ÅAC Sirius Product Family Errata

Rev. K

Introduction

Purpose of document

This document details the errata in the ÅAC Sirius Breadboard and its manual, [RD1].

Revision log

Rev	Date	Change description	Prepared
A	2016-10-07	First issue	E. Zachrisson
B	2016-11-03	Update for release 0.7.0	M. Werner
C	2017-01-03	Update for release 0.8.0	M. Werner
D	2017-02-01	Update for release 0.9.0	M. Werner
E	2017-03-07	Update for release 0.10.0	M. Werner
F	2017-04-18	Update for release 0.11.0	M. Werner
G	2017-10-31	Update for release 1.0.0 Update for release 1.1.0	M. Werner
H	2018-03-06	Removed #1452, #1619, #1743, #1824, #1890, #1897, #1898, #1954, #1960, #2131, #2238 and #2493.	J. Viketoft
I	2018-04-16	Removed #1743, #1954 and #2488. Added #2577 and #2596. Update for release 1.3.0.	M. Werner
J	2018-06-25	Removed #1576, #2291, #2596 and #1879. Added #2598, #1475 and #2531.	M. Werner
K	2018-10-26	Update for release 1.4.0. Added #2602, #2669, #2651 #2131.	M. Werner

Reference documents

Rev	Document Ref	Document name
RD1	205065, rev K	Sirius Product User Manual

List of errata

Table 1 specifies which devices and what revisions that are affected by the errata described in this document.

Table 1 Affected units

Errata description	OBC-S	TCM-S w. o. Software	TCM-S w. software
System			
#2131 Measured ADC current input is incorrectly scaled on older boards	**All**	**All**	**All**
#2131 Measured ADC current input is incorrectly scaled on older boards **Description**: Due to a modified resistor, the measured ADC current input is precisely a factor 10 above the actual value. This only applies to older TCM-S and OBC-S EM/FM units with a sequence number below 306150 (produced before the year 2017). **Impact**: Measurement scale is incorrect. Maximum measurable input current is limited to 400mA for the TCM-S and 143mA for the OBC-S. **Suggested Workaround**: Account for a factor 10 when handling the measurement. #2669 Some TC bit errors not handled by HW		**All**	**All**
#2602 NVRAM uncorrectable multi-bit errors sometimes reported as correctable double-bit errors	**All**	**All**	**All**
#1061 Error injection mechanisms	**All**	**All**	**All**
TCM-S Core Application			
#2651 BD frame TC with invalid MAPID is not rejected			**All**
#2598 Potential invalid TM content at high rate on multiple VCs			**All**
#2531 Incorrect TM timestamp handling			**All**
#2431 TC reconfiguration may affect ongoing down			**All**
#2495 Mass memory uncorrectable read errors are not reported			**All**

#1475 RMAP read replies for fixed data not limited by requested size			**All**
GDB			
#1207 Writing and reading to non-32-bit-aligned addresses does not work	**All**	**All**	**All**
#1332 Breakpoints may change subsequent program behaviour	**All**	**All**	**All**
RTEMS			
#1896 CCSDS driver allows multiple opens for same device	**All**	**All**	

System

#2131 Measured ADC current input is incorrectly scaled on older boards

Description	Due to a modified resistor, the measured ADC current input is precisely a factor 10 above the actual value. This only applies to older TCM-S and OBC-S EM/FM units with a sequence number below 306150 (produced before the year 2017).
Impact	Measurement scale is incorrect. Maximum measurable input current is limited to 400mA for the TCM-S and 143mA for the OBC-S.
Suggested Workaround	Account for a factor 10 when handling the measurement.

#2669 Some TC bit errors not handled by HW

Description	Some TC frame bit errors are not properly handled on the HW level by the CCSDS RTL module.
Impact	Invalid TC frames may be passed to the SW level. TCM-S with the core application: Handling on the SW level will partially mitigate this, but bit errors in the TC packet data may cause the application to incorrectly report frame reception success via the COP-1 mechanism, and instead only report acceptance failure based on packet level validation.
Suggested Workaround	TCM-S without core application: Ensure additional TC frame validation on SW level. TCM-S with core application: Utilise packet acceptance reports to handle critical packet retransmission.

#2602 NVRAM uncorrectable multi-bit errors sometimes reported as correctable double-bit errors

Description	Some specific sequences of uncorrectable multi-bit errors detected in the NVRAM are incorrectly reported as correctable double-bit errors with invalid data when reading.
Impact	Reported NVRAM double-bit correction is not reliable.
Suggested Workaround	None.

#1061 Error injection mechanisms not implemented

Description	Error detection and recovery mechanisms are currently unverifiable outside of radiation testing for RAM, CPU and system flash, due to the lack of mechanisms for injecting errors.
Impact	Hard to verify customer error detection and recovery algorithms and error counting registers
Suggested Workaround	None

TCM-S Core Application

#2651 BD frame TC with invalid MAPID is not rejected

Description	BD frame type telecommands with an invalid MAPID (only 0 is defined as valid in the TCM-S core application) are not correctly rejected.
Impact	TC with invalid MAPID may be accepted incorrectly.
Suggested Workaround	None.

#2598 Potential invalid TM content at high rate on multiple VCs

Description	When sending/downloading different large telemetry chunks with multiple PUS packets on alternating virtual channels, the first header pointer and frame contents are wrong in the sent TM frames. Recovery occurs if the rate is reduced. This has been observed on an artificial test case running directly on the TCM-S and has not been observed in system-level tests.
Impact	Very high throughput of simultaneous live and stored telemetry may not be completely reliable.
Suggested Workaround	Avoid very high simultaneous rates of both live and stored telemetry.

#2531 Incorrect TM timestamp handling

Description	The TCM Core Application combines the full SCET readout and trigger timestamps to generate a full timestamp of when frames on VC0 are sent. The full SCET readout is done when the VC0 timestamp is requested and not at the instant when the timestamp was trigged.
Impact	If 256 seconds or more pass between the timestamp and request of the timestamp, the timestamp will be incorrect. If the timestamp and request of the timestamp occurs on different sides of a wrap of the low byte of the seconds field (that occurs every 256 seconds), the timestamp will incorrectly indicate a value that is 265 seconds in the future.
Suggested Workaround	Request VC0 at a period shorter than 256 seconds. If the timestamp indicates a time that is in the future, it can be assumed that it is incorrect due to a wrap event, and subtracting 256 seconds from the timestamp should yield the correct value.

#2431 TC reconfiguration may affect ongoing downlink

Description	Doing a reconfiguration of the telecommand path while a downlink is in progress may affect the ongoing downlink.
Impact	Telemetry handling may cease sending. Real-world tests indicate that this is unlikely to occur in practice, but it remains a possibility that have not yet been fully eliminated.
Suggested Workaround	Before doing a configuration of telecommand path, stop any ongoing downlinking.

#2495 Mass memory uncorrectable read errors are not reported

Description	The TCM core application mass memory handler does not propagate uncorrectable read errors.
Impact	The RMAP read reply status of mass memory read commands does not provide information if the read contained uncorrectable errors.
Suggested Workaround	Do not rely on mass memory RMAP read reply status for data consistency verification.

#1475 RMAP read replies for fixed data not limited by requested size

Description	The read size in RMAP read commands sent to the TCM core application does not limit the size of the data in the corresponding RMAP read reply.
Impact	If an RMAP read command is sent to the TCM core application and the read size is less than the size of the defined read reply size for the given address, the read reply will not be limited by the requested size. This is a deviation from the RMAP standard. The MMData address is not affected by this since the size is only defined by the requested size.
Suggested Workaround	Do not use RMAP read commands with a read size of less than the defined read reply size for an address.

GDB

#1207 Writing and reading to non-32-bit-aligned addresses does not work

Description	The debugger interface to the OpenRISC CPU does not support byte writing and reading on non-32-bit-aligned addresses
Impact	When using gdb single bytes cannot be manipulated nor observed.
Suggested Workaround	Align all writes and read on a 32 bit data word basis, i.e. step the address by 4 and write 32 bits at a time.

#1332 Breakpoints may change subsequent program behaviour

Description	When using breakpoints, the execution of code may show unreliable results around the location of the breakpoint, which is not representative of execution without breakpoints.
Impact	Breakpoints cannot in general be reliably used as a pause point for subsequent stepping or execution.
Suggested Workaround	Try using other debug methods, such as printouts.

RTEMS

#1896 CCSDS driver allows multiple opens for same device

Description	The RTEMS driver does not block multiple opens of the same device.
Impact	Multiple opens of the same device may lead to conflicts in data handling.
Suggested Workaround	Enforce single opens per device on application layer.