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1 Scope of Document

This document lists the requirements applicable to the design of the HTMSS module of AUTOSAR.

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2 Conventions to be used

- The representation of requirements in AUTOSAR documents follows the table specified in [5].
- In requirements, the following specific semantics are used
- The representation of requirements in AUTOSAR documents follows the table specified in [TPS_STDT_00078].

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as:

- SHALL: This word means that the definition is an absolute requirement of the specification.
- SHALL NOT: This phrase means that the definition is an absolute prohibition of the specification.
- MUST: This word means that the definition is an absolute requirement of the specification due to legal issues.
- MUST NOT: This phrase means that the definition is an absolute prohibition of the specification due to legal constraints.
- SHOULD: This word, or the adjective "RECOMMENDED", mean that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
- SHOULD NOT: This phrase, or the phrase "NOT RECOMMENDED" mean that there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but the full implications should be understood and the case carefully weighed before implementing any behavior described with this label.
- MAY: This word, or the adjective „OPTIONAL", means that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item. An implementation, which does not include a particular option, MUST be prepared to interoperate with another implementation, which does include the option, though perhaps with reduced functionality. In the same vein an implementation, which does include a particular option, MUST be prepared to interoperate with another implementation, which does not include the option (except, of course, for the feature the option provides.)

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3 Acronyms and abbreviations

Abbreviation / Acronym:	Description:
ADC	Analog to Digital converter
BIST	Built In Self Test
BSW	Basic Software
ECU	Electronic Control Unit
ECUM	Electronic Control Unit Manager
HTMSS	Hardware Test Management startup shutdown
MCU	Micro Controller Unit
MSTP	Microcontroller Specific Test Package

Document ID 760: AUTOSAR_SRS_HWTestManager

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4 Functional Overview

The purpose of this module is to provide an infrastructure for integrating/transforming the microcontroller manufacturer specific start up and shutdown tests (e.g. BIST) test results/status within the AUTOSAR standard software platform.

The basic functionalities of this module includes collecting the test results/status from the MSTP, configure MSTP tests, start tests execution, provide the MSTP test status to EcuM module and application SWC to evaluate the test results for the system behavior.

The HTMSS module integrates on the level of the AUTOSAR BSW service layer. Below figure shows the functional integration of the HTMSS module in AUTOSAR software platform.
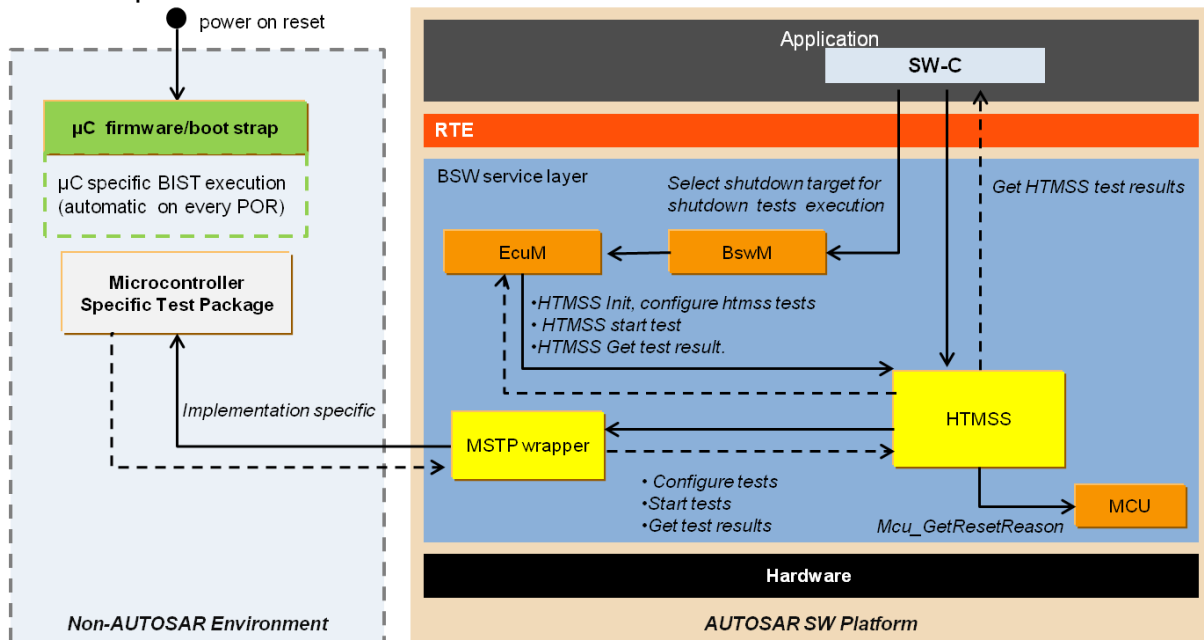

Figure 1 HTMSS interaction overview

The HTMSS module pre-integration requirements are:

- It shall be possible to run Microcontroller Specific Test Package (MSTP) startup and shutdown tests on the device under development
- The test results/status are available to the HTMSS module access
- It shall be possible to configure the MSTP start up and shutdown tests via HTMSS module

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4.1 Functional Requirements

4.1.1 Configuration requirements of HTMSS and MSTP tests

4.1.1.1 [SRS_HTMSS_00001] The HTMSS shall allow configuration of start up and shutdown tests

[

Type:	Valid
Description:	It shall be possible to configure the microcontroller specific start up and shutdown tests
Rationale:	It is necessary to be able to select and configure the tests based on HTMSS integrator requirements
Use Case:	The HTMSS configuration developer maps the microcontroller specific tests in the module configuration set
Dependencies:	[SRS_HTMSS_00002]
Supporting Material:	

](FS_HTMSS_00001)

4.1.1.2 [SRS_HTMSS_00002] The HTMSS shall allow the configuration of tests at individual hardware resource level

[

Type:	Valid
Description:	It shall be possible to test the individual hardware resources (e.g. selected via module / channel ID) on the given hardware
Rationale:	The given hardware may contain two hardware unit for the resource considered under test (e.g. 2 separate ADC hardware units). In this example, it may be possible to test/obtain result for each ADC unit individually.
Use Case:	The user may need to test all the hardware resources under test (used and unused), since certain microcontroller manufacturer may state that there is no guarantee that errors in unused hardware resource do not propagate or have influence on the rest of the microcontroller.
Dependencies:	
Supporting Material:	

](FS_HTMSS_00001)

4.1.2 Main functionalities of HTMSS

4.1.2.1 [SRS_HTMSS_00003] The HTMSS shall provide a service to collect the MSTP tests results

[

Type:	Valid
Description:	The HTMSS shall collect and provide the test results of all executed tests
Rationale:	The MSTP test results shall be accessible
Use Case:	Having the tests results details, shall convey the fault status of the microcontroller.
Dependencies:	[SRS_HTMSS_00001], [SRS_HTMSS_00002]
Supporting Material:	

](FS_HTMSS_00001)

4.1.2.2 [SRS_HTMSS_00004] The HTMSS shall provide a mechanism to share the test results with the application layer software

[

Type:	Valid
Description:	The current MSTP test results shall be provided to the application layer software during RUN time
Rationale:	The applicative software evaluates and react on critical errors to ensure the safe state (e.g. change from normal run time to a degradation mode)
Use Case:	The application software shall maintain the safe state based on the test results. E.g. a critical error judged according to the safety goals of the system may result in going to a safe state
Dependencies:	[SRS_HTMSS_00001], [SRS_HTMSS_00002], [SRS_HTMSS_00004]
Supporting Material:	

](FS_HTMSS_00001)

4.1.3 ECUM integration functionalities of HTMSS

Below HTMSS module functions shall be integrated in the ECUM module.

4.1.3.1 [SRS_HTMSS_00005] The HTMSS shall provide a service to configure/Initialise the MSTP tests during ECUM start up phase

[

Type:	Valid
Description:	It shall be possible to configure the start up and shutdown tests during the ECUM start up phase via HTMSS interface
Rationale:	Initialization is required to pre-initialize the variables of HTMSS and the MSTP tests
Use Case:	During MCU start up the hardware is initialised to execute MSTP tests
Dependencies:	[SRS_HTMSS_00001], [SRS_HTMSS_00002]
Supporting Material:	

](FS_HTMSS_00001)

4.1.3.2 [SRS_HTMSS_00006] The HTMSS shall provide a service to trigger the tests execution

[

Type:	Valid
Description:	It shall be possible to trigger the start up tests during the ECUM start up phase and shutdown tests during ECUM shut down phase via HTMSS provided service function
Rationale:	The start up tests shall be performed during ECUM start up phase and the shut down tests shall be performed during the ECUM shutdown phase
Use Case:	During ECU start up and shutdown phase the configured MSTP tests are triggered for its execution
Dependencies:	
Supporting Material:	

](FS_HTMSS_00001)

4.1.4 Fault Operation

4.1.4.1 [SRS_HTMSS_00007] HTMSS shall provide callout options to handle the test failure conditions

[

Type:	Valid
Description:	On test failure (critical error conditions) it shall be possible to initiate error hooks as callout functions.
Rationale:	e.g. React to test failure to initiate ECU reset, safe state etc…
Use Case:	The ECU software need to react to the test failures by preparing the system state (e.g. reset, halt, safe state)
Dependencies:	
Supporting Material:	

](FS_HTMSS_00001)

5 Requirements Tracing

Requirement	Description	Satisfied by
FS_HTMSS_00001	-	SRS_HTMSS_00001, SRS_HTMSS_00002, SRS_HTMSS_00003, SRS_HTMSS_00004, SRS_HTMSS_00005, SRS_HTMSS_00006, SRS_HTMSS_00007

Note: Currently HTMSS concept results are self contained hence, it does not refer other documents in AUTOSAR (i.e. FS_HTMSS_00001 is specified in TR_HWTestManagementIntegrationGuide).

6 References

6.1 Deliverables of AUTOSAR

[1] Layered Software Architecture

AUTOSAR_EXP_LayeredSoftwareArchitecture.pdf

[2] Technical report HTMSS

TR_HWTestManagementIntegrationGuide.pdf

[3] Specification of HTMSS

AUTOSAR_SWS_HTMSS.pdf

6.2 Related standards and norms

The ISO26262 part 5 chapter 8 requirements for hardware architecture metrics.