

SPULCKSTP

SPU Lockstep Comparator

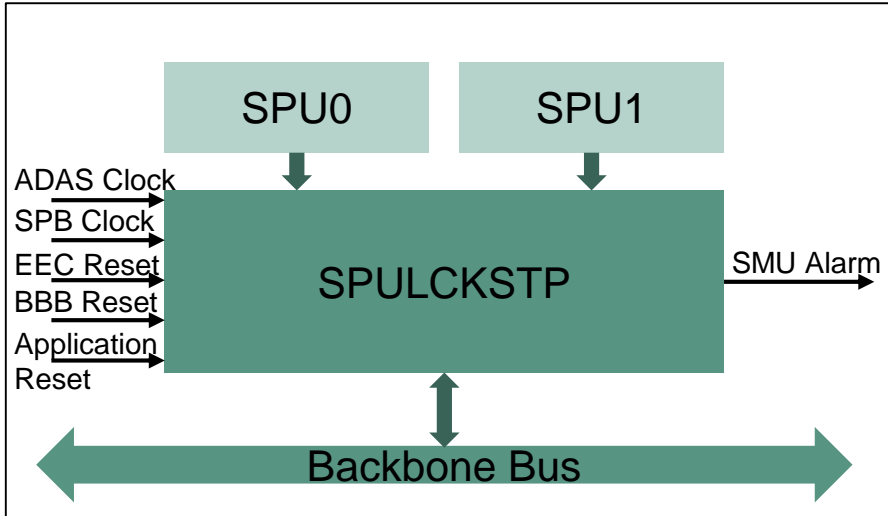
AURIX™ TC3xx Microcontroller Training
V1.0 2020-12



[Please read the Important Notice and Warnings at the end of this document](#)

SPULCKSTP

SPU Lockstep Comparator



Highlights

- > The SPU Lockstep Comparator module provides output comparators and difference detection for the two Signal Processing Units.
- > It provides the necessary logic to trigger the two SPUs synchronously and triggers an SMU alarm in case of any mismatch.

Key Features

Partial Lockstep Mode

Full Lockstep Mode

Continuous Self Test

Customer Benefits

- > Comparison of identical SPU configurations that process different data
- > Comparison of data signals
- > Validation of the SPULCKSTP correct operation

- › In this mode, only the control and addressing outputs of the two SPUs are compared.
- › It enables the SPUs to process different data providing that the SPU configurations are identical.
- › Both Radar Interfaces (RIFs) are active with identical configuration and each of them is feeding an SPU.
- › The RIFs are started synchronously, therefore the operation of SPUs is synchronized also.
- › Each SPU is processing the RIF data in an identical manner, therefore the control sequence is identical, but the data is different.
- › In case of a mismatch in the control sequence, an SMU alarm will be triggered and reactive actions can be taken.

SPULCKSTP

Full Lockstep Mode



- › In this mode, all SPU outputs, including the data are compared.
- › The use of Full Lockstep Mode requires both SPUs to be reading the same input data and writing to the same addresses in the Radar Memory in exactly the same clock cycles.
- › For examples, one RIF is active feeding the same data to both SPUs or the data is accessed from the Radar Memory (EMEM).
- › Each SPU is processing the same data in an identical manner, so both the control sequence and data output will be identical.
- › In case of a mismatch, an SMU alarm is triggered and reactive actions can be taken.

SPULCKSTP

Continuous Self Test

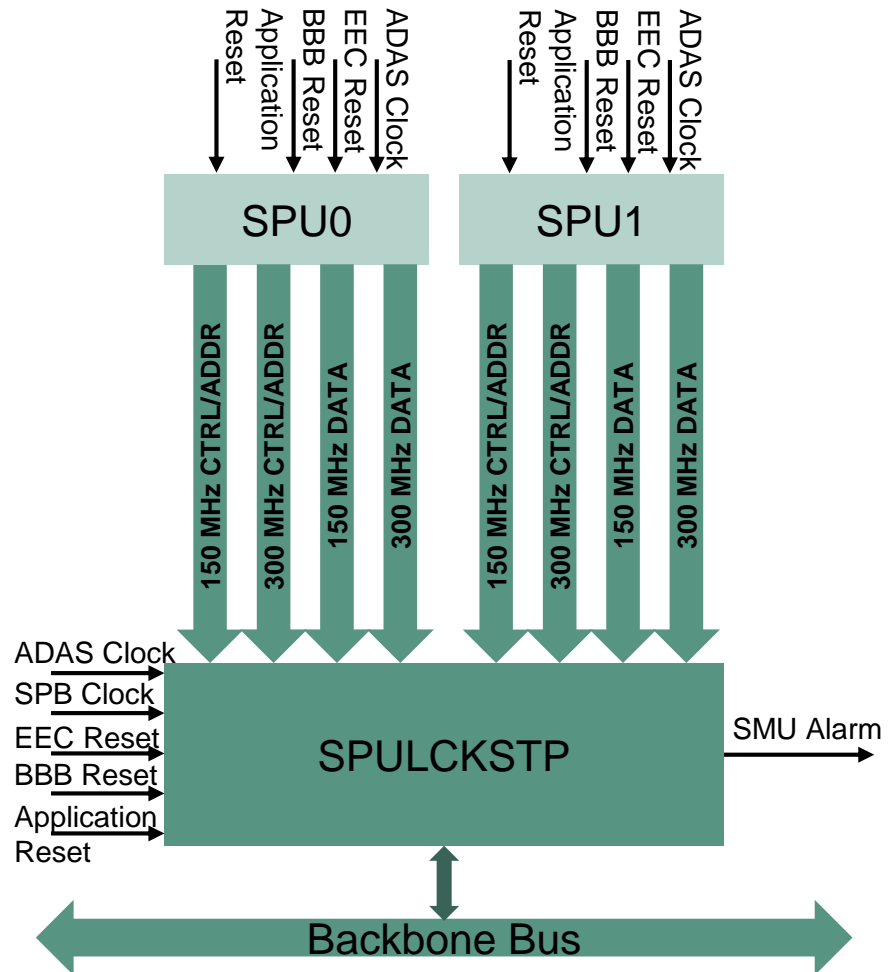


- › The SPULCKSTP has a continuously running background self test of the lockstep comparator.
- › The self test function injects faults and verifies that the fault is correctly detected by the monitoring logic.
- › In case of a self test failure being detected, the failure is reported to the Safety Management Unit for the appropriate reaction.
- › An additional safety measure is the duplication of any register of the lockstep block that cannot be directly monitored for correct operation by the self test function.

SPULCKSTP

System integration

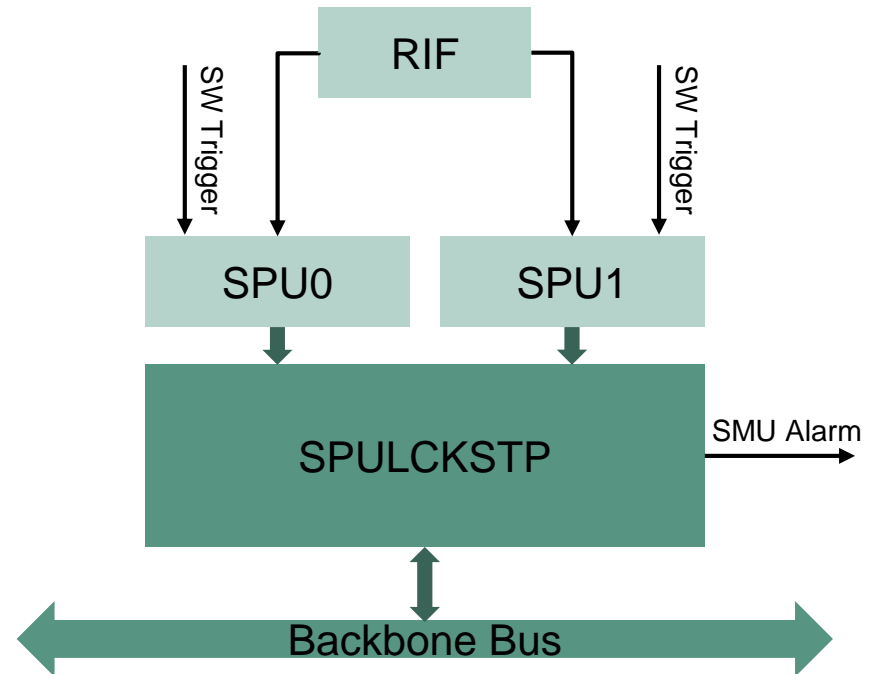
- > The SPULCKSTP implements four independent comparators, which allow the use of two clock domains of the SPU:
 - 300 MHz processing clock
 - 150 MHz BBB clock used for the interfaces to the Radar memory (EMEM)
- > For the Partial Lockstep, two comparators are needed, while for the Full Lockstep all four of them are used.
- > SPULCKSTP is also connected to the Safety Management Unit (SMU) and in case of mismatch an alarm is triggered. In the SMU, the response to the alarm can be configured.
- > The SPULCKSTP is only accessible through the Backbone Bus.



Application example

SPU synchronous triggering

- > In this application example, SPULCKSTP is configured in Full Lockstep Mode.
- > The RIF is feeding the same data to both SPUs.
- > In order to be able to use the Full Lockstep Mode, the SPU0 and SPU1 have to be triggered synchronously.
- > Using the Lockstep Control Registers, a SW trigger can be defined.
- > Since each SPU is processing the same data using the same control sequence, the data output should be identical.
- > In case a failure, an SMU alarm is triggered and a reaction can be defined (e.g. Application reset).



Trademarks

All referenced product or service names and trademarks are the property of their respective owners.

Edition 2020-12

Published by

Infineon Technologies AG
81726 Munich, Germany

© 2020 Infineon Technologies AG.
All Rights Reserved.

Do you have a question about this document?

Email: erratum@infineon.com

Document reference

AURIX_Training_2_
SPU_Lockstep_Comparator

IMPORTANT NOTICE

The information given in this document shall in no event be regarded as a guarantee of conditions or characteristics (“Beschaffenheitsgarantie”).

With respect to any examples, hints or any typical values stated herein and/or any information regarding the application of the product, Infineon Technologies hereby disclaims any and all warranties and liabilities of any kind, including without limitation warranties of non-infringement of intellectual property rights of any third party.

In addition, any information given in this document is subject to customer’s compliance with its obligations stated in this document and any applicable legal requirements, norms and standards concerning customer’s products and any use of the product of Infineon Technologies in customer’s applications.

The data contained in this document is exclusively intended for technically trained staff. It is the responsibility of customer’s technical departments to evaluate the suitability of the product for the intended application and the completeness of the product information given in this document with respect to such application.

For further information on the product, technology, delivery terms and conditions and prices please contact your nearest Infineon Technologies office (www.infineon.com).

WARNINGS

Due to technical requirements products may contain dangerous substances. For information on the types in question please contact your nearest Infineon Technologies office.

Except as otherwise explicitly approved by Infineon Technologies in a written document signed by authorized representatives of Infineon Technologies, Infineon Technologies’ products may not be used in any applications where a failure of the product or any consequences of the use thereof can reasonably be expected to result in personal injury.