames. The timing of the lock event affects the timing window of the unlock event as follows: Situation A) Rx MB is locked during the second frame. A frozen Tx MB occurs if: 1) Both of these events occur in either a-then-b or b-then-a order: a) A new transmission is initiated by writing its C/S between CRC6 (sixth bit of CRC field) and EOF7 (seventh bit of end of frame) of the second frame. b) The Rx MB is locked by reading its C/S after EOF6 of first frame and before EOF6 of second frame. 2) The Rx MB is unlocked between EOF7 and intermission at end of the second frame. Notice in this situation that if the lock/unlock combination happens close together, the lock must have been just before EOF6 of the second frame, and therefore the system is very close to having an overrun condition due to delayed handling of received frames. Situation B) Rx MB was locked before EOF6 of the first frame; in other words, before its IFLAG is set. This is a less likely situation but provides a larger window for the unlock event. A frozen Tx MB occurs if: 1) The Rx MB is locked by reading its C/S word before EOF6 of the first frame. 2) Both of these events occur in either a-then-b or b-then-a order: a) A new transmission is initiated by writing its C/S word sometime between CRC6 and EOF7 of the second frame. b) The Rx MB is unlocked between CRC6 and intermission at end of the second frame. Notice in this situation that if the unlock event occurs after EOF6, the first frame would be lost and the second frame would be moved to the Rx MB due to the delayed handling of received frames. Situation C) Rx unlocked during bus idle. A frozen/missing Tx occurs if: 1) An Rx MB is locked before EOF6 of an incoming frame with matching ID and remains locked at least until intermission. This situation would usually occur only if the received frame was serviced after reception of a second frame. 2) An internal arbitration period is triggered by writing a C/S field of an MB. 3) The locked Rx MB is unlocked within two internal arbitration periods (defined below) before or after step 2). 4) 0xC is written to the C/S of a Tx MB within these same two arbitration periods. This step is optional if 0xC was writin in step 2) above. Two internal arbitration periods are calculated as ((2 * number of MBs) + 16) IMB clocks. Additional Notes: 1) The received frames can be transmitted from the same node, but they must be received into an Rx MB. 2) When the frozen Tx MB’s IFLAG becomes set, an interrupt will occur if enabled. 3) The timestamp of the missing Tx will be set to the same timestamp value as the last reception before it was frozen. 4) If the user software locks the Rx MB before a frame is received, situation A can occur with a single received frame. 5) The issue does not occur if there were any additional pending Tx MBs before CRC6. 6) If multiple Tx MBs are initiated within the CRC6/EOF7 window (situation A and B) or two internal arbitration windows (situation C), they all become frozen.

WORKAROUND:
If received frames can be handled (lock/unlocked) before EOF6 of the next frame, situations A and C are avoided. If they are handled before CRC6, or lock times are below 23 CAN bit times, situation B is avoided. If these conditions cannot be guaranteed, situation A and B are avoided by inserting a delay of at least 28 CAN

bit times between initiating a tranmission and unlocking an Rx MB, and vice versa. Typically a system would use a mechanism to selectively add the necessary delay. For example, software might use a global variable to record an external timer value (the TouCAN timer can't be used as that would unlock) when initiating a new Tx or unlocking an Rx, and then add the required delay before performing second action. Situation C can be avoided by inserting a delay of at least two internal arbitration periods between writing 0xC and unlocking the locked Rx MB.

CDR_AR_1045 **Customer Information** **TOUCAN.CDR3IMB3_05_1A**

CAN: Bus Off recovery not ISO compliant

DESCRIPTION:
The Bus Off recovery is not ISO compliant on the FlexCAN and TouCAN modules. The ISO specification indicates that the CAN node should remain inactive until user intervention restarts it. The FlexCAN and TouCAN modules both include an automatic recovery mechanism for the Bus Off condition.

WORKAROUND:
The Bus Off condition interrupt should be enabled and an interrupt service routine implemented to disable the CAN. The user's software should then determine when the CAN should be re-activated.

CDR_AR_1142 **Customer Information** **TOUCAN.CDR3IMB3_05_1A**

TouCAN: Writing to an active receive MB may corrupt MB contents

DESCRIPTION:
Deactivating a TouCAN receive message buffer (MB) may cause corruption of another active receive MB, including the ID field, if the following sequence occurs. 1) A receive MB is locked via reading the Control/Status word, and has a pending message in the temporary receive serial message buffer (SMB). 2) A second frame is received that matches a second receive MB, and is queued in the second SMB. 3) The first MB is unlocked during the time between the CRC field and the 6th bit of end of frame (EOF) of the second frame. 4) The second MB is deactivated within 20 IMB clock cycles of the 6th bit of EOF, resulting in corruption of the first MB.

WORKAROUND:
Do not write to the Control/Status word after initializing a receive MB. If a write (deactivation) is required to the Control/Status field of an active receive MB, either FREEZE the TouCAN module or insert a delay of at least 27 CAN bit times plus 21 IMB clock cycles between unlocking one MB and deactivating another MB. This will avoid MB corruption, however frames may still be lost.

CDR_AR_627 Customer Information TPU3.CDR3IMB3_03_0A

TPU: (Microcode) Add neg_mrl with write_mer and end_of_phase

DESCRIPTION:
Incorrect generation of 50% duty cycle is caused by the command combination "write_mer, end". If the write_mer is the last instruction together with the end, this may create an additional match using the old contents of the match register (which are in the past now and therefore handled as an immediate match)

WORKAROUND:
Add neg_mrl together with the last write_mer and with end-of-phase. The negation of the flag overrides the false match which is enabled by write_mer and postpones the match effect by one micro-instruction. In the following micro-instruction the NEW MER value is already compared to the selected TCR and no false match is generated. The neg_mrl command has priority over the match event recognition, separating the write_mer and the end command. This gives enough time for the new MER to update before the channel transition re-enables match events.

CDR_AR_985 Customer Erratum USIU.CDR3UBUS_11_3

USIU: Do not use ORx[EHTR] with Dual Mapping

DESCRIPTION:
When an access is matched through the Dual Mapping registers (DMBR/DMOR), extended hold time (from a previous access region) or Burst length (from the new access region) may cause execution of wrong code.

WORKAROUND:
1) Do not set ORx[EHTR] while a dual mapping region is enabled. Or: 2) Do not enable dual mapping if an extended hold time is required for any memory in the system.

CDR_AR_909 Customer Erratum USIU.CDR3UBUS_11_3

USIU: Do not assert cr_b to abort pending store reservation access

DESCRIPTION:
If an external cancel reservation (cr_b) is asserted then a pending store reservation may show on the external bus. This may occur with or without transfer start (ts_b), and will terminate after 1 clock. If the region is in the memory controller of the chip generating the store with reservation, then no chip-select or other memory controller attributes will assert on the bus, and the memory will not be altered.

WORKAROUND:
1) Do not assert cr_b; or 2) following assertion of cr_b, external logic must prevent the erroneous store with reservation bus cycle from altering memory, and must not assert ta_b to terminate the erroneous store with reservation bus cycle.

CDR_AR_910 Customer Erratum USIU.CDR3UBUS_11_3

USIU: PITRTC Clock may not work when SCCR[RTDIV] is 0

DESCRIPTION:
The RCPU RTC/PIT may not count in all operating conditions if the ratio of System clock to the PITRTC Clock is less than or equal to 4. This may happen if the SCCR[RTDIV] is set to 0 and either 1) the part is running on the limp clock, or 2) the PLPRCR[MF] = 0 and both the System PLL and the PITRTC Clock use the same clock source (EXTCLK or the crystal oscillator).

WORKAROUND:
Keep the System Clock to PITRTC clock frequency ratio greater than 4. This can be done the easiest by setting the SCCR[RTDIV] to a value of 1 (reset value).

CDR_AR_984 Customer Erratum USIU.CDR3UBUS_11_3

USIU: Setting of SCCR[EBDF] may slow execution of code

DESCRIPTION:
If the SCCR[EBDF] is greater than 0 and the RCPU is running not serialized, the USIU may issue external read bus cycles that are not complete. The TS_B will assert with an address, but without a chip select or STS_B assertion. These cycles may cause a delay in execution of application code. These cycles will self terminate in 1 to 3 clocks, depending on the TS_B signal negation rate, defined by the external pull up strength and board capacitance.

WORKAROUND:
There are two possible workarounds: 1) In a program with critical timing, do not run from external memory with the SCCR[EBDF] set to a value greater than 0. Or 2) If external logic is used as a memory controller, define the logic to disregard these extra bus cycles.

CDR_AR_1134 Customer Erratum USIU.CDR3UBUS_11_3

USIU: RTC, DEC, TB and PIT counters may not count after PORESET or HRESET

DESCRIPTION:
The Real-Time Clock (RTC), Timebase (TB), Decrementer (DEC) and Periodic Interrupt Timer (PIT) may not count during the time between PORESET or HRESET negation and the time at which the PLL is programmed by application software and becomes locked to the target frequency.

WORKAROUND:
Always program the PLL to the target operating frequency (by changing the PLPRCR[MF] or PLPRCR[DIVF] bits) before referencing the TB, RTC, DEC, or PIT in an application after a PORESET or a HRESET.

CDR_AR_1158 Customer Erratum USIU.CDR3UBUS_11_3

USIU: Stop Time Base to write new value

DESCRIPTION:
The RCPU Time Base registers may become corrupted if a new value is written (with a mttbl or mttbu instruction) to the Time Base Upper (TBU) or Time Base Lower (TBL) registers while the Time Base clock is enabled in the Time Base Control and Status Register (TBSCR[TBE]=1).

WORKAROUND:
Disable the Time Base clock by clearing the Time Base Enable bit in the TBLSCR (TBSCR[TBE]=0) prior to any write to the TBU or TBL registers.

CDR_AR_287 Customer Erratum USIU.CDR3UBUS_11_3

USIU: System to Time Base frequency ratio must be greater than 4

DESCRIPTION:
The Time Base and Decrementer may not count properly if the ratio of the System clock to Time Base Clock is 4 or less.

WORKAROUND:
Keep the ratio of the System Clock to the Time Base clock above 4. Always set SCCR[TBS] = 1 when running on the limp clock. Refer to manual dated on or after May 2003.

CDR_AR_479 Customer Erratum USIU.CDR3UBUS_11_3

USIU: The MEMC does not support external master burst cycles

DESCRIPTION:
The MTS function of the Memory Controller (MEMC) will not work properly to control external devices when an external master initiates a burst.

WORKAROUND:
Use external logic to control devices which can have burst accesses from multiple masters. Refer to manual dated on or after May 2003.

CDR_AR_1135 Customer Erratum USIU.CDR3UBUS_11_3

USIU: Disable USIU burst in debug mode if READI R/W feature is used

DESCRIPTION:
If the RCPU is in debug mode and USIU burst mode is enabled (SIUMCR[BURST_EN]=1), READI R/W accesses may cause the RCPU to stop fetching instructions. The device must be reset before the RCPU will fetch and execute instructions.

WORKAROUND:
Use a BDM debugger or when using a Nexus debugger, disable the USIU burst when debugging (SIUMCR[BURST_EN]=0). Alternately, debuggers could disable the USIU burst when entering debug mode (and re-enable upon exiting debug mode) before using READI R/W accesses (i.e. with BDM messages), or the debugger could use BDM messages to perform all read/write accesses instead of using READI R/W accesses.

CDR_AR_1152 Customer Erratum USIU.CDR3UBUS_11_3

USIU: PORESET must always be asserted before the 2.6V supplies reach 0.5V

DESCRIPTION:
When exiting low power modes where the 2.6V supplies (VDD, QVDDL, NVDDL and VDDSYN) are off (Power-down and SRAM Standby modes), correct operation cannot be guaranteed if the 2.6V supplies are above 0.5V before PORESET is asserted. For example, the CALRAM or flash contents may be corrupted.

WORKAROUND:
Ensure PORESET is asserted before ramping the 2.6V supplies above 0.5V in any power-up sequence.

CDR_AR_867 Customer Erratum USIU.CDR3UBUS_11_3

USIU: Do not operate USIU burst on a burst-inhibited memory region

DESCRIPTION:
If the SIUMCR[BURST_EN] is set and a burst-inhibited code region (memory) is accessed (either by asserting bi_b pin or setting the BI bit in the corresponding ORx memory controller register) then the CPU will not execute code properly.

WORKAROUND:
Do not set the SIUMCR[BURST_EN] while trying to run code from an external non-burstable memory.

CDR_AR_1154 Customer Erratum USIU.CDR3UBUS_11_3

SIU: RTSEC register not documented; May affect the initial increment of the RTC

DESCRIPTION:
The Reference Manuals have an incomplete statement in the description of the Real-Time Clock register (RTC). In addition, the reserved Real-Time Clock Predivider Register (RTSEC) is not documented and may affect the initial increment of the RTC (seconds) counter. In the Reference Manual, the statement "A write to the RTC resets the seconds timer to zero." is incorrectly worded. A better statement that fully describes the this action would be: "A write of 0 to the RTC must be performed to reset the RTC (seconds) timer to zero." The RTSEC register is the predivider to the RTC (seconds) timer. The RTC, the RTSEC, and the Real Time Clock Alarm (RTCAL) registers, as well as the Real-Time Clock Enable [RTE] and the Real-Time Clock Source [4M] bits of the Real Time Clock Control and Status Register (RTCSC), are not affected by any reset (unchanged) and power up in a random state. This will cause the initial increment of the RTC to be between one system clock and 26143 PITRTCLK clocks. All of these bits and registers must be initialized the first time they are used or if known start points are required. RTSEC is implemented as an 18-bit counter that is left justified in a 32-bit word at address 0x2F_C228. The RTC Alarm itself is always disabled by reset, but RTCAL should be initialized to the desired alarm time, if required, before the Alarm Interrupt Enable (ALE) in the RTCSC is enabled (RTCSC[ALE]=0b1).

WORKAROUND:
To properly initialize the RTC timer to a completely known state with the most accurate startup, the following sequence must be used. 1) The Real-Time Clock Enable [RTE] and the Real-Time Clock Source [4M] bits must be configured in the Real-Time Clock Control and Status Register (RTCSC) after any true power on reset (if KAPWR is powered up) prior use of the RTC. The bits must be initialized since they are not affected by any reset and can be in a random state after the power up. For the most accuracy in the start value of the RTC, RTE should be cleared during this step. For the most accuracy in the start value of the RTC, RTE should be cleared during this step. 2) In order to guarantee that the first increment of the RTC register occurs in approximately 1 second (depending on whether a 4 MHz or 20 MHz crystal is being used), the reserved register RTSEC must also be initialized by writing either 0x0F42_4000 (if using a 4 MHz crystal) or 0x4C4B_4000 (if using a 20 MHz crystal). Alternately, RTSEC could be written to 0 and RTSEC will be updated automatically to these values, but will then immediately (within one PITRTCLK clock) increment the RTC when the RTC is enabled. 3) If a known starting point is desired (like 0), a value must be written to the Real-Time Clock register (RTC). 4) RTE bit should be then be set in the RTCSC register to enable RTC operationNote that the RTCSC, the RTC, and the RTSEC registers are locked following all resets and must be unlocked. The RTSEC can be unlocked by writing 0x55CC_AA33 to address 0x2F_C328.

CDR_AR_1113 Customer Information USIU.CDR3UBUS_11_3

USIU: Ensure HRESET/SRESET negation time is longer than 3 CLKOUT periods

DESCRIPTION:
If either HRESET or SRESET are externally re-asserted after a negation time of less than 3 CLKOUT clocks, and after an initial assertion of more than 512 CLKOUT periods, the MCU will remain in that reset until PORESET is applied. In the case of SRESET being the cause, then HRESET can also clear the locked condition. In the case of HRESET being the cause then SRESET will be held asserted internally by the MCU. The SWT (Software Watchdog Timer) will not clear the locked condition.

WORKAROUND:
Do not re-assert HRESET/SRESET within 3 CLKOUT periods of the previous HRESET/SRESET negation; Or apply PORESET.

CDR_AR_869 Customer Information USIU.CDR3UBUS_11_3

USIU: Do not enable BRx[SST] with SCCR[EBDF]>0

DESCRIPTION:
When EBDF>0 an external burst access with short setup timing will corrupt any USIU register load/store

WORKAROUND:
Do not enable BRx[SST] while EBDF>0. Refer to manual dated on or after MAy 2003.

CDR_AR_895 Customer Information USIU.CDR3UBUS_11_3

USIU: Do not assert TEA pin on fetch while SIUMCR[BURST_EN] bit set.

DESCRIPTION:
If USIU burst is enabled (SIUMCR[BURST_EN]) a transfer error indication (internal by Bus Monitor, Chip Select Region access attribute mismatch, or external by TEA signal) may cause the chip to stop executing until reset. In some cases the address read from the SRR0 register in Machine Check Exception handler may not precisely indicate the exact faulty bus address causing the exception. The RCPU will pre-fetch code from the memory address after the last address of the Chip Select region. When the pre-fetch causes a Transfer Error Acknowledge, either by the Bus Monitor or by a Supervisor/User attribute mismatch in the Memory Controller Region, the RCPU will hang up even if the pre-fetch was unnecessary for code execution.

WORKAROUND:
1. Do not assert TEA on the external bus for instruction fetch while the SIUMCR[BURST_EN] bit is set. 2. Do not place code at the 8 last words of a memory controller region while the SIUMCR[BURST_EN] bit is set. Refer to manual dated on or after May 2003.

CDR_AR_965 Customer Information USIU.CDR3UBUS_11_3

USIU: Program All Chip Selects with the same Burst Length

DESCRIPTION:
When the enhanced burst mode is activated in the USIU by setting SIUMCR[BURST_EN] bit and the burst length bits in the BRx[BL] of the active chip selects are programmed differently, the USIU may provide the wrong instruction to the RCPU core.

WORKAROUND:
Before programming the Enhanced Burst feature (SIUMCR[BURST_EN] = 1), make sure that all of the BRx[BL] bits of active chip selects are programmed to the same value; and do not load instructions from an external memory region that is not covered by any chip selects if any of the BRx[BL] bits is set to 1.

CDR_AR_1153 Customer Information USIU.CDR3UBUS_11_3

USIU: Sleep and Deep-Sleep modes require power to all 2.6V supplies

DESCRIPTION:
The reference manual table 8-5 Power Mode Descriptions has incorrect votlage requirements for Sleep and Deep-Sleep modes. Sleep and Deep-Sleep modes require that VDD, QVDDL, NVDDL and VDDSYN all remain powered-up.

WORKAROUND:
Maintain power to all 2.6V supplies during Sleep or Deep-Sleep low power mode.

CDR_AR_389 Customer Information USIU.CDR3UBUS_11_3

Little Endian modes are not supported

DESCRIPTION:
The little Endian modes are not functional.

WORKAROUND:
Do not activate little endian modes. The reference manual will be updated to remove all little endian mode references.

CDR_AR_1109 Customer Information USIU.CDR3UBUS_11_3

USIU: Do not write zero value to the SYPCR[BMT]

DESCRIPTION:
If the BMT (Bus Monitor Timing) field of the SYPCR register is written as zero, the external bus activity may not be available after SRESET assertion even if the bus monitor is disabled by BME bit. The MCU will assert TEA which will terminate any external bus cycle with a data error.

WORKAROUND:
Always write a non-zero value to the BMT field of the SYPCR register.

CDR_AR_1120 Customer Information USIU.CDR3UBUS_11_3

USIU: Interrupt Controller may generate vector 0x0 or has no request indication

DESCRIPTION:
When software masks interrupt requests, clears interrupt flags, stops or disables a module, or masks or changes interrupt logic in the UIMB or the USIU interrupt controller while MSR[EE] = 1, the interrupt request may disappear during or after the RCPU has acknowledged the external interrupt exception. It may also occur after re-enabling interrupts in the RCPU. This may cause the following: 1. When external interrupt relocation is enabled, the BBC may issue a vector offset of 0x0. 2. The SIPEND registers will not contain set bits, and if the service routine polls for a set bit it may hang. 3. The SIVEC register may contain a value of zero which could cause software to branch to an unmapped location.

WORKAROUND:
Follow the workarounds in AR_214, however, note that a time delay is required prior to re-enabling interrupts. Before clearing an interrupt related register, ensure that MSR[EE] = 0. Expect a vector offset of 0x0 if an interrupt is cleared or disabled while MSR[EE] = 1. This vector should be handled as if no interrupt has occurred, i.e. perform an RFI. After clearing an interrupt source, sufficient time must occur before re-enabling interrupts in the RCPU. This time should take longer than the time needed for a load of the same register that was just cleared. If unsure, include this load instruction before the instruction that re-enables interrupts in the RCPU. Refer to manual dated on or after May 2003.

CDR_AR_1137 Customer Information USIU.CDR3UBUS_11_3

USIU: RSR[LLRS] can be set even though no loss of lock reset has occurred

DESCRIPTION:
If the Loss of Lock Reset Enable bit in the PLPRCR register is set when the PLL Multiplication or Division Factor value is changed (PLPRCR[MF] or PLPRCR[DIVF]), the Loss of Lock Reset Status bit in the RSR register will be set (RSR[LLRS] = 1), even though a reset does not occur.

WORKAROUND:
Enable PLPRCR[LOLRE] after setting PLPRCR[MF] and PLPRCR[DIVF] values, or if PLPRCR[LOLRE] is already enabled, clear RSR[LLRS] after changing the value of PLPRCR[MF] or PLPRCR[DIVF].

CDR_AR_1155 Customer Information USIU.CDR3UBUS_11_3

SIU: TEA for external access must be negated within 1 system bus clock

DESCRIPTION:
When accessing external memory and the SIU bus monitor terminates the cycle with a Transfer Error Acknowledge (TEA), the SIU may produce unexpected results on subsequent accesses to the SIU address space, including SIU internal registers reads. This condition occurs when the TEA signal (pin) is not negated within 1 system clock of the time that the MCU stops asserting the TEA signal. While TEA is asserted by the MCU, it must be negated by the required external pull-up resistor. While the TEA negation requirement (1 clock) is documented in the Reference Manual, it may not be obvious that internally terminated accesses of an external memory space require the use of the external pull-up resistor. The value of the resistor should be small enough to pull the TEA line up to VIH level faster than one system clock and depends on the TEA line/board wire capacitance. Circuitry inside the MCU generates an actively driven TEA for accesses to internal non-existent memory spaces and does not rely on the external pull-up resistor to negate the cycle.

WORKAROUND:
Insure that the external pull-up resistor on the TEA pin is sufficient to negate TEA within one system clock. A value of 1K is recommended.